## WILDEBEESTKUIL PV GENERATION (PTY) LTD

# Basic Assessment (BA) for the Proposed Development of the 9.9MW Wildebeestkuil 2 Solar Photovoltaic (PV) Plant, 132kV Power line and associated infrastructure near Leeudoringstad in the North West Province, Maquassi Hills Local Municipality, Dr Kenneth Kaunda District Municipality

Draft Basic Assessment Report (DBAR)

**Department Reference Number:** **To be Allocated**
**Issue Date:** 11 June 2021
**Revision No.:** **1.0**
**Project No.:** 15962

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|---|---|
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| **Document Title:** | Basic Assessment (BA) for the Proposed Development of the 9.9MW Wildebeestkuil 2 Solar Photovoltaic (PV) Plant, 132kV Power line and associated infrastructure near Leeudoringstad in the North West Province, Maquassi Hills Local Municipality, Dr Kenneth Kaunda District Municipality: **Draft Basic Assessment Report (DBAR)** |
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| **Revision Number:** | **1.0** |
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| **For:** | SiVEST Environmental Division |

***Confidentiality Statement***

# KEY PROJECT INFORMATION

| Component | Description / Dimensions |
| --- | --- |
| Technology | Solar PV and Overhead Power Line |
| Generation Capacity of Solar PV Plant | Maximum of up to approx. 9.9MW |
| Capacity of Overhead Power Line | 132kV |
| Capacity of Switching Substation | More than 33kV but less than 275kV. Exact capacity of the proposed on-site switching substation will be determined and confirmed at a later stage. |
| Dimensions of PV Panels | ▪ Width: up to approx. 1134mm (≈1.1m)<br>▪ Length: up to approx. 2274mm (≈2.3m) |
| Area of Application Site | Approximately 115.540ha |
| Area of PV Array | Approximately 23.864ha[1] |
| On-site Switching Substation | ▪ One (1) new on-site switching substation with a capacity of more than 33 but less than 275kV. Exact capacity of the proposed on-site switching substation will be determined and confirmed at later stage;<br>▪ To connect proposed solar PV plant to 132kV power line;<br>▪ Located within Portion 13 of the Farm Wildebeestkuil No. 59;<br>▪ Total footprint: up to approx. 0.2003ha (i.e. 2 003m$^2$); and<br>▪ To contain transformers for voltage step up from medium voltage to high voltage. Direct Current (DC) power from the PV modules will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers. |
| Overhead Power Line | ▪ Preferred power line will link proposed solar PV plant to Leeudoringstad Solar Plant Substation (part of separate BA process with **Department Ref No.:** To be Allocated);<br>▪ Preferred power line corridor (Option 1) will traverse the following properties / farm portions:<br>o Portion 13 of the Farm Wildebeestkuil No. 59;<br>o Portion 14 of the Farm Wildebeestkuil No. 59;<br>o Remainder of Portion 5 of the Farm Wildebeestkuil No. 59;<br>o Remainder of Portion 7 of the Farm Leeuwbosch No. 44;<br>o Portion 35 of the Farm Leeuwbosch No. 44;<br>o Portion 36 of the Farm Leeuwbosch No. 44;<br>o Portion 37 of the Farm Leeuwbosch No. 44;<br>o Portion 38 of the Farm Leeuwbosch No. 44;<br>o Portion 42 of the Farm Leeuwbosch No. 44*; |

[1] Area where PV panels will be erected. It should be noted that although the PV array area will cover an area of up to approximately 23.864ha, the entire area will not be cleared as the PV panels only require small areas of vegetation to be cleared. It should be noted that less than 20ha of indigenous vegetation will ultimately be cleared (as determined by the specialist)

| Component | Description / Dimensions |
| --- | --- |
| | ○ Portion 43 of the Farm Leeuwbosch No. 44*;<br>○ Portion 44 of the Farm Leeuwbosch No. 44*;<br>○ Portion 45 of the Farm Leeuwbosch No. 44*; and<br>○ Portion 28 of the Farm Wildebeestkuil No. 59*.<br>***Properties / farm portions are road / rail servitudes***<br>▪ Length of approximately 2.49km for preferred power line (namely Option 1);<br>▪ Grid connection is to the Leeudoringstad Solar Plant Substation, which forms part of a separate BA process; Leeudoringstad Solar Plant Substation located on Portion 37 of the Farm Leeuwbosch No.44, approximately 2.2km to the north-east of application site;<br>▪ Type of power line towers being considered at this stage includes both lattice and monopole towers. Type of power line towers will be determined during the final design stages of the proposed development, prior to construction commencing;<br>▪ Height of power line towers will vary based on terrain, but will ensure minimum Overhead lines (OHL) line clearances with buildings and surrounding infrastructure<br>▪ At this stage it is anticipated that proposed power line towers will be located approximately 200m to 250m apart;<br>▪ Exact height and location of towers will be confirmed during the final design stages of power line design process; and<br>▪ Area to be cleared for proposed power line to be confirmed during the detailed design phase of the proposed development, when final design details have been confirmed and become available. |
| Rail / Road Crossings | ▪ Two (2) rail / road crossings required for proposed 132kV power line;<br>▪ To occupy areas of up to approx. 1.51ha and 0.54ha respectively; and<br>▪ Where transmission lines cross SANRAL and/or Transnet infrastructure, this will be done by means of underground cabling. At this stage it is anticipated that this will involve pipe jacking under these existing linear structures. |
| Guard House | ▪ One (1) permanent guard house; and<br>▪ Total footprint: up to approx. 0.0876ha (i.e. 876m$^2$). |
| Temporary Building Zone | ▪ One (1) temporary building zone; and<br>▪ Total footprint: up to approx. 0.2944ha (i.e. 2 944m$^2$). |
| Area Occupied by Buildings | Up to approximately 1.3807ha (i.e. 13 807m$^2$) |
| Width of Existing Internal Gravel Roads | ▪ Up to approx. 4m; and<br>▪ Existing internal gravel site roads will be used wherever possible. However, where required, new internal gravel roads may be constructed. |

| Component | Description / Dimensions |
|---|---|
| Length of existing internal roads (to be potentially upgraded) | ▪ Up to approx. 1.30km; and<br>▪ Final lengths however to be confirmed once contractor has been selected and the design is finalised. |
| Site Access | Access to the proposed development (solar PV plant application site and power line) will be via existing gravel roads which connect to the tarred R502 road. |
| Height of fencing | ▪ Approx. 2.1m high;<br>▪ Fencing will surround the entire proposed solar PV plant;<br>▪ Proposed 132kV power line will however not be fenced. |
| Type of fencing | Galvanised steel with electrification on top. |
| Area covered by fencing | Up to approximately 18ha |
| Boreholes and storage tanks | ▪ At this stage it is anticipated that existing boreholes will be utilised;<br>▪ Water will potentially be stored in temporary water storage tanks. This will be confirmed throughout the BA process; and<br>▪ The necessary approvals from the Department of Water and Sanitation (DWS) will be applied for separately (should this be required). |

The final design details of the proposed solar PV plant, 132kV power line and associated infrastructure will become available during the detailed design phase of the proposed development, before construction commences.

| WILDEBEESTKUIL 2 SOLAR PV PLANT: APPLICATION SITE | | |
|---|---|---|
| CORNER POINT COORDINATES (DD MM SS.sss) | | |
| POINT | SOUTH | EAST |
| W_01 (NW) | S27° 13' 13.897" | E26° 16' 53.432" |
| W_02 (NE) | S27° 13' 1.290" | E26° 17' 23.334" |
| W_03 (E) | S27° 13' 23.646" | E26° 17' 32.467" |
| W_04 (SE) | S27° 13' 54.700" | E26° 16' 58.386" |
| W_05 (SW) | S27° 13' 45.167" | E26° 16' 47.449" |
| CENTRE POINT COORDINATES (DD MM SS.sss) | | |
| POINT | SOUTH | EAST |
| CENTRE | S27° 13' 26.675" | E26° 17' 8.295" |

| WILDEBEESTKUIL 2 SOLAR PV PLANT: PV SITE AREA | | | |
|---|---|---|---|
| PHASE | AREA (HECTARES) | CENTRE POINT COORDINATES | |
| | | SOUTH | EAST |
| SITE AREA | 23.864[2] | S27° 13' 31.275" | E26° 17' 4.620" |

*A full list of all corner point coordinates for the PV development area is provided in* ***Appendix 9A****.*

[2] Area where PV panels will be erected. It should be noted that although the PV array site area will cover an area of up to approximately 23.864ha, the entire development area will not be cleared as the PV panels only require small areas of vegetation to be cleared. It should be noted that less than 20ha of indigenous vegetation will ultimately be cleared (as determined by the specialist)

| WILDEBEESTKUIL 2 SOLAR PV PLANT: SWITCHING SUBSTATION COORDINATES | | |
|---|---|---|
| **CENTRE POINT COORDINATES (DD MM SS.sss)** | | |
| **POINT** | **SOUTH** | **EAST** |
| CENTRE | S27° 13' 18.221" | E26° 17' 27.146" |

*On-site switching substation forms part of this proposed Basic Assessment (BA) application.*

| WILDEBEESTKUIL 2 SOLAR PV PLANT: TEMPORARY BUILDING ZONE COORDINATES | | |
|---|---|---|
| **CENTRE POINT COORDINATES (DD MM SS.sss)** | | |
| **POINT** | **SOUTH** | **EAST** |
| CENTRE | S27° 13' 26.560" | E26° 17' 7.465" |

| WILDEBEESTKUIL 2 SOLAR PV PLANT: GUARD HOUSE COORDINATES | | |
|---|---|---|
| **CENTRE POINT COORDINATES (DD MM SS.sss)** | | |
| **POINT** | **SOUTH** | **EAST** |
| CENTRE | S27° 13' 21.341" | E26° 17' 2.377" |

| WILDEBEESTKUIL 2 SOLAR PV PLANT: PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE | | | | |
|---|---|---|---|---|
| **CENTRE LINE COORDINATES (DD MM SS.sss)** | | | | |
| **CORRIDOR ALTERNATIVE** | **START POINT** | **MIDDLE POINT** | **END POINT (LEEUDORINGSTAD SOLAR PLANT SUB)** | **APPROX LENGTH (KM)** |
| Option 1 (Overhead Power Line) | S27° 13' 17.571" | S27° 12' 47.378" | S27° 12' 15.722" | 2.49 |
| | E26° 17' 27.090" | E26° 17' 47.372" | E26° 18' 24.623" | |

Refer to **Appendix 9A** for the full list of coordinates (including all the bending points of the proposed preferred power line corridor alternative, from the starting point to the finishing point).

# EXECUTIVE SUMMARY

**Introduction and Project Description**

Wildebeestkuil PV Generation (Pty) Ltd (hereafter referred to as 'Wildebeestkuil PV Generation') is proposing to construct a solar photovoltaic (PV) plant, 132kV overhead power line and associated infrastructure on a number of properties, approximately 4km east of the town of Leeudoringstad in the North West Province of South Africa (hereafter referred to as the 'proposed development') (**Department Ref No.:** To be Allocated) (**Figure i**). The proposed development will have a maximum generation capacity of up to approximately 9.9 megawatts (MW) and will be referred to as the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line. The proposed development is located within the Maquassi Hills Local Municipality, and the Dr Kenneth Kaunda District Municipality. The overall objective of the proposed development is to generate electricity (by capturing solar energy) to feed into the national electricity grid and 'wheel' the power to customers based on a Power Purchase Agreement (PPA).

At this stage, it is anticipated that the proposed solar PV plant will include PV fields (arrays) comprising multiple PV modules. The associated infrastructure would include, but not be limited to:

- Internal access roads;
- One (1) switching substation;
- One (1) permanent guard house; and
- One (1) temporary building zone.

A 132kV overhead power line is also being proposed to feed the electricity generated by the proposed solar PV plant into the national electricity grid. The proposed 132kV power line (part of this application) will connect to the proposed Leeudoringstad Solar Plant Substation (part of a separate BA process with **Department Ref No.:** To be Allocated).

It should be noted that this proposed solar PV and power line development (this application) forms part of one (1) of four (4) solar PV plants and associated infrastructure (including switching substations and 132kV overhead power lines) that are being proposed as part of a greater PV project near the town of Leeudoringstad in the North West Province, namely the Leeudoringstad Solar PV Project. In addition, one (1) 132/11kV on-site substation (namely the Leeudoringstad Solar Plant Substation) is also being proposed as part of the greater Leeudoringstad Solar PV Project (**Figure i**). The other proposed developments (solar PV, 132kV overhead power lines and 132/11kV on-site substation) which form part of the greater Leeudoringstad Solar PV Project include the following:

- 9.9MW Leeuwbosch 1 Solar PV Plant - **Reference Number:** To be Allocated (part of separate on-going BA process);
- 9.9MW Leeuwbosch 2 Solar PV Plant - **Reference Number:** To be Allocated (part of separate on-going BA process);
- 9.9MW Wildebeestkuil 1 Solar PV Plant and 132kV Power Line - **Reference Number:** To be Allocated (part of separate on-going BA process); and
- 132/11kV Leeudoringstad Solar Pant Substation - **Reference Number:** To be Allocated (part of separate on-going BA process).

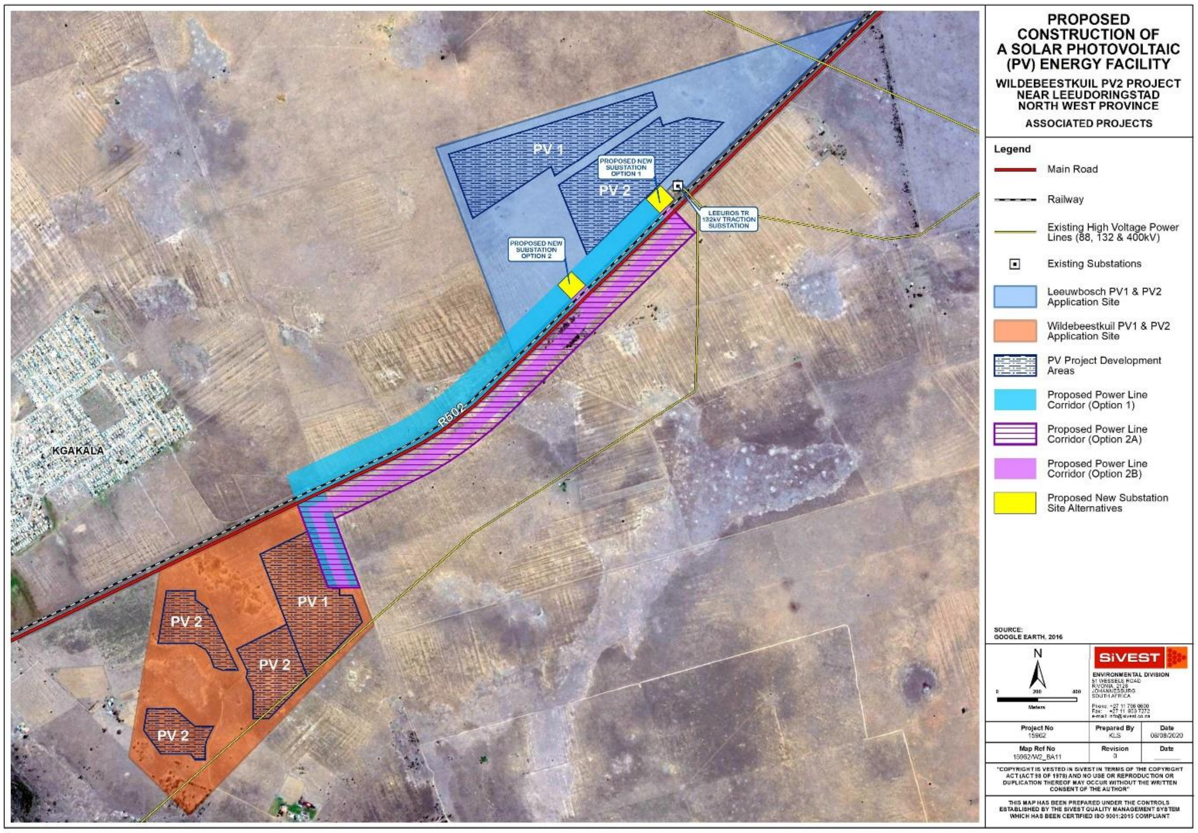


**Figure i:** Regional context of greater Leeudoringstad Solar PV Project

## NEMA EIA Regulations

In terms of the Environmental Impact Assessment (EIA) Regulations, which were published on 04 December 2014 and amended on 07 April 2017 [promulgated in Government Gazette 40772 and Government Notice (GN) R326, R327, R325 and R324 on 7 April 2017], various aspects of the proposed development are considered listed activities which may have an impact on the environment and therefore require authorisation from the North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT) prior to the commencement of such activities[3].

**Table i:** Listed activities in terms of the NEMA Regulations

| Activity No(s): | Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended |
|---|---|
| 1 (ii) | **GN R. 327 Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where–<br><br>(ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; |

[3] Since the electricity generated by the proposed solar PV plant (part of this application) will be purchased by a second party as part of a Power Purchase Agreement (PPA) and will NOT form part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the proposed construction and operation of the solar PV plant project requires EA from the provincial competent authority, namely the NW DEDECT

| | |
|---|---|
| 11 (i) | **GN R. 327 Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity—<br><br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. |
| 12 (ii) (a) (c) | **GN R. 327 Item 12:** The development of:<br><br>ii) infrastructure or structures with a physical footprint of 100 square metres or more;<br>where such development occurs-<br><br>(a) within a watercourse;<br>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. |
| 19 | **GN R. 327 Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; |
| 27 | **GN R. 327 Item 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—<br><br>(i) the undertaking of a linear activity; or<br>(ii) maintenance purposes undertaken in accordance with a maintenance<br>management plan. |
| 28 (ii) | **GN R. 327 Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:<br><br>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; |
| 48 (i) (a) (c) | **GN R. 327 Item 48:** The expansion of-<br><br>(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;<br>where such expansion occurs—<br><br>(a) within a watercourse; or<br>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; |
| 56 (ii) | **GN R. 327 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –<br><br>(ii) where no reserve exists, where the existing road is wider than 8 metres. |
| **Activity No(s):** | **Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended** |
| 12 h. vi. | **GN R. 324 Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation.<br><br>**h. North West**<br>vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland |
| 18 h. ix. | **GN R. 324 Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer-<br><br>**h. North West**<br>ix. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland |

**Details of alternatives**
No site alternatives for the proposed developments are being considered as the placement of solar PV installations and power lines is dependent on several factors, all of which are favourable at the proposed site location. This included land availability, topography, environmental sensitivities, distance to the national grid, solar resource site accessibility and current land use.

No design or layout alternatives for the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) have been considered or assessed as part of the current BA process. Design and layout alternatives were considered and assessed as part of a previous BA process that was never completed, and as such the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) have been placed to avoid site sensitivities identified as part of a previous BA process as well as the current BA process. Specialist studies were originally undertaken in 2016 and the current layout being proposed was selected based on the environmental sensitivities identified as part of these studies in 2016. All specialist studies which were undertaken in 2016 were updated in 2020 (including ground-truthing, where required) to focus on the impacts of the layout being proposed as part of the current BA application. The results of the updated specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or 'no-go' areas.

Three (3) power line corridor route alternatives for the proposed 132kV power line were identified and assessed by the respective specialists as part of the current BA process. These alternatives essentially provide for different power line route alignments contained within an assessment corridor. It should be noted that the power line corridor route associated with the solar PV plant is intrinsically linked to the Leeudoringstad Solar Plant Substation site (part of a separate on-going BA process). The Leeudoringstad Solar Plant Substation site which was chosen as 'preferred' by the respective specialists as part of that separate BA process therefore informed the connection point for the power line corridor being proposed as part of this BA application. All power line corridor route alternatives were however extensively investigated and comparatively assessed (refer to **Section 9.6**).

**Summary of specialist assessments**
The following assessments were conducted as part of the BA process in order to identify and assess the issues associated with the proposed development:

- Desktop Agricultural and Soils Compliance Statement;
- Surface Water Impact Assessment;
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Heritage Impact Assessment (including Palaeontology, Archaeology & Cultural Landscape);
- Palaeontological Impact Assessment;
- Desktop Social Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Terrestrial Ecological Impact Assessment; and
- Visual Impact Assessment.

These studies were undertaken to inform the impact assessment of the proposed development. The specialists assessed the entire application site and power line corridors as part of their respective assessments and also focused on specific impacts of the proposed PV development area, power line corridor alternatives and solar PV plant infrastructure in detail.

**Table ii:** Summary of Specialist findings

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| **Desktop Agriculture and Soils - Appendix 6A** | Soil information was obtained for the solar PV plant and 132kV power line proposed near the town of Leeudoringstad in the North West Province. The data source was existing 1:250 000 scale land type information and indicates that the soils are mostly shallow, with much rock.<br><br>The construction of the solar PV plant, 132kV power line and associated infrastructure at the chosen site will have minimal impact on the loss of agricultural land, due to the small percentage of high potential agricultural land indicated by the Land Type survey information.<br><br>The potential impact on the loss of agricultural land will be low, and there is not expected to be any significant soil erosion hazard, if standard mitigation measures are followed.<br><br>As far as the soils are concerned, **as long as the proposed mitigation measures are adhered to**, there should not be any significant cumulative impacts occurring, as any impact on agricultural potential will be contained to the specific site itself. Cumulative soil-related impacts are thus expected to be low. | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Loss of agricultural land | Medium Negative | Medium Negative |
| | | Soil erosion (wind or water) caused by surface disturbance | Medium Negative | Low Negative |
| | | **Operational Phase** | | |
| | | Loss of agricultural land | Medium Negative | Medium Negative |
| | | Soil erosion (wind or water) caused by surface disturbance | High Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Loss of agricultural land | Medium Negative | Medium Negative |
| | | Soil erosion (wind or water) caused by surface disturbance | Medium Negative | Low Negative |
| | | **Cumulative** | | |
| | | Proposed project can contribute to overall loss of soil health and productivity | Medium Negative | Low Negative |
| **Surface Water - Appendix 6B** | Ultimately, it was found that there are two (2) Artificial Depression Wetlands, one (1) Drainage Line and one (1) Natural Depression Wetland within the study site and the proposed power line corridors.<br><br>A present ecological status (PES) determination was undertaken for Natural Depression Wetland 1. Accordingly, the PES of Natural Depression Wetland 1 was categorised to have an overall PES – D (Largely Modified).<br><br>The wetland ecosystem services and environmental sensitivity and importance were assessed and provided for Artificial Depression Wetlands 1 and 2 as well as Natural Depression Wetland 1. These | **Pre-Construction Phase** | | |
| | | Impacts associated with the Temporary Building Zone within 55m to Artificial Wetland 1 | Low Negative | Low Negative |
| | | **Construction Phase** | | |
| | | Vehicle and machinery degradation - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 | Medium Negative | Medium Negative |
| | | Human degradation to fauna and flora associated with the surface water resources - Natural Depression | Low Negative | Low Negative |

<table>
<tr><th>Specialist</th><th>Key Findings</th><th>Impacts</th><th>Impact pre-mitigation</th><th>Impact post-mitigation</th></tr>
<tr><td rowspan="10"></td><td rowspan="10">assessments were undertaken to determine their functionality and sensitivity. With regards to the potential wetland ecosystems services provided by each wetland, Artificial Depression Wetland 1 scored highest was in terms of sediment trapping followed closely by phosphate trapping, erosion control and flood attenuation. Artificial Depression Wetland 2 scored highest in terms of erosion control, with other potential wetland ecosystem services provided at a slightly lower degree including sediment trapping, phosphate trapping, flood attenuation, maintenance of biodiversity and toxicant removal. For Natural Depression Wetland 1, the potential wetland ecosystem service provided which scored highest includes sediment trapping. The sediment trapping function of this wetland can be said to be one of the primary functions of an endorheic wetland. Other potential wetland ecosystem services provided at a slightly lower degree include phosphate trapping and erosion control. This is closely followed by toxicant control and nitrate removal. Other potential wetland ecosystem services which could potentially be provided, which scored to a lesser degree, include flood attenuation, education and research, tourism and recreation, natural resources and maintenance of biodiversity.<br><br>The EISC for the surface water resources were determined. The results were as follows:<br>▪ Natural Depression Wetland 1 was categorised as a Class C (Moderate);<br>▪ Artificial Depression Wetland 1 was categorised as a Class C (Moderate); and<br>▪ Artificial Depression Wetland 2 was categorised as a Class B (High).<br><br>The Department of Water Affairs (DWA) (2014) database shows that the nearby Leeudoringspruit is classified as having a PES: B (Largely natural), EI: Moderate and ES: Moderate. This watercourse will not be directly impacted by the proposed</td><td>Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td></td><td></td></tr>
<tr><td>Degradation and removal of soils and vegetation associated with the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td>Increased storm water run-off, erosion and increased sedimentation impacting on the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Operational Phase</td></tr>
<tr><td>Vehicle damage to the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td>Impermeable and hardened surfaces creating accelerated run-off, consequent erosion and sedimentation - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Decommissioning Phase</td></tr>
<tr><td colspan="3">Should the proposed development need to be decommissioned, the same impacts as identified for the construction phase of the proposed development can be anticipated. Similar potential impacts are therefore expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts.</td></tr>
<tr><td colspan="3">Cumulative</td></tr>
<tr><td colspan="3">No impact assessment has been undertaken, as no cumulative impact is likely. Direct and indirect surface water impacts will be negligible. No wetlands will be lost as a result of the renewable energy projects proposed. The cumulative loss of wetlands is therefore negligible. It is not expected that the cumulative impacts</td></tr>
</table>

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
| --- | --- | --- | --- | --- |
| | development as is it located approximately 150m from the study site.<br><br>The functional assessments undertaken were used to inform a 50m buffer zone that was applied to the identified surface water resources.<br><br>In terms of potentially applicable environmental and water related legislation, several listed activities and water uses have been identified that are likely to be applicable to the proposed development. Accordingly, in terms of National Environmental Management Act (1998) and the EIA Regulations (2014), Activities 12 and 19 of Government Notice 983, and Activity 14 of Government Notice 985 have been identified as being applicable based on the scenarios presented in the sub-section. With respect to the National Water Act (1998), water uses (c) and (i) are also applicable where stipulated. The aforementioned identified environmental listed activities and water uses should however be confirmed in consultation with the relevant government departments.<br><br>Foreseen potential negative impacts in terms of the pre-construction, construction, operation and decommissioning phases of the proposed development were identified and assessed. Mitigation measures have been stipulated and must be included and implemented as part of the respective Environmental Management Programme (EMPr) for the proposed development.<br><br>It is not anticipated that the proposed development will need to be decommissioned. However, should this need to take place, all relevant identified potential construction impacts will be applicable and the relevant mitigation measures must be implemented as far as practically possible and where applicable. | will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost. | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | For cumulative potential impacts, surrounding renewable energy projects are located a relatively considerable distance from the proposed developments' study site and direct and indirect surface water impacts will be negligible. In consideration of the nearby Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant (part of separate respective BA processes), indirect impacts in terms of increased run-off, sedimentation and erosion may potentially be expected. However, none of the surface water resources appear to be hydrologically connected. Downstream impacts are therefore unlikely. Additionally, aside from the distance (approximately 1km) which separates the two renewable energy developments, the R502 and existing railway line acts as a barrier between the two project sites. In light of the above, it is not expected that the cumulative impacts will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost.<br><br>Finally, in terms of final specialist recommendations, it is strongly recommended that the preferred power line option (namely Option 1) is presented as the preferred alternatives for the environmental authorization process. Where this is not possible, the more intensive mitigation measures stipulated will need to be implemented where the necessary environmental authorization and water use license is obtained.<br><br>The existing site access roads currently routes through Drainage Line 1 and is in the buffer zone of Artificial Depression Wetland 1 on the study site. It is highly recommended that the access route is re-aligned outside of all the delineated surface water resources as well as the associated buffer zones where possible. Should this not be possible, the more intensive mitigation measures stipulated will need to be implemented where the necessary environmental authorization and water use license are obtained. Please note that the crossing of the wetland by the road is not a fatal flaw. | | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | The risk assessment matrix is attached as Appendix D of the Surface Water Impact Assessment Report (**Appendix 6B**), and notes that all risks are considered Low, and appropriate mitigation measures have been proposed.<br><br>Finally, all the identified triggered activities and water uses identified should be confirmed with the relevant government authoritative departments.<br><br>Based on the findings above, with the implementation of the control and mitigation measures stipulated herein, it is the opinion of the specialist that the proposed development may proceed. | | | |
| **Avifauna (including pre-construction monitoring) - Appendix 6C** | The proposed Wildebeestkuil 2 Solar PV Plant and 132kV Power Line will have a medium negative impact on priority avifauna, which can be reduced to low with appropriate mitigation. The development is supported provide the mitigation measures listed in this report is strictly implemented. No fatal flaws were discovered in the course of the investigations.<br><br>The cumulative impact of the facility on priority avifauna within a 50km radius around the proposed development (considering all current impacts on avifauna) is assessed to be low, mainly due to the small size of the proposed development | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure | Medium Negative | Medium Negative |
| | | **Operational Phase** | | |
| | | Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure | Medium Negative | Low Negative |
| | | Entrapment of large-bodied birds in the double perimeter fence | Low Negative | Low Negative |
| | | Mortality of priority species due to collisions with the 132kV grid connection | Low Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Displacement of priority species due to disturbance associated with de-commissioning of the PV plant and associated infrastructure | Low Negative | Low Negative |
| | | **Cumulative** | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | | Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and grid connection and entrapment in fences | Medium Negative | Low Negative |
| **Heritage (including Palaeontology, Archaeology & Cultural Landscape) – Appendix 6D** | The fieldwork completed for the HIA in September 2016 and updated in April 2021, identified seven (7) heritage resources, a recent wind pump and a cement dam.<br><br>The design process and methodology followed by the developer for these projects enabled the heritage assessment to provide input into the proposed layouts before the impact assessment. This resulted in cognisance being taken of the positions of the heritage sites and thus the reduction of impacts at an early design phase. Analysis of the impact matrix tables will reflect this.<br><br>The comparative assessment of the alternatives has shown that an overall low impact on heritage is foreseen, as all the heritage resources identified are of a low to medium significance. None of the heritage resources will be impacted by any of the proposed layouts.<br><br>***Grid corridor***<br>An assessment of the aerial photographs and historical imagery has revealed possible heritage features. A field survey identified no heritage features in the alignments. There is no preference to any of the OHL corridor alternatives.<br><br>***Mitigation measures***<br>The following mitigation is suggested to reduce impacts on heritage resources:<br>▪ Features WB02-WB08 must be considered no-go areas with a **30-meter** buffer for the burial ground at **WB08** and a **20-meter** buffer for the other sites. | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | N/A | | |
| | | **Decommissioning Phase** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |
| | | **Cumulative** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | ▪ If heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.<br><br>***Impact Statement***<br>The overall impact of the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line, on the heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.<br><br>Based on the comparative assessment of alternatives undertaken, it is the specialist's opinion that no preference for either of the power line corridor route alternatives exist as all three (3) will have the same low impact on heritage resources. | | | |
| **Palaeontology – Appendix 6D** | The development footprint is underlain by the Allanridge Formation (Ventersdorp Supergroup). The Ventersdorp Supergroup characterise a major occurrence of igneous extrusion that is associated with fracturing of the Kaapvaal Craton approximately 2.7 Ga (billion years) ago. The Late Archaean Allanridge succession is almost fully composed of resistant-weathering, dark green lavas and associated pyroclastic rocks.<br><br>***Impact Statement***<br>The ancient basement rocks, including the Allanridge Formation, are not known to be fossiliferous and thus there is no possibility that the rocks of the Allanridge Formation will contain any fossils. **Thus, the construction and operation of the Wildebeestkuil 2 Solar PV Plant & 132kV Power Line may be authorized as the whole extent of the development footprint is not considered as sensitive in terms of palaeontological resources**.<br><br>As mentioned, three (3) power line corridor route alternatives for the proposed 132kV power line were identified and assessed. | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Impact on palaeontological resources as a result of site clearance and excavations | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | N/A | | |
| | | **Decommissioning Phase** | | |
| | | Impact on palaeontological resources as a result of site clearance and excavations | Low Negative | Low Negative |
| | | **Cumulative** | | |
| | | Impact on palaeontological resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | These alternatives essentially provide for different power line route alignments contained within an assessment corridor. The three (3) power line corridor route alternatives were considered during the site visit and impact assessment. Based on the comparative assessment of alternatives undertaken, the alternatives will result in an equal impact and none if preferred above the other. | | | |
| **Desktop Social – Appendix 6E** | A recognition of the potential of renewable energy projects to stimulate the local economy, create new jobs, and contribute to sustainable development, is evident.<br><br>The policy review indicates that from national and local levels, renewable energy projects are key to sustainable development of the national economy. In fact, one renewable project has been approved for the development and will be located 10km from the proposed project site.<br><br>The economy and communities of Maquassi Hills need economic injection, particularly considering the decline and stagnation of the economy since 2009, the poor access to basic services, and heavy reliance of the entire economic base of the municipality on the purchasing power of its households. It is clear that the economy of Maquassi Hills needs to be diversified and the installation of the solar PV plant in the area will offer such an opportunity.<br><br>Furthermore, this project could inspire and stimulate the development of similar projects in the area, contributing to the growth of the utilities sector as well as stimulating economic development further. The project will also have the potential to improve the standard of living of the local communities and slightly decrease unemployment in the area.<br><br>During the site visit and interviews with the potentially affected land owners, directly or indirectly, no concerns were raised with respect to the project. The proposed solar PV plant will sterilise some agricultural land currently used for commercial livestock farming, | **Pre-construction Phase** | | |
| | | Availability of sufficient local construction materials of PV Plant | High Negative | Low Positive |
| | | **Construction Phase** | | |
| | | Increase in production of the national and local economies due to project capital expenditure | Low Positive | Low Positive |
| | | The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure) | Low Positive | Low Positive |
| | | **Operational Phase** | | |
| | | The solar PV plant and 132kV power line will increase the size of the local utility sector and stimulate economic production through multiplier effects | Low Positive | Low Positive |
| | | Creation of jobs to support operation and maintenance of the plant | Low Positive | Low Positive |
| | | Generated electricity will improve the security of electricity in the local municipality and increase government's revenue and service delivery | Low Positive | Low Positive |
| | | **Decommissioning Phase** | | |
| | | Land demarcated for the solar PV plant and 132kV power line will be sterilised and all current activities | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | but it will not impact on the production of the farm; therefore, no negative effects on the current economic activities in the area are envisaged.<br><br>Overall, the project will require an investment of about R135 million and create between 10 to 60 temporary jobs during various stages of the construction period. Thirty to 200 people will be working on site at different stages during the construction phase. Many of these jobs will be filled by labourers from the local communities, which will be highly beneficial considering the high unemployment rate observed in the local municipality.<br><br>During operations, the project will employ only six people. Although these jobs will increase the overall employment in the municipality they will not make a notable positive effect on the high unemployment rate in the area. The major benefit of the project though will be in the improved electricity security that the municipality will gain as the electricity generated by the plant will be supplied directly to the municipality and then to its customers.<br><br>The local government will also experience an increase in its earnings through the collection of taxes and rates from the operating plant, which in turn will be spent on providing services to the residents and business. Furthermore, the project will contribute to the increase in the size of the local utilities industry.<br><br>With respect to the site layout of the PV plant, there are no alternative site layouts proposed therefore the proposed layout is the preferred layout. All potential impacts considered had no differential results for the layout. No fatal flaws have been identified for the layout across all potential impacts considered. Three (3) alternative power line layouts are considered, namely Option 1 and Option 2A, which are above-ground power lines either side of the R502 road, and Option 2B, which is an underground power line on the southern side of the R502 road. With respect to the alternative | taking place on said land will be discontinued | | |
| | | **Cumulative** | | |
| | | The proposed project will result in several positive cumulative effects on the socio-economic environment, namely:<br>▪ Stimulation of the economy and increased production<br>▪ Creation of employment and business opportunities<br>▪ Increased household income and standard of living<br>▪ Adoption of clean, renewable energy and benefits in terms of global warming and climate change | Low Positive | Low Positive |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | power line site layout, all potential impacts considered had no differential results for the layout, except for the minimal loss of agricultural land of the underground power line, while no fatal flaws have been identified for the alternative layouts across all potential impacts considered. Option 2B is the preferred site layout. | | | |
| **Desktop Geotechnical – Appendix 6F** | The study area receives a relatively low mean annual precipitation of 588mm, with the warmest month being January. Various tributaries of the Leeudoringspruit River drain the study area. The study area is underlain by the Ventersdorp Supergroup, which comprises amygaloidal lava, agglomerate and tuff. The Ventersdorp Supergroup is predominantly an accumulation of andesitic to basaltic lavas with related pyroclastic rocks. Competent founding conditions can be anticipated in the residual soil profile and in weathered bedrock conditions, which will have to be assessed during the detailed investigation. Typical boreholes indicate moderate yields estimated in the range of 0.50-2.0 l/s. Regional groundwater quality test results indicate a conductivity value of 0.70 mS/m, indicating relatively non-corrosive groundwater attributes. The desktop study indicates **no fatal flaws** from a preliminary and geological and geotechnical assessment. The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock. The impact assessment matrix impact of the 9.9MW Wildebeestkuil 2 Solar PV Plant, 132kV Power Line and Associated Infrastructure was found to be *'Negative low impact - The anticipated impact will have negligible negative effects and will require little to no mitigation.'* The site, from a desktop level geotechnical study is considered suitable for the proposed 9.9MW Wildebeestkuil 2 Solar PV Plant, 132kV Power Line and Associated Infrastructure.<br><br>It recommended that a detailed geotechnical investigation be undertaken during the detailed design phase of the project. The detailed geotechnical investigation must entail the following: | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Displacement of natural earth material and overlying vegetation:<br>1) Increase in soil and wind erosion due to clearing of vegetation.<br>2) Construction and earthmoving vehicles may displace soil during operations.<br>3) Creation of drainage paths along access tracks.<br>4) Potential oil spillages from heavy plant.<br>5) Excessive dust | Negative Low | Negative Low |
| | | **Operational Phase** | | |
| | | Displacement of natural earth material:<br>1) Increase in soil erosion due to concentrated flow received off PV Panels<br>2) Potential oil spillages from maintenance vehicles<br>3) Sedimentation of non-perennial features caused by soil erosion | Negative Low | Negative Low |
| | | **Decommissioning Phase** | | |
| | | Decommissioning of the structure will disturb the geological environment:<br>1) Increase in soil and wind erosion due to clearance of structures | Negative Low | Negative Low |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | ▪ Profiling and sampling exploratory trial pits to determine founding conditions for the PV modules, substation and pylons. Also to determine the subgrade conditions for internal roads and a materials investigation (if required);<br>▪ Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements;<br>▪ Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes; and<br>▪ Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures. | 2) Construction and earthmoving vehicles will displace the soil<br>3) Creation of drainage paths<br>4) Potential oil spillages from vehicles<br>5) Excessive sediments in non-perennial features | | |
| | | **Cumulative** | | |
| | | None | | |
| **Terrestrial Ecology – Appendix 6G** | The project study area consists of a mixture of natural and secondary grassland, along with other localised modifications to the landscape, within a largely agricultural area close to a small town. The natural vegetation is grassland but within an area in which large proportions of the landscape were previously cultivated. The original natural vegetation has therefore been modified to a large degree by these historical agricultural activities. As a result, the regional vegetation type, Vaal-Vet Sandy Grassland has undergone a high degree of overall transformation and is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004). Any remaining natural habitat on site therefore has to be considered to possibly have biodiversity value, although only some parts of the Leeuwbosch site are mapped as Ecological Support Areas in the Provincial Conservation Plan.<br><br>There are no plant species occurring on site or likely to occur there that are protected according to the National Environmental Management: Biodiversity Act. There are also no species found on site that are protected according to the North West Biodiversity Management Act. In addition, there a small number of the protected tree, *Vachellia erioloba*, in the general area, but none within the | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing for construction of infrastructure for solar PV plant | High Negative | Medium Negative |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing for construction of infrastructure for power line | Low Negative | Low Negative |
| | | Loss of protected trees due to clearing for construction of infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Loss of fauna habitat due to clearing for construction of infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Direct fauna mortality due to machinery, construction and increased traffic for solar PV plant and power line | Low Negative | Low Negative |
| | | Displacement and disturbance of fauna due to increased activity and | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | footprint of proposed infrastructure (all options). There is therefore no flora of concern for the project or for any of the grid / power line options.<br><br>There are a small number of fauna of possible conservation concern that were assessed as having a possibility of occurring on site. This includes the Near Threatened South African Hedgehog and Brown Hyaena, and a number of protected species, including the Cape Fox, Honey Badger, and Giant Bullfrog. Some of them (Cape Fox, Brown Hyena, Honey Badger) are **highly mobile species that are unlikely to be affected by any activities on site, but others are more restricted or territorial and could be more significantly affected**. Of those that are more likely to be affected, are the South African Hedgehog and the Giant Bullfrog, neither of which are confirmed to occur on site.<br><br>The vegetation on site consists largely of a mixture of grassland and secondary grassland. Due to the length of time since last cultivation, in combination with possible degradation of natural areas due to other factors, there is little difference in species composition across all areas assessed, except for the possible dominance of *Aristida congesta* in some areas that may be due to historical degradation. The overall species diversity is not high and there are no specific habitats within the proposed footprints that are unique. Some localised depressions have been identified, some of which are secondary, in which wetland vegetation occurs. These areas have all been omitted from the proposed project footprint areas.<br><br>The project involves construction of arrays of solar panels with access roads, a sub-station, and power line to take the power to the grid. The plains are relatively flat and accessible from existing roads. It is therefore expected that impacts can be contained within footprint areas. All project components are adjacent to an existing | noise levels for solar PV plant and power line | | |
| | | **Operational Phase** | | |
| | | Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors – solar PV plant and power line | Medium Negative | Low Negative |
| | | Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape – solar PV plant and power line | Medium Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites – solar PV plant and power line | Low Negative | Low Negative |
| | | Direct mortality of fauna due to machinery, construction and increased traffic - solar PV plant and power line | Low Negative | Low Negative |
| | | Displacement and/or disturbance of fauna due to increased activity and noise levels - solar PV plant and power line | Low Negative | Low Negative |
| | | Continued establishment and spread of alien invasive plant species due to the presence of migration corridors | Medium Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | regional road and railway line, as well as within proximity to a small town. There will therefore be limited overall habitat fragmentation and no necessity to build extensive access roads.<br><br>An impact assessment identified various impacts, all typical of projects of this nature, most of which can be minimised with mitigation measures. As with any greenfields development, it is difficult to mitigate loss of habitat, but in the case of the current projects, few sensitivities have been identified for the remaining areas of natural habitat.<br><br>***Conclusions***<br>At the site-specific scale, some sensitivities have been identified, primarily related to natural habitat. However, it is possible that these can be minimised or avoided with the application of appropriate mitigation or management measures. There will be residual impacts, primarily on natural habitat. **The amount of habitat that will be lost to the project is insignificant compared to the area in hectares of the regional vegetation type that occurs on site**. From this perspective it is unlikely that the proposed project will have an unacceptable impact on the natural environment. The view is that they should be authorised. | and disturbance vectors - solar PV plant and power line | | |
| | | Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape - solar PV plant and power line | Medium Negative | Low Negative |
| | | **Cumulative** | | |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing | Low Negative | Low Negative |
| | | Loss of individual plant species of concern and protected plants and trees | Low Negative | Low Negative |
| | | Changes to ecological processes at a landscape level | Low Negative | Low Negative |
| | | Mortality, displacement and/or disturbance of fauna | Low Negative | Low Negative |
| | | General increase in the spread and invasion of new habitats by alien invasive plant species | Medium Negative | Low Negative |
| | | Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape | Low Negative | Low Negative |
| **Visual – Appendix 6H** | The Visual Impact Assessment (VIA) conducted for the proposed Wildebeestkuil 2 Solar PV Energy facility (SPEF), associated on-site infrastructure and 132kV power line found that much of the study area has a partly natural visual character with some rural or pastoral elements. As such, a solar PV facility, power line and associated infrastructure would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. However, areas in close proximity to the Wildebeestkuil 2 Solar PV | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction – solar PV plant and power line | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | Plant application site exhibit high levels of human transformation resulting from urban and infrastructural development such as the Kgakala township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line. These elements have resulted in a significant degree of landscape degradation, and thus the introduction of a solar PV facility and associated power line into this setting would be considered to be less visually intrusive than if there was no existing built infrastructure visible.<br><br>A broad-scale assessment of landscape sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a low visual sensitivity. However, an important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.<br><br>No visually sensitive receptors were identified within the study area. This is most likely due to the fact that the study area is not typically valued or utilised for its tourism significance. Additionally, the R502 and R504 regional roads, which traverse the visual assessment zone, are used almost exclusively as local access roads and do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.<br><br>A total of sixty-five (65) potentially sensitive receptors were however identified within the study area, many of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown. | Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings – solar PV plant and power line | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers - solar PV plant and power line | Low Negative | Low Negative |
| | | Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment - solar PV plant and power line | Low Negative | Low Negative |
| | | Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact - solar PV plant and power line | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | The PV arrays may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings | Medium Negative | Medium Negative |
| | | The proposed solar PV facility will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. | Medium Negative | Medium Negative |
| | | Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke | Medium Negative | Medium Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | The receptor impact rating conducted in respect of these potentially sensitive receptors found that none of these potentially sensitive receptors are expected to experience high levels of visual impact from the proposed SPEF or the 132kV power line. Thirty-one (31) of the potentially sensitive visual receptors identified within the study area, will experience moderate levels of visual impact as a result of the proposed Wildebeestkuil Solar PV Plant project and twenty-five (25) potentially sensitive receptors will experience moderate levels of impact as a result of the proposed 132kV power line. Twenty-seven (27) potentially sensitive visual receptors will be subjected to low levels of visual impact as a result of the proposed SPEF while seventeen (17) will experience low levels of impact as a result of the 132kV power line.<br><br>The overall impact rating revealed that the Wildebeestkuil 2 SPEF and 132kV power line is expected to have a (negative) low visual impact rating during both construction and decommissioning phases. During operation, visual impacts from the solar PV facility arrays would be of (negative) medium significance with relatively few mitigation measures available to reduce the visual impact. Impacts from the associated infrastructure and 132kV power line would however be of (negative) low significance during operation.<br><br>Several renewable energy developments are being proposed within a 50 km radius of the Wildebeestkuil 2 SPEF application site and power line corridors. These renewable energy developments have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. It was determined that only three (3) of these would have any significant impact on the landscape within the visual assessment zone, namely the 9.9MW Leeuwbosch 1 Solar PV Plant, 9.9MW Leeuwbosch 2 Solar PV Plant and Bokamoso Solar Energy Facility (SEF). These projects, in conjunction with the | negative sentiments from surrounding viewers | | |
| | | The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility | Medium Negative | Medium Negative |
| | | The on-site infrastructure and proposed power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings | Low Negative | Low Negative |
| | | The on-site infrastructure and proposed power line will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from maintenance vehicles accessing the site and power line servitude via gravel roads may evoke negative sentiments from surrounding viewers | Low Negative | Low Negative |
| | | The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility – associated on-site infrastructure | Low Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts - solar PV plant and power line | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | proposed Leeudoringstad Solar Plant Substation (part of separate BA process), located on the Leeuwbosch 1 and Leeuwbosch 2 Solar PV Plant application site, will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. In light of this and the significant degree of human transformation and landscape degradation evident in close proximity to the proposed development, cumulative impacts have been rated as medium.<br><br>No design and layout alternatives for the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) were considered and assessed as part of this VIA as these were considered as part of a previous BA process that was never completed. As such the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) have been placed to avoid site sensitivities previously identified. Specialist studies were originally undertaken in 2016 and all current layouts and/or positions being proposed were selected based on the environmental sensitivities identified as part of these studies in 2016. All specialist studies which were undertaken in 2016 were however updated in 2020 (including ground-truthing, where required) to focus on the impacts of the layout being proposed as part of the current project. The results of the updated specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or "no-go" areas. | Decommissioning activities may be perceived as an unwelcome visual intrusion - solar PV plant and power line | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers - solar PV plant and power line | Low Negative | Low Negative |
| | | Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment - solar PV plant and power line | Low Negative | Low Negative |
| | | Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact - solar PV plant and power line | Low Negative | Low Negative |
| | | **Cumulative Impacts** | | |
| | | Additional renewable energy developments and associated grid connection infrastructure in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts | Medium Negative | Medium Negative |
| | | Visual intrusion of multiple renewable energy developments and associated grid connection infrastructure may be | Medium Negative | Medium Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | Three (3) proposed power line corridor alternatives have however been comparatively assessed in this VIA and no fatal flaws were identified in respect of any of the alternatives. Options 1 and 2A were found to be favourable, but Option 2B was found to be the preferred alternative due to fact that this alternative will be located underground thus minimising any visual impacts.<br><br>From a visual perspective therefore, the proposed Wildebeestkuil 2 SPEF and 132kV Power Line project is deemed acceptable and the Environmental Authorizations (EA) should be granted. SiVEST is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. | exacerbated, particularly in more natural undisturbed settings | | |
| | | Additional renewable energy facilities and associated grid connection infrastructure in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes | Medium Negative | Medium Negative |
| | | The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area | Medium Negative | Medium Negative |

**Table ii:** Summary of comparative assessment of power line corridor alternatives for 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line

| ALTERNATIVE | ENVIRONMENTAL ASPECT | | | | | | | | | FATAL FLAW (YES / NO) | PREFERRED (YES / NO) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Terrestrial Ecology | Surface Water | Visual | Geotech | Avifauna | Social | Palaeo | Agric. and Soils | Heritage | | |
| POWER LINE CORRIDOR ROUTE ALTERNATIVES | | | | | | | | | | | |
| **Option 1** | Favourable | Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **YES** |
| **Option 2A** | Favourable | Not Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **NO** |
| **Option 2B** | Favourable | Not Preferred | Preferred | No Preference | Preferred | Preferred | No preference | No preference | No preference | **NO** | **NO** |

In light of the information above, **Power Line Corridor Option 1 is the preferred power line corridor route alternative from an environmental perspective and is being proposed for authorisation**.

The preferred site layout (including preferred power line corridor route alternative) in relation to the sensitive / 'no-go' areas identified by the specialists is indicated in **Figure ii** and **Figure iii** below.

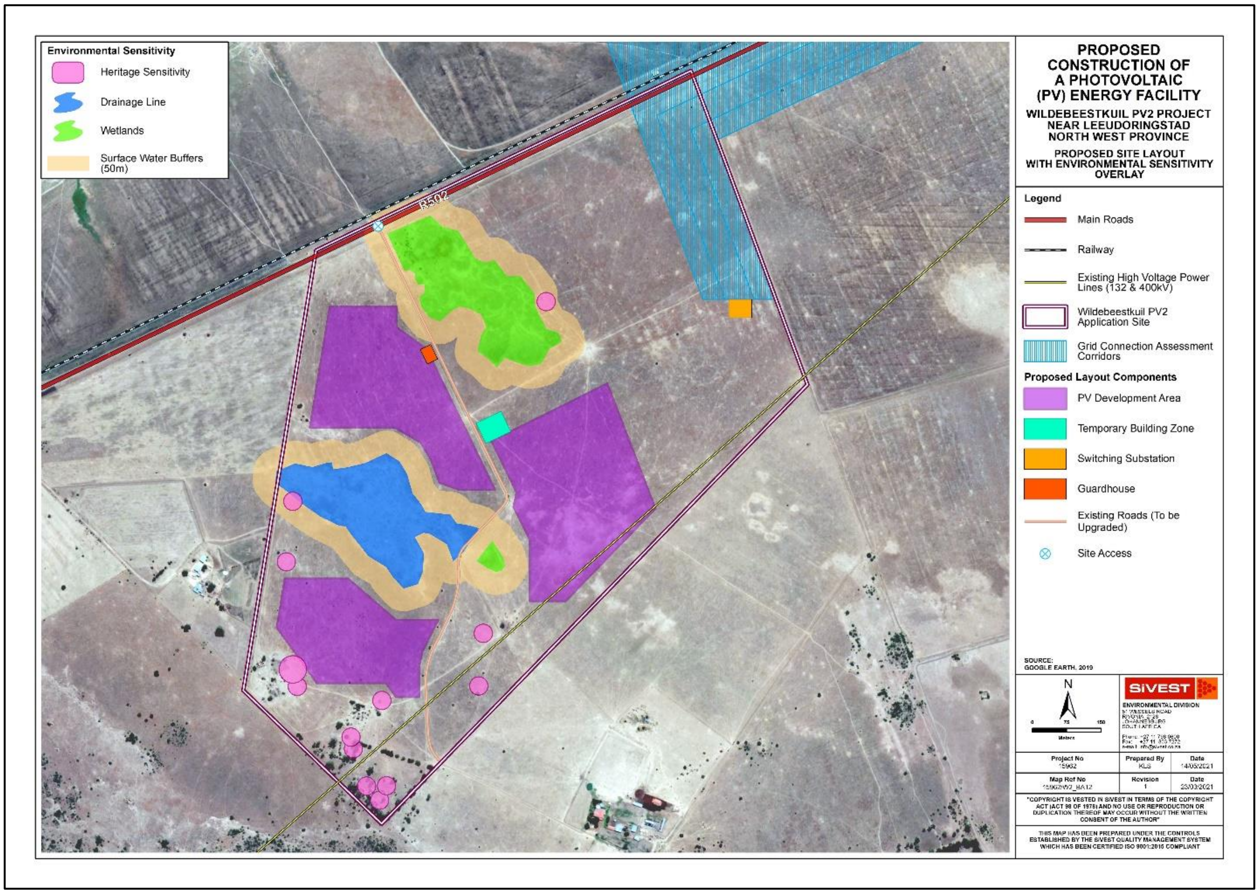


**Figure ii:** Preferred site layout in relation to identified environmental sensitive / 'no-go' areas – Solar PV Plant

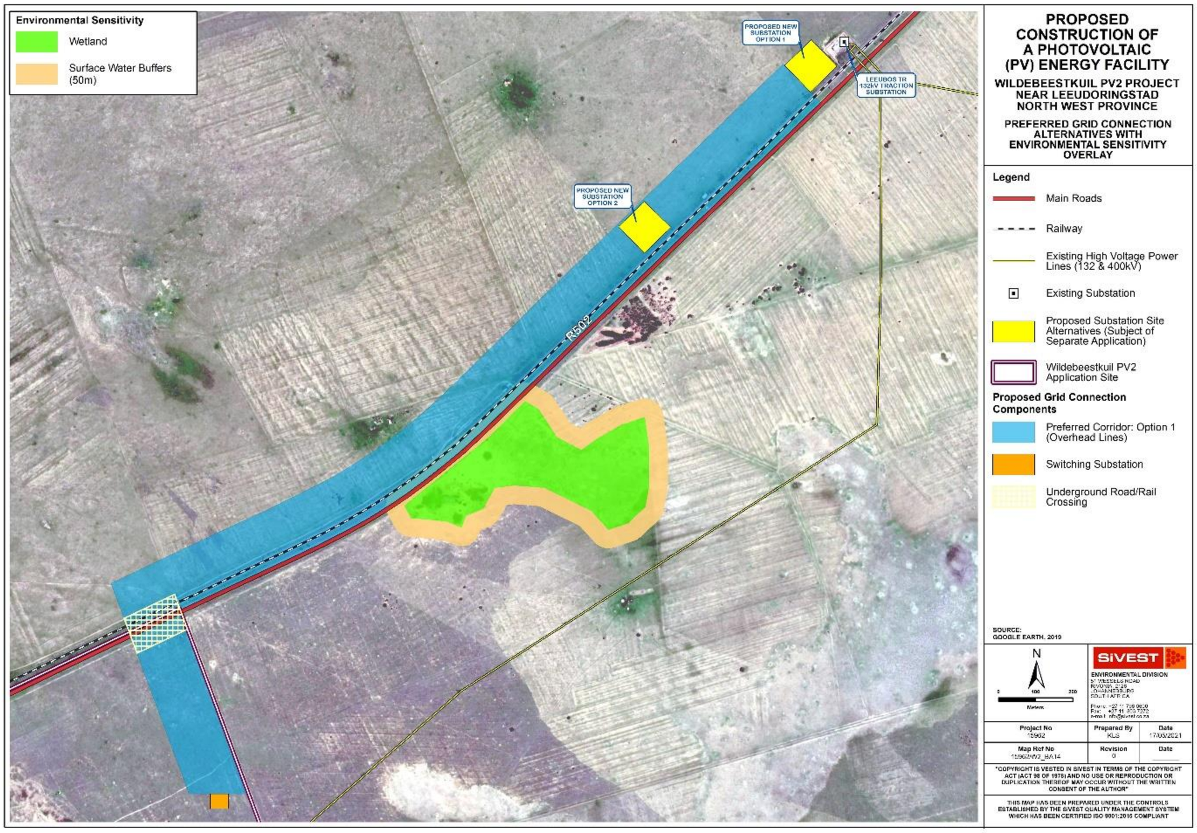


**Figure iii:** Preferred site layout in relation to identified environmental sensitive / 'no-go' areas – 132kV Overhead Power Line

**ENV Impact Statement**

The results of the specialist assessments have indicated that all alternatives (including the preferred alternative) contain no fatal flaws that should prevent the proposed project from proceeding. In light of this, it is the EAP's reasoned opinion that authorisation be granted and that the layout being proposed as part of this BA process also be authorised (provided there are no concerns raised during the public participation process).

SiVEST, as the independent EAP, is therefore of the view that:

- The site location and project description can be authorised based on the findings of the suite of specialist assessments;
- A **preferred power line corridor route alternative (Power Line Corridor Alternative Option 1)** has been identified which is environmentally acceptable and will not result in significant impacts (**Figure iii**), provided that the recommended mitigation measures are implemented and the routing of the power line within the chosen corridor avoids tower placement within the identified sensitive and 'no-go' areas;
- One (1) power line corridor alternative (namely **Power Line Corridor Alternative Option 1**) is therefore being recommended to be authorised;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, majority of the cumulative impacts associated with the proposed development can be kept either low or medium after the implementation of mitigation measures. In addition, the social specialist found that the project will result in several positive cumulative effects on the socio-economic environment and that these cumulative impacts will be **positive** low, before and after the implementation of mitigation measures; and
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed Environmental Control Officer (ECO) as well as the competent authority, the potential detrimental impacts associated with the proposed development can be mitigated to acceptable levels.

The following recommendations are suggested:

- Final routing of the proposed power line within the corridor should avoid tower placement within the identified sensitive / 'no-go' areas (as shown in **Figure 67**) located within the power line corridor, and no construction activities should take place within these areas;
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final Environmental Management Programme (EMPr) and implemented, where applicable;
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists; and
- The final layout should be submitted to the Competent Authority (namely the NW DEDECT) for approval prior to commencing with the activity.

It is trusted that the DBAR provides adequate information to the Interested and/or Affected Parties (I&APs) / stakeholders to provide input and for the competent authority to make an informed decision regarding the proposed development.

**<u>Way forward</u>**

The DBAR is currently being circulated for public participation for a period of 30 days (excluding public holidays) **from 11 June 2021 until 12 July 2021**.

All I&APs and key stakeholders who are registered on the project database will be notified of the availability of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all OoS / authorities will be sent electronic copies (via email) of the DBAR. All comments received will be responded to in a C&RR (included as **Appendix 7E**), which will be included prior to submission of the FBAR to the decision-making authority, namely the NW DEDECT. Comments received on the DBAR will be taken into consideration, incorporated into the report (where applicable) and will be used when compiling the FBAR. Once the FBAR has been submitted and the NW DEDECT have acknowledged receipt thereof, a decision to either grant or refuse the EA for the proposed development will be made by the NW DEDECT. In addition, once a decision regarding the EA has been received from the NW DEDECT, it will be made available to the public and all registered I&APs, stakeholders and OoS / authorities will be notified accordingly and provided details regarding the appeal process. The BA process will thus come to an end once appeals (if any) have been dealt with adequately and the appeal process closes.

All I&APs and key stakeholders are invited to register as I&APs in order to be kept informed throughout the process. To register as an I&AP / stakeholder and/or to obtain additional information, please submit your name, contact details (telephone number, postal address and email address) and the interest which you have in the application to SiVEST Environmental Division, as per the details below:

Contact: Hlengiwe Ntuli or Stephan Jacobs
PO Box 2921, RIVONIA, 2128
☎ Phone: (011) 798 0600
E-mail: sivest_ppp@sivest.co.za
Fax: (011) 803 7272
Website: www.sivest.com

Please reference '*Wildebeestkuil 2 Solar PV and Power Line*' in your correspondence, should your comments be project specific. SiVEST shall keep all registered I&APs / key stakeholders informed of the BA process.

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## Glossary of Terms

**Acceptability:** The evaluation of the risk in comparison to certain known level of risk in other areas.

**Alternative:** Alternatives can refer to any of the following but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials.

**Alluvial:** Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.

**Archaeological resources:** This includes:

- 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;
- 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;
- 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 in the Maritimes Zones Act, 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;
- features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

**Biodiversity:** The diversity of genes, species and ecosystems, and the ecological and evolutionary processes that maintain that diversity.

**Critical Biodiversity Areas:** Areas required to meet biodiversity targets of representivity and persistence for ecosystems, species and ecological processes, determined by a systematic conservation plan. They may be terrestrial or aquatic, and are mostly in a good ecological state. These areas need to be maintained in a natural or near-natural state, and a loss or degradation must be avoided. If these areas were to be modified, biodiversity targets could not be met.

**Cultural landscape:** A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992). Includes and extends beyond the study site boundaries.

**Cultural significance:** This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

**Cumulative Impact:** In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

**Development:** This means any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of the heritage authority in any way result in a change to the nature, appearance or physical nature of a place or influence its stability and future well-being, including:

- construction, alteration, demolition, removal or change in use of a place or a structure at a place;
- carrying out any works on or over or under a place;
- subdivision or consolidation of land comprising a place, including the structures or airspace of a place;
- constructing or putting up for display signs or boards;
- any change to the natural or existing condition or topography of land; and
- any removal or destruction of trees, or removal of vegetation or topsoil

**Ecosystem services:** The benefits that people obtain from ecosystems, including provisioning services (such as food and water), regulating services (such as flood control), cultural services (such as recreational benefits), and supporting services (such as nutrient cycling, carbon storage) that maintain the conditions for life on Earth.

**Endemic:** Restricted or exclusive to a particular geographic area and occurring nowhere else. Endemism refers to the occurrence of endemic species.

**Environmental Impact Assessment:** In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

**Environmental Impact Report:** In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Scoping Report.

**Environmental Management Programme (EMPr):** A legally binding working document, which stipulates environmental and socio-economic mitigation measures which must be implemented by several responsible parties throughout the duration of the proposed project.

**Fossil:** Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

**Habitat:** The area of an environment occupied by a species or group of species, due to the particular set of environmental conditions that prevail there.

**Heritage:** That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act 25 of 1999).

**Heritage Resources:** This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures and equipment of cultural significance;
- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features of cultural significance;

- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa;

**Kilovolt (kV):** a unit of electric potential equal to a thousand volts (a volt being the standard unit of electric potential. It is defined as the amount of electrical potential between two points on a conductor carrying a current of one ampere while one watt of power is dissipated between the two points).

**Landscape character:** A distinct, and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse.

**Mitigate:** The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

**"No-Go" option:** The “no-go” development alternative option assumes the site remains in its current state, i.e. there is no construction of a solar PV energy facility and associated infrastructure in the proposed project area.

**Palaeontology:** 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.

**PV Development Area:** Area for the potential erection of PV panels within the application site

**Red Data Species:** All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

**Red List:** A publication that provides information on the conservation and threat status of species, based on scientific conservation assessments.

**Rehabilitation:** Less than full restoration of an ecosystem to its pre-disturbance condition.

**Restoration:** To return a site to an approximation of its condition before alteration.

**Riparian:** The area of land adjacent to a river or stream that is, at least periodically, influenced by flooding.

**Sense of place:** The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

**Species of Special / Conservation Concern:** Species that have particular ecological, economic or cultural significance, including but not limited to threatened species.

**Threatened Ecosystems:** An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on analysis of ecosystem threat status. A threatened ecosystem has lost, or is losing, vital aspects of its structure, composition or function. The Biodiversity Act makes provision for the Minister

or Environmental Affairs, or a provincial MEC of Environmental Affairs, to publish a list of threatened ecosystems.
**Threatened Species:** A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.

**Visual character:** The pattern of physical elements, landforms and land use characteristics that occur consistently in the landscape to form a distinctive visual quality or character.

**Visual impact:** The effect of an aspect of the proposed development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.

**Visual receptors:** An individual, group or community that is subject to the visual influence of the proposed development but is not necessarily adversely impacted by it. They will typically include commercial activities, residents and motorists travelling along routes that are not regarded as scenic.

**Visual sensitivity:** The inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (visual character), spatial distribution of potential receptors, and the likely value judgements of these receptors towards the new development, which are usually based on the perceived aesthetic appeal of the area.

## List of Abbreviations

| | |
|---|---|
| AAA | - Astronomy Advantage Area |
| AP | - Action Plan |
| APM | - Archaeology, Palaeontology and Meteorites |
| ATNS | - Air Traffic and Navigation Services Company Limited |
| AIA | - Archaeological Impact Assessment |
| BA | - Basic Assessment |
| BLSA | - BirdLife South Africa |
| CAA | - Civil Aviation Act (Act No. 13 of 2009) |
| CARA | - Conservation of Agricultural Resources Act (Act No. 43 of 1983) |
| CBA | - Critical Biodiversity Area |
| CBD | - Convention on Biodiversity |
| CR | - Critically Endangered |
| DBAR | - Draft Basic Assessment Report |
| DEA | - Department of Environmental Affairs |
| DFFE | - Department of Forestry, Fishery and the Environment |
| DHSWS | - Department of Human Settlements, Water and Sanitation |
| DDD | - Data Deficient: well known but not enough information for assessment |
| DDT | - Data Deficient: taxonomic problems |
| DDX | - Data Deficient: unknown species |
| DM | - District Municipality |
| DSR | - Draft Scoping Report |
| DoE | - Department of Energy |
| DNI | - Direct Normal Irradiation |
| DWS | - Department of Water and Sanitation |
| EAP | - Environmental Assessment Practitioner |
| ECA | - Environmental Conservation Act (ECA) (Act No. 73 of 1989) |
| ECO | - Environmental Control Officer |
| ED | - Economic Development |
| EHS | - Environmental, Health, and Safety |
| EIA | - Environmental Impact Assessment |
| EISC | - Ecological Importance and Sensitivity Categorisation |
| EMPr | - Environmental Management Programme |
| EN | - Endangered |
| ENPAT | - Environmental Potential Atlas |
| ERA | - The Electricity Regulation Act No. 4 of 2006 |
| ESA | - Ecological Support Area |
| ESMP | - Environmental and Social Management Plan |
| ESMS | - Environmental and Social Management System |
| EX | - Extinct |
| FBAR | - Final Basic Assessment Report |
| FSR | - Final Scoping Report |
| GA | - General Authorisation |
| GDP | - Gross Domestic Product |
| GHG | - Green House Gases |
| GHI | - Global Horizontal Irradiation |

| | |
|---|---|
| GIS | - Geographic Information System |
| GUMP | - Gas Utilisation Master Plan |
| GW | - Gigawatts |
| HIA | - Heritage Impact Assessment |
| I&AP(s) | - Interested and/or Affected Party/Parties |
| IBA(s) | - Important Bird Area(s) |
| IDP | - Integrated Development Plan |
| IEP | - Integrated Energy Plan |
| IKA | - Index of Kilometric Abundance |
| IPP(s) | - Independent Power Producers |
| IRP | - Integrated Resource Plan |
| IUCN | - International Union for the Conservation of Nature and Natural Resources |
| kV | - Kilo Volt |
| LM | - Local Municipality |
| LED | - Local Economic Development |
| LSA | - Late Stone Age |
| MSA | - Middle Stone Age |
| MSL | - Mean Sea Level |
| MW | - Megawatt |
| NEA | - The National Energy Act (Act No. 34 of 2008) |
| NEMA | - National Environmental Management Act (Act No. 107 of 1998) |
| NEM:AQA | - National Environmental Management: Air Quality Act (Act No. of 2004) |
| NEM:BA | - National Environmental Management: Biodiversity Act (Act No. 10 of 2004) |
| NEM:PAA | - National Environmental Management: Protected Areas Act (Act No. 57 of 2003) |
| NFA | - The National Forest Act (Act No. 84 of 1998) |
| NFEPA | - National Freshwater Ecosystem Priority Areas |
| NHRA | - National Heritage Resources Act (Act No. 25 of 1999) |
| NPAES | - National Parks Area Expansion Strategy |
| NRTA | - National Road Traffic Act (Act No. 93 of 1996) |
| NT | - Near Threatened |
| NWA | - National Water Act (Act No. 36 of 1998) |
| OHSA | - Occupational Health and Safety Act (Act No. 85 of 1993) |
| PDP | - Provincial Development Plan |
| PES | - Present Ecological Status |
| PIA | - Palaeontological Impact Assessment |
| PM | - Public Meeting |
| PPA | - Power Purchase Agreement |
| PPP | - Public Participation Process |
| PV | - Photovoltaic |
| RDP | - Rural Development Plan |
| REDZ | - Renewable Energy Development Zone |
| REIPPPP | - Renewable Energy Independent Power Producer Procurement Programme |
| RE | - Renewable Energy |
| RMIPPPP | - Risk Mitigation Independent Power Producer Procurement Programme |
| SA | - South Africa |
| SACAA | - South African Civil Aviation Authority |
| SAHRA | - South African Heritage Resources Agency |

| | |
|---|---|
| SAHRIS | - South African Heritage Resources Information System |
| SALA | - Subdivision of Agricultural Land Act (Act No. 70 of 1970) |
| SALT | - Southern African Large Telescope |
| SANBI | - South African National Biodiversity Institute |
| SANRAL | - South African National Roads Agency SOC Ltd |
| SDF | - Spatial Development Framework |
| SEF | - Solar Energy Facility |
| SKA | - Square Kilometre Array |
| SPVs | - Special Purpose Vehicles |
| VEGRAI | - Vegetation Response Assessment Index |
| VIA | - Visual Impact Assessment |
| VU | - Vulnerable |
| WETFEPA | - Wetland Freshwater Priority Areas |
| WEF | - Wind Energy Facility |
| WMA | - Water Management Area |
| WUL | - Water Use License |
| WULA | - Water Use License Application |

## Wildebeestkuil PV Generation (Pty) Ltd

## Proposed Development of the 9.9MW Wildebeestkuil 2 Solar Photovoltaic (PV) Plant, 132kV Power line and associated infrastructure near Leeudoringstad in the North West Province, Maquassi Hills Local Municipality, Dr Kenneth Kaunda District Municipality

## Draft Basic Assessment Report (DBAR)

# 1 INTRODUCTION

## 1.1 Project Background

Wildebeestkuil PV Generation (Pty) Ltd (hereafter referred to as 'Wildebeestkuil PV Generation') is proposing to construct a solar photovoltaic (PV) plant, 132kV overhead power line and associated infrastructure on a number of properties, approximately 4km east of the town of Leeudoringstad in the Maquassi Hills Local Municipality, which falls within the Dr Kenneth Kaunda District Municipality in the North West Province of South Africa (hereafter referred to as the 'proposed development') (**Figure 2**) (**Department Ref No.:** To be Allocated). The proposed development will have a total maximum generation capacity of up to approximately 9.9 megawatts (MW) and will be referred to as the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line.

SiVEST Environmental Division (hereafter referred to as 'SiVEST') has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process for the proposed construction of the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line (including associated infrastructure). The overall objective of the proposed development is to generate electricity (by capturing solar energy) to feed into the national electricity grid and 'wheel' the power to customers based on a Power Purchase Agreement (PPA).

It should be noted that this proposed solar PV and power line development (this application) forms part of one (1) of four (4) solar PV plants and associated infrastructure (including switching substations and 132kV overhead power lines) that are being proposed as part of a greater PV project near the town of Leeudoringstad in the North West Province, namely the Leeudoringstad Solar PV Project. In addition, one (1) 132/11 kilovolt (kV) on-site substation (namely the Leeudoringstad Solar Plant Substation) is also being proposed as part of the greater Leeudoringstad Solar PV Project (**Figure 1Figure 1**).

The other proposed developments (solar PV, 132kV overhead power lines and 132/11kV on-site substation) which form part of the greater Leeudoringstad Solar PV Project include the following:

- 9.9MW Leeuwbosch 1 Solar PV Plant - **Reference Number:** To be Allocated (part of separate on-going BA process);
- 9.9MW Leeuwbosch 2 Solar PV Plant - **Reference Number:** To be Allocated (part of separate on-going BA process);
- 9.9MW Wildebeestkuil 1 Solar PV Plant and 132kV Power Line - **Reference Number:** To be Allocated (part of separate on-going BA process); and

▪ 132/11kV Leeudoringstad Solar Pant Substation - **Reference Number:** To be Allocated (part of separate on-going BA process).

The 132kV overhead power line and 132/11kV on-site substation (namely the Leeudoringstad Solar Plant Substation) are being proposed to feed the electricity generated by the proposed Wildebeestkuil 2 Solar PV Plant into the national electricity grid. The 132kV overhead power line will form part of the Wildebeestkuil 2 Solar PV Plant BA process and will be authorised under the Wildebeestkuil 2 Solar PV Plant Environmental Authorisation (EA), while the Leeudoringstad Substation will form part of a separate BA process and will be authorised under its own respective EA.

Although the solar PV plants, 132kV power lines and associated 132/11kV Leeudoringstad Solar Plant Substation will be assessed separately, a single public participation process is being undertaken to consider all of the proposed developments which form part of the greater Leeudoringstad Solar PV Project [i.e. four (4) solar PV plant BAs (including 2 132kV overhead power lines), and one (1) substation BA]. The potential environmental impacts associated with all of the developments will be assessed as part of the cumulative impact assessment.

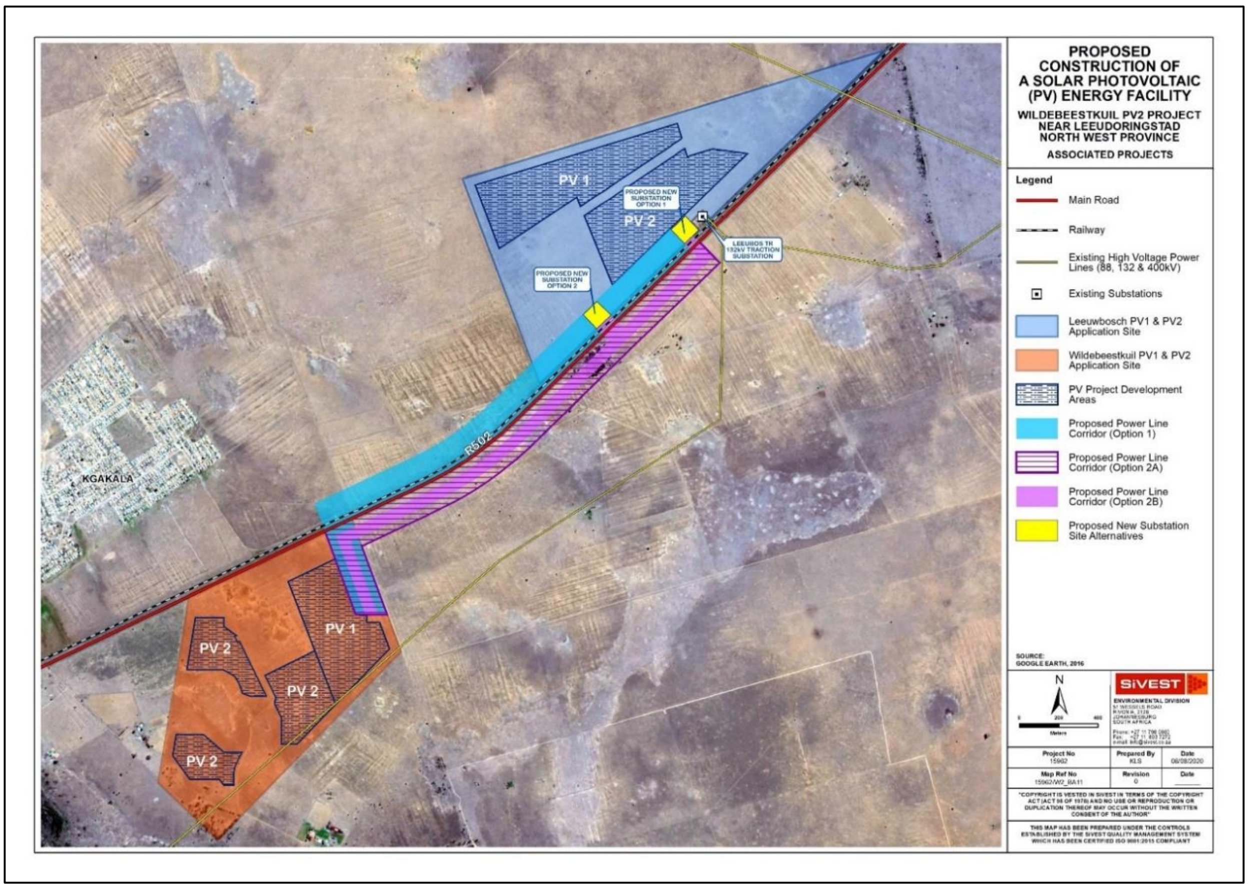


**Figure 1**: Regional context of greater Leeudoringstad Solar PV Project

The greater Leeudoringstad Solar PV Project will contribute to providing electricity for a licensed private sector electricity trader in South Africa. The electricity generated by the proposed solar PV plant (part of this application) will be sold by the Authorisation Holder to a second party, as part of a PPA.

The proposed development will be developed under a Special Purpose Vehicle (SPV). The SPV, namely Wildebeestkuil PV Generation, is currently owned by Upgrade Energy South Africa (Pty) Ltd (hereafter referred to as 'Upgrade Energy'). Once Commercial Operation Date (COD) is accomplished, 100% of the Wildebeestkuil PV Generation shares will be transferred to the new owners of the proposed development, namely SIG Energy (Pty) Ltd, trading as SIG Energy Investments.

The proposed solar PV plant is not located within any of the Renewable Energy Development Zones (REDZs) formally gazetted[4] in South Africa for the purpose of development of solar and wind energy generation facilities. The proposed 132kV power line is however located within one (1) of the Central Strategic Transmission Corridors (namely the Central Corridor) as defined and in terms of the procedures laid out in Government Notice No. 113 and No. 145 which were formally gazetted on 16 February 2018 and 26 February 2021 respectively. Ultimately the 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line is subject to a full BA process in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA), as amended, and the EIA Regulations, 2014 (as amended).

The proposed development requires an EA from the North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT). The BA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full BA process is required for the proposed development[5].

All relevant legislation and guidelines will be consulted during the BA process and will be complied with at all times.

[4] Formally gazetted on 16 February 2018 (Government Notice 114)

[5] Since the electricity generated by the proposed solar PV plant (part of this application) will be purchased by a second party as part of a Power Purchase Agreement (PPA) and will NOT form part of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), the proposed construction and operation of the solar PV plant project requires EA from the provincial competent authority, namely the NW DEDECT

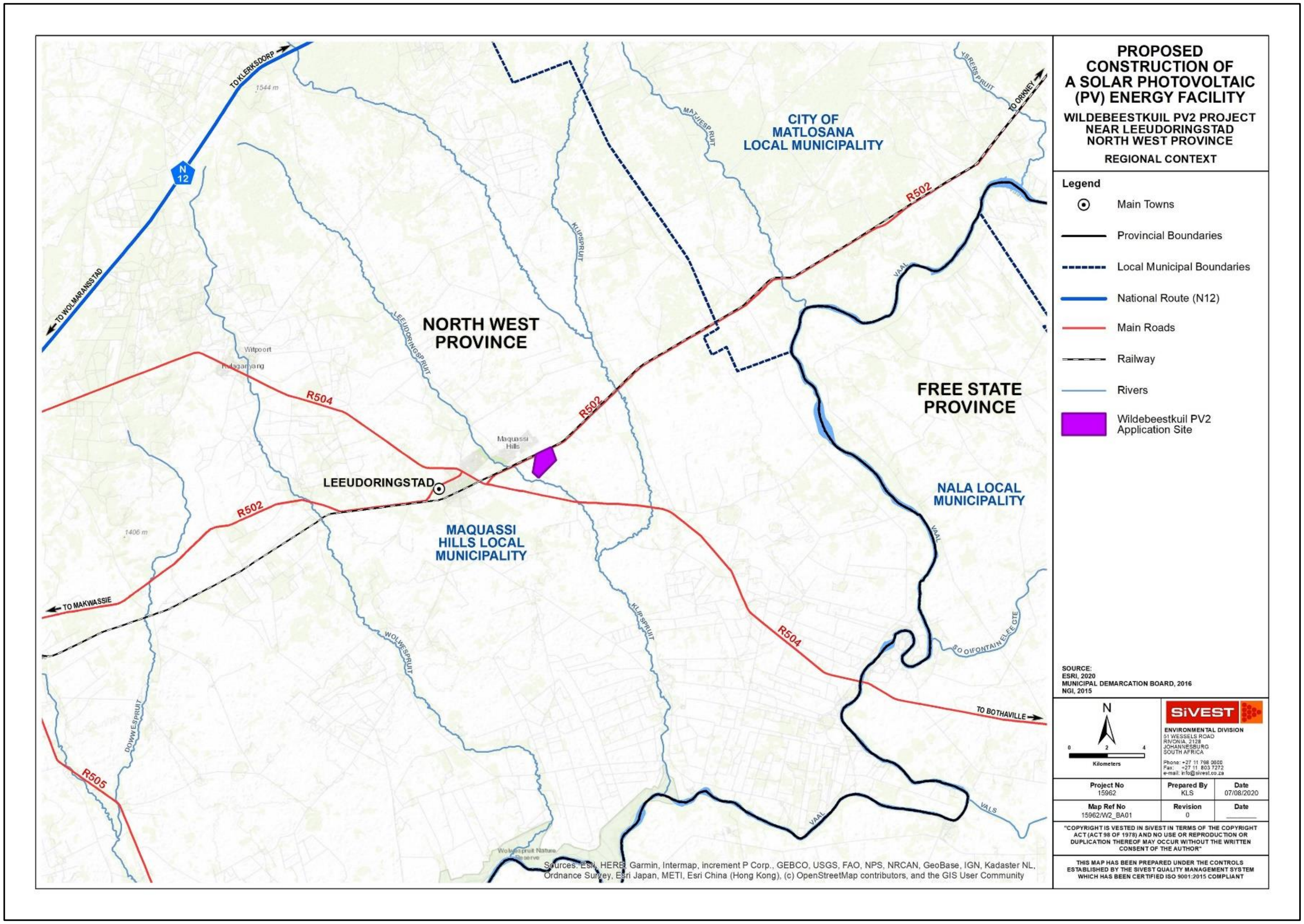


**Figure 2:** 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line in the regional context

## 1.2 Project History

The original BA process for the proposed Wildebeestkuil PV Generation Solar PV Plant was initiated in August 2016. All specialist studies were undertaken and subsequently all site sensitivities were identified. The specialist studies and Draft Basic Assessment Reports (DBARs) were completed and released for 30-day public review. The BA was however put out on hold prior to submitting the Final Basic Assessment Reports (FBARs) to the Department of Environmental Affairs (DEA) [now known as the Department of Forestry, Fisheries and the Environment (DFFE)]. In February 2017, the proposed capacity and layout of the solar PV plant was amended, and a new connection point and associated power line corridors were assessed. However, the project was put on hold prior to submitting the application forms to the DEA (now DFFE) or commencing with the legislated public participation process. In August of 2020, Wildebeestkuil PV Generation proposed an additional 9.9MW PV plant on the Wildebeestkuil site (now referred to as the Wildebeestkuil 1 Solar PV Plant & 132kV Power Line and Wildebeestkuil 2 Solar PV Plant & 132kV Power Line) outside of all site sensitivities that were identified in 2016, and as such specialist studies have been commissioned to assess and verify the now two (2) solar PV plants and 132kV power lines under the new Gazetted specialist protocols[6].

## 1.3 Objectives of the Basic Assessment (BA) Process

The NEMA EIA Regulations, 2014 (as amended in 2017), state that the objective of the BA process is to, through a consultative process:

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
(b) identify the alternatives considered, including the activity, location, and technology alternatives;
(c) describe the need and desirability of the proposed alternatives;
(d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    (ii) the degree to which these impacts—
        (aa) can be reversed;
        (bb) may cause irreplaceable loss of resources; and
        (cc) can be avoided, managed or mitigated; and
(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

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[6] GOVERNMENT GAZETTE No. 43110, PROCEDURES FOR THE ASSESSMENT AND MINIMUM CRITERIA FOR REPORTING ON IDENTIFIED ENVIRONMENTAL THEMES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, WHEN APPLYING FOR ENVIRONMENTAL AUTHORISATION, 20 MARCH 2020

In terms of sections 24(5)(a), (h) and 44 of the National Environmental Management Act, 1998, prescribe general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring environmental authorisation, as contained in the Schedule hereto. When the requirements of a protocol apply, the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as amended, (EIA Regulations), promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), are replaced by these requirements. Each protocol applies exclusively to the environmental theme identified within its scope. Multiple themes may apply to a single application for environmental authorisation, and assessments for these themes must be undertaken in accordance with the relevant protocol, or where no specific protocol has been prescribed, in accordance with the requirements of the EIA Regulations

(i) identify and motivate a preferred site, activity and technology alternative;
(ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
(iii) identify residual risks that need to be managed and monitored.

A Basic Assessment Report (BAR) must contain the information that is necessary for the competent authority to consider and come to a decision on the application. The content requirements for a BAR (as provided in Appendix 1 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

**Table 1:** Content requirements for a BAR

| Content Requirements | Applicable Section |
|---|---|
| (a) details of-<br>(i) the EAP who prepared the report; and<br>(ii) the expertise of the EAP, including a curriculum vitae (CV); | Details of the EAP and full project team are included in **section 1.6**. The expertise (including curriculum vitae) of the EAP and full project team are included in **Appendix 1**. |
| (b) the location of the activity, including-<br>(i) the 21-digit Surveyor General code of each cadastral land parcel;<br>(ii) where available, the physical address and farm name;<br>(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; | The location (including 21-digit Surveyor General codes) of the proposed development is detailed on **page *iii-vi*** of the report (under Key Project Information), as well as in **section 3**. Coordinates of the application site, as well as corner points and centre point coordinates for switching substation, guard house and building zone are also provided on **page *v-vi*** of the report (under Key Project Information), as well as in **Appendix 9A**. |
| (c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-<br>(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or<br>(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken; | A map of the regional locality is shown in **section 1** and the site locality is shown in **section 3**. Additionally, all project maps are included in **Appendix 5.** Coordinates of the application site are provided on ***page v-vi*** of the report (under Key Project Information), as well as in **section 3**. Additionally, all coordinates are included in **Appendix 9A**. |
| (d) a description of the scope of the proposed activity, including-<br>(i) all listed and specified activities triggered;<br>(ii) a description of the activities to be undertaken including associated structures and infrastructure; | The listed and specified activities triggered as per NEMA are detailed in **section 6.1.3**. The technical project description is included in **section 4**. This includes a description of activities to be undertaken, including associated structures and infrastructure. |
| (e) a description of the policy and legislative context within which the development is proposed including-<br>(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and<br>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments; | A description of all legal requirements and guidelines is provided in **section 6**. This includes key legal and administrative requirements as well as key development strategies and guidelines. |
| (a) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location; | The need and desirability of the proposed project in the context of the preferred location is discussed in **section 7**. |

| Content Requirements | Applicable Section |
|---|---|
| (b) motivation for the preferred site, activity and technology alternative; | The motivation for the preferred site, activity and technology alternative of the proposed development is discussed in **section 5.** |
| (c) a full description of the process followed to reach the proposed preferred alternative within the site, including–<br>(i) details of all the alternatives considered;<br>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;<br>(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;<br>(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;<br>(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—<br>(aa) can be reversed;<br>(bb) may cause irreplaceable loss of resources; and<br>(cc) can be avoided, managed or mitigated;<br><br>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;<br>(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;<br>(viii) the possible mitigation measures that could be applied and level of residual risk;<br>(ix) the outcome of the site selection matrix;<br>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and<br>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity; | A description of the alternatives considered in terms of the Regulations is included in **section 5.**<br>• Alternatives are detailed / discussed in **section 5.**<br>• The public participation process followed is detailed in **section 10.** Additionally, all public participation documents are included in **Appendix 7.**<br>• This will include a summary of issues raised by I&AP's and key stakeholders, and the responses to their comments.<br>• A full description of the environmental attributes within the development area is included in **section 8**.<br>• The impacts, risks and mitigation associated with each alternative are assessed in **section 9,** specifically **section 9.2** and **9.3**.<br>• The methodology used in identifying the impacts and risks associated with each alternative is included in **section 9.1.**<br>• The positive and negative impacts, along with the proposed mitigation measures related to the proposed activity will have on the environment are discussed in **section 9.2** and **section 9.3**.<br>• The outcome of the site selection matrix is included in **section 9.5**.<br>• A concluding statement indicating the preferred layout is contained in **section 9.5** and **section 11.2**. |
| (d) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including—<br>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and<br>(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; | The process undertaken to assess the impacts as well as the assessment of impacts by each specialist are shown in **section 9.**1 and **9.2**, respectively**.**<br><br>Each environmental issue and risk is tabulated in **section 9.3**, and an assessment of the significance of each issue before and after mitigation measures is included. |
| (e) an assessment of each identified potentially significant impact and risk, including—<br>(i) cumulative impacts;<br>(ii) the nature, significance and consequences of the impact and risk;<br>(iii) the extent and duration of the impact and risk;<br>(iv) the probability of the impact and risk occurring;<br>(v) the degree to which the impact and risk can be reversed; | The impact rating system contained in **section 9.1.2** as well as **Appendix 9C** details the methodology for determining the significance of an impact. This includes the points (i) to (vii) of point (j) in Appendix 1 of the EIA Regulations, 2014 (as amended). The assessment of each potentially significant impact and risk identified by the |

| Content Requirements | Applicable Section |
|---|---|
| (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and<br>(vii) the degree to which the impact and risk can be avoided, managed or mitigated; | specialists is contained in **section 9.2** with impacts and recommended mitigation measures contained in **section 9.3**. |
| (f) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report; | All relevant specialist findings are included in **section 8**, with all recommended mitigation measures / impact management measures detailed in **section 9**. The mitigation measures have been incorporated into the Draft Environmental Management Programme (EMPr) which is contained in **Appendix 8**. The tabulated summary of key specialist findings and recommendations is included in **section 11.1** and in the Executive Summary. |
| (g) an environmental impact statement which contains—<br>(i) a summary of the key findings of the environmental impact assessment;<br>(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and<br>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; | The summary of key findings of the environmental impact assessment is found in **section 11.1**.<br>The high-quality maps showing the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint indicating any areas that should be avoided, including buffers, is provided as **Figure 67** and **Figure 68** and can also be found in **Appendix 5**.<br>The summary of the positive and negative impacts and risks of the proposed activity and identified alternatives can be found in **section 9.2** and **section 9.5** respectively. **Section 11** details the conclusions and recommendations of the specialist assessment and the findings of the DBAR. |
| (h) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr; | The recommended mitigation measures from specialist reports associated with each impact are included in **section 9.3**. Overall specialist recommendations and mitigation measures are also included in **section 9.3**. These measures are contained in the EMPr which can be found in **Appendix 8**. |
| (i) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation; | Any aspects identified by specialists or the EAP that should be included as conditions of the authorisation are identified in **section 11.2** and in the **Executive Summary**. |
| (j) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed; | All assumptions and limitations are highlighted in **section 2**. |
| (k) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be | A reasoned opinion as to whether the proposed activity should be authorised, and, any conditions that should be made in |

| Content Requirements | Applicable Section |
|---|---|
| authorised, any conditions that should be made in respect of that authorisation; | respect of that authorisation can be found in **section 11** and in the **Executive Summary.** |
| (l) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised; | The period required for the environmental authorisation, as well as the date on which the activity and post-construction monitoring (if required) will be concluded is addressed in **section 11** and in the **Executive Summary.** |
| (m) an undertaking under oath or affirmation by the EAP in relation to—<br>(i) the correctness of the information provided in the reports;<br>(ii) the inclusion of comments and inputs from stakeholders and I&APs;<br>(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and<br>(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; | The EAP affirmation is included in **Appendix 3.** |
| (n) where applicable, details of any financial provision for the rehabilitation, closure, and on-going post decommissioning management of negative environmental impacts; | Where applicable, details of any financial provisions for the rehabilitation, closure, and on-going post-decommissioning management of negative environmental impacts are included in **section 9**, **section 11** and the **Executive Summary**. |
| (o) any specific information that may be required by the competent authority; and | At this stage, there is no other specific information required by the competent authority. However, a record of authority consultation is kept in **section 1.5** as well as **Appendix 4**, and should there be any specific information requested, this will be detailed in the same section. |
| (p) any other matters required in terms of section 24(4)(a) and (b) of the Act. | All requirements in terms of section 24(4)(a) and (b) of the Act have been met in this report. |
| (2) Where a government notice by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply. | The BA process has been based on the findings of the Site Sensitivity Verification which was undertaken by the specialists. In addition, all specialist assessments which have been undertaken as part of the BA process comply with Appendix 6 of the EIA Regulations, 2014 (as amended), promulgated under sections 24(5) and 44 of the NEMA. The specialist assessments which have been undertaken are listed in **section 1.4** below, and the summary of the findings are detailed in **section 11.1.** |

## 1.4 Specialist Studies

Specialist studies have been conducted in terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) And 44 of the NEMA when applying for EA, as well as the EIA Regulations, 2014 (as amended).

The following assessments were conducted to identify and assess the issues associated with the proposed development, as well as to comparatively assess all project alternatives:

- Agricultural and Soils Compliance Statement[7];
- Surface Water Impact Assessment[8];
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Heritage Impact Assessment (including Palaeontology, Archaeology & Cultural Landscape);
- Palaeontological Impact Assessment;
- Desktop Social Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Terrestrial Ecology Impact Assessment[9]; and
- Visual Impact Assessment.

It must be noted that the proposed development includes a solar PV plant, on-site switching substation as well as an associated overhead power line. As a result, three (3) separate screening tools had to be run to ensure that all the requisite specialist assessments and impacts associated with the proposed development were accurately assessed as part of the BA process. The three (3) screening tool reports can be found in **Appendix 9E**. A summary of the applicable themes which identified sensitivities as per the screening tool is detailed in the table below.

**Table 2:** Summary of the screening tool results and associated methodologies for specialist impact assessments

| Theme | Solar PV Plant Screening tool | On-site Switching Substation Screening Tool | Overhead Power Line Screening tool | Gazetted Protocol | Protocol- Appendix 6 |
|---|---|---|---|---|---|
| Agricultural and Soils[7] | X | X | X | X | |
| Surface Water[8] | X | X | X | X | |
| Avifauna (including pre-construction monitoring) | X | | X | X | |
| Heritage, including[10]:<br>o Archaeology;<br>o Palaeontology;<br>o Cultural Landscape. | X | X | X | | X |
| Geotechnical | X | X | X | | X |
| Social | X | | | | X |
| Terrestrial Ecology[9] | X | X | X | X | |
| Visual | X | | X | | X |

The above-mentioned specialist assessments were also undertaken to inform the impact assessment of the proposed development. The specialists assessed the entire application site[11] and power line corridors as part

[7] Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources for a site identified by the national web based environmental screening tool as being of 'medium' or 'low' sensitivity for agricultural resources, gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

[8] Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

[9] Protocol for the assessment and reporting of environmental impacts on terrestrial biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

[10] The Heritage and Palaeontological Impact Assessments were undertaken as standalone assessments, however, the findings of the Palaeontological Impact Assessment were used in order to inform the Heritage Impact Assessment (HIA)

[11] It should be noted that the property which forms part of the project **application site** is approximately **115.540ha** in extent. The **buildable area** will however likely cover up to approximately **23.864ha** of the application site. It should be noted that although the PV array area will cover an area of up to approximately 23.864ha, the entire area will not be

of their respective assessments, and also focused on specific impacts of the proposed PV development area and solar PV plant and power line infrastructure in detail. In addition, the specialist assessments also included the identification of sensitive and/or 'no-go' areas. These sensitive / 'no-go' areas were subsequently used to inform the area for the potential erection of PV panels and associated infrastructure within the application site (referred to as the PV development area[12]) as well as the 132kV overhead power line route.

It should be noted that none of the specialists found any issues or fatal flaws with the final layout being proposed for authorisation. Key issues relating to the proposed development area are discussed in **section 8** and **section 9** respectively.

## 1.5 Decision-Making Authority Consultation

The NW DEDECT is the competent authority for this proposed development. A Pre-Application Meeting with the NW DEDECT was not required (as confirmed by the Department). An application for EA for the proposed development was submitted to the NW DEDECT on Friday 11 June 2021. The proof of payment for the application fee, details of the EAP and Declaration of Independence (DoI), declaration signed by the Applicant, the project schedule, details of landowners, landowner consents, and locality map formed part of the application form. This DBAR was submitted to the NW DEDECT on the same day that the application for EA was submitted (namely Friday the 11th of June 2021). Following the allocation of the NW DEDECT reference number, this will be included in the FBAR.

A record of all decision-making authority consultation is included within **Appendix 4**.

## 1.6 Expertise of Environmental Assessment Practitioner (EAP)

SiVEST has considerable experience in the undertaking of BAs. Staff and specialists who have worked on this proposed development and contributed to the compilation of this DBAR are detailed in **Table 3** below.

**Table 3:** Project Team

| Name | Organisation | Role |
|---|---|---|
| John Richardson | SiVEST SA (Pty) Ltd | Divisional Manager / Lead Project Coordinator |
| Michelle Nevette | SiVEST SA (Pty) Ltd | Divisional Manager / Project Review |
| Liandra Scott-Shaw* | SiVEST SA (Pty) Ltd | Project Coordinator / Environmental Consultant |
| Stephan Jacobs | SiVEST SA (Pty) Ltd | Project Coordinator / Environmental Consultant |
| Kerry Schwartz | SiVEST SA (Pty) Ltd | GIS, Mapping and Visual** |
| Mark Summers | SiVEST SA (Pty) Ltd | Environmental Consultant and Visual** |
| Hlengiwe Ntuli | SiVEST SA (Pty) Ltd | Public Participation Consultant |
| Stephen Burton* | SiVEST SA (Pty) Ltd | Surface Water Specialist** |
| Garry Paterson | ARC | Agriculture & Soils Specialist |
| Chris Van Rooyen | Chris Van Rooyen Consulting | Avifauna (Birds) Specialist |
| Wouter Fourie | PGS | Heritage and Archaeology Specialist |
| Elize Butler | Banzai Environmental (Pty) Ltd | Palaeontology Specialist |

cleared as the PV panels only require small areas of vegetation to be cleared. It should be noted that less than 20ha of indigenous vegetation will ultimately be cleared (as determined by the specialist)

[12] PV modules will not necessarily be erected in the entire proposed PV development area, particularly where PV modules cannot be placed

| Name | Organisation | Role |
|---|---|---|
| Tsebo Majoro | Urban Econ Development Economists | Socio-Economic Specialist |
| Keval Singh | JG Afrika | Geotechnical Specialist |
| David Hoare | David Hoare Consulting | Terrestrial Ecology Specialist |

**Individual no longer employed by SiVEST SA (Pty) Ltd.*

***Specialist assessments undertaken by SiVEST's in-house specialists.*

As per the requirements of the NEMA 2014, (as amended), the details and level of expertise of the persons who prepared the DBAR are provided in **Table 4** below. The EAP Affirmation and Declaration of Independence (DoI) is contained in **Appendix 3**.

**Table 4:** Expertise of the EAP

| **Role** | **Details** |
|---|---|
| **Lead Project Coordinator** | **SiVEST SA (Pty) Ltd – John Richardson** |
| Contact Details | johnr@sivest.co.za |
| Qualifications | BSc Hons (Geography and Environmental Management) – University of KwaZulu-Natal |
| Professional Affiliations | IAIAsa Membership Number: 2143 |
| Expertise | John has approximately thirteen years' professional experience as an environmental scientist and GIS specialist in a range of environmental and strategic planning projects, processes and applications for private, government and commercial clients. Mr Richardson has experience in conducting Environmental Screening Assessments, Basic Assessment, Scoping and Full Environmental Impact Assessment, and Section 24G compliance process under the 2006, 2010 & 2014 National Environmental Management: Environmental Impact Assessment Regulations, his experience includes Environmental Control Officer (ECO) site auditing duties and management of the GIS mapping requirements for several Biodiversity Sector Plans, Strategic Environmental Assessments, Environmental Management Frameworks and Strategic Environmental Management Plans.<br><br>John prescribes to the International Association for Impact Assessment South Africa (IAIAsa) code of conduct and was between 2009-2014 a committee member of the KwaZulu-Natal branch. He was in August 2014 elected as the IAIAsa KwaZulu-Natal Branch Chairman and served as branch chairman for a two-year term. In August 2017 he was elected to serve on the IAIAsa National Executive Committee for a two-year term. John is currently in the process of registering with the Environmental Assessment Practitioners Association of South Africa (EAPASA). |
| **Project Coordinator / Project Review** | **SiVEST SA (Pty) Ltd – Michelle Nevette** |
| Contact Details | michellen@sivest.co.za |
| Qualifications | BA (Economics), Honours in Environmental Management<br>MEnvMgt. (Environmental Management) |
| Professional Affiliations | ▪ South African Council for Natural Scientific Professions: Cert.Nat.Sci. reg. No. 120356<br>▪ International Association for Impact Assessment South Africa (IAIAsa)<br>▪ Environmental Assessment Practitioners Association of South Africa (EAPSA) No.2019/1560 |
| Expertise | Michelle has expertise in Environmental Project Management and Environmental Impact Assessment. Michelle's strong managerial skills have been extensively used in setting up and running projects. She is responsible for the management of a team of environmental impact assessment practitioners, and on-going responsibilities on various environmental projects including review of processes and reports. Extensive experience in following the Basic Assessment and Environmental Impact procedure for a wide range of projects, as well as in preparing Environmental Management Plans, consulting with authorities and conducting Audits. |

| Role | Details |
|---|---|
| **Project Coordinator / Environmental Consultant** | **SiVEST SA (Pty) Ltd - Stephan Jacobs** |
| Contact Details | stephanj@sivest.co.za |
| Qualifications | B.Sc. Environmental Sciences (undergraduate) and B.Sc. (Hons) Environmental Management and Analysis |
| Professional Affiliations | IAIAsa Membership Number: 5736 |
| Expertise | Stephan specialises in the field of Environmental Management and has vast experience undertaking EIA and BA processes for various types of projects / developments, in particular renewable energy projects / developments which form part of South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) as well as the 2020 Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). As such, Stephan has vast experience with regards to the compilation of EIA and BA reports. Additionally, Stephan has extensive experience in undertaking and facilitating public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of field work and the compilation of reports for specialist studies such as Surface Water and Visual Impact Assessments. Stephan also has considerable experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects. |

Please refer to attached CV's in **Appendix 1** for more information. DoIs for each respective specialist are contained in **Appendix 3**.

## 1.7 Draft Basic Assessment Report (DBAR) Structure

This DBAR is structured as follows:

- **Chapter 1** Provides an introduction and background to the proposed project and outlines the purpose of this document and the assumptions and limitations applicable to the study. Furthermore, the chapter discusses the experience of the EAP as well as specialists who have contributed to the report;
- **Chapter 2** elaborates on the assumptions and limitations pertaining to the BA process for the proposed development;
- **Chapter 3** presents the location of the proposed development, including 21-digit Surveyor General codes. This section also includes coordinates of the application site, as well as corner points and centre point coordinates for associated infrastructure;
- **Chapter 4** presents the technical description of the proposed development;
- **Chapter 5** presents a description of alternatives being considered;
- **Chapter 6** expands on the relevant legal ramifications applicable to the proposed development and describes relevant development strategies and guidelines;
- **Chapter 7** provides explanation to the need and desirability of the proposed development;
- **Chapter 8** provides a description of the region in which the proposed development is intended to be located. Although the chapter provides a broad overview of the region, it is also specific to the application. It contains descriptions of the site and the specialist studies conducted are also summarised;
- **Chapter 9** identifies potential impacts associated with the proposed development. The chapter further identifies these impacts per specialist study and discusses potential cumulative impacts per environmental issue (i.e. per specialist study). In addition, a rating of each environmental issue before and after the implementation of mitigation measures is also presented. **Chapter 9** also discusses layout alternatives, including how they relate to sensitive areas identified by specialists and provides a comparison of alternatives;
- **Chapter 10** describes the Public Participation Process (PPP) undertaken during the BA process and tables issues and concerns raised by Interested and/or Affected Parties (I&APs) and key stakeholders;

- **Chapter 11** summarises the findings and recommendations per specialist study and provides the overall conclusion;
- **Chapter 12** outlines the processes to be followed, following the submission of the DBAR; and
- **Chapter 13** lists references indicated in the DBAR.

# 2 ASSUMPTIONS AND LIMITATIONS

## 2.1 General Assumptions and Limitations

- It is assumed that all information provided to the Environmental Team by the applicant was correct and valid at the time it was provided;
- It is not always possible to involve all I&APs individually, however, every effort has been / is being made to involve as many interested parties as possible. It is also assumed that individuals representing various associations or parties convey the necessary information to these associations / parties;
- It is assumed that the information provided by the various specialists is unbiased and accurate;
- It is not possible to determine the actual degree of the impact that the proposed development will have on the immediate environment without some level of uncertainties. Actual impacts can only be determined following the commencement of construction and/or operation; and
- SiVEST undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. The information that could be obtained for the surrounding planned renewable energy developments was taken into account as part of the cumulative impact assessment.

## 2.2 Specialist Assumptions and Limitations

The following assumptions, uncertainties and gaps in knowledge were encountered by the various specialists:

### *2.2.1 Terrestrial Ecology*

The following assumptions, limitations, uncertainties are listed regarding the ecological assessment of the project site:

- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed.
- The faunal component of the study relies primarily on existing information, as available in various spatial databases and published accounts. These databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists for an area do not always adequately reflect the actual fauna and flora present at the site. In order to counter the likelihood that the area has not been well sampled in the past and in order ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study area and are likely to include a much wider array of species than actually occur at the site. The study excludes Bats, Avifauna, Aquatic Ecology and Invertebrates.
- Cumulative impacts are assessed by adding expected impacts from this proposed development to existing and proposed developments of a similar nature that are within a 50 km radius of the proposed project site.

### *2.2.2 Surface Water*

- This study has focused on a short term study whereby the identification, delineation and assessment of surface water resources found within the study site has been undertaken. A detailed in-field delineation of all surface water resources in the wider area has not been undertaken. Additionally, given the short term nature of the study, the study should not be undertaken to be a comprehensive study of vegetation and faunal species occurrence for the surface water resources on the study site.

- The fieldwork component was undertaken on the 13th September 2016 and the 19th of August 2020. Given the once-off nature of the assessment, seasonal limitations apply. This study should therefore not be taken as a comprehensive study of vegetation and faunal species occurrence for the surface water resources identified on the study site, since some species may not have been present at the time.
- A Global Positioning System (GPS) device was used to ground-truth surface water resources as well as for delineation purposes. The GPS is expected to be accurate from 5m up to 15m depending on meteorological conditions.
- It must be noted that the Present Ecological Status (PES) was not assessed in this study for the artificial wetlands. The WET Health methodology (Macfarlane *et al*., 2009) focuses on natural wetlands and assessing the deviation from the reference natural condition. Artificial wetlands are created and therefore do not have a reference condition from which to assess since they are created for specific purposes and are not naturally occurring systems.
- The WET-EcoServices (Kotze *et al*., 2009) methodology is limited to wetlands. This was not applied to any watercourses (i.e. drainage lines) identified.
- Groundwater, hydrology, aquatic studies of fish, invertebrates, amphibians etc. have not been included in this study.
- Use of database information for the desktop assessment included the National Freshwater Ecosystem Priority Areas (NFEPA, 2011) database. This database is a national level database and some smaller surface water resources may not be identified if the database. Additionally, mainly wetlands with permanent inundation are included in the database. Therefore, wetlands with seasonal and temporary saturation cycles may not be included. The fieldwork component was included in the assessment to verify the desktop database information in order to address these shortcomings.
- As an avifaunal component to the biodiversity assessment is being carried out for the proposed development, impacts as related to avifauna are not included in this report. It is assumed that potential impacts to avifauna are included in the standalone avifauna assessment.

#### *2.2.3 Avifauna*

This study assumed that the sources of information used in this report are reliable. In this respect, the following must be noted:

- The focus of the study is primarily on the potential impacts on priority species which were defined as follows:
    - South African Red Data species;
    - South African endemics and near-endemics;
    - Waterbirds; and
    - Raptors
- The impact of solar installations on avifauna is a new field of study, with only one (1) published scientific study on the impact of PV facilities on avifauna in South Africa (Visser et al. 2019). Strong reliance was therefore placed on expert opinion and data from existing monitoring programmes at solar facilities in the USA where monitoring has been ongoing since 2013. The pre-cautionary principle was applied throughout as the full extent of impacts on avifauna at solar facilities is not presently known.
- The assessment of impacts is based on the baseline environment as it currently exists in the application site.
- Cumulative impacts include all solar PV projects within a 50km radius that currently have open applications or have been approved by the Competent Authority.
- Conclusions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will be valid under all circumstances.

- The site was classified as a Low Sensitivity site as defined in the Solar Guidelines, requiring a Regime 1 protocol to be followed for data collection i.e. a minimum of one (1) site visit of 1 to 5 days in duration.

### *2.2.4 Heritage, Archaeology and Cultural Landscape*

- Not detracting in any way from the comprehensiveness of the fieldwork undertaken, it is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the subterranean nature of some archaeological sites and the current dense vegetation cover. As such, should any heritage features and/or objects not included in the present inventory be located or observed, a heritage specialist must immediately be contacted.
- Such observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to make an assessment as to the significance of the site (or material) in question. This applies to graves and cemeteries as well. If any graves or burial places are located during the developments, the procedures and requirements pertaining to graves and burials will apply as set out below.

### *2.2.5 Palaeontology*

The accuracy of the Palaeontological Desktop Assessment (PDA) is reduced by several factors which may include the following:

- The databases of institutions are not always up to date and relevant locality and geological information were not accurately documented in the past. Various remote areas of South Africa have not been assessed by palaeontologists and data is based on aerial photographs alone. Geological maps concentrate on the geology of an area and the sheet explanations were never intended to focus on palaeontological heritage.
- Similar Assemblage Zones, but in different areas is used to provide information on the presence of fossil heritage in an unmapped area. Desktop studies of similar geological formations and Assemblage Zones generally **assume** that exposed fossil heritage is present within the development area. The accuracy of the Palaeontological Impact Assessment is thus improved considerably by conducting a field-assessment.
- No fieldwork was required as the SAHRIS palaeontological sensitivity map rated the palaeontological sensitivity as low.

### *2.2.6 Social*

- Project-related information supplied by the environmental practitioner and the client for the purpose of the analysis is assumed to be reasonably accurate.
- The secondary data sources used to compile the socio-economic baseline (demographics, dynamics of the economy) although not exhaustive, can be viewed as being indicative of broad trends within the study area.
- Possible impacts, as well as stakeholder responses to these impacts, cannot be predicted with complete accuracy, even when circumstances are similar and these predictions are based on research and years of experience, taking the specific set of circumstance into account.
- Limited timeframes were allocated for the study. However, it is believed that the data gathered from various I&APs is sufficient to confidently predict the potential socio-economic impacts of the proposed project and objectively evaluate their significance. This is assuming that:
    - Questions asked during the interviews were answered accurately and truthfully by respondents and to the best of their abilities and knowledge.

- That the attitudes of the respondents towards the project will remain reasonably stable over the short- to medium-term.

- The focus on the primary data collection was on those parties that were perceived to be most sensitive to the proposed project. As such, it is believed that the study was able to identify the most significant impacts and assess the most pertinent issues.

### *2.2.7 Geotechnical*

The interpretation of the overall geotechnical conditions across the site are based on observations and point information acquired from a desktop level. Subsurface and geotechnical conditions intermediate to these have been inferred by extrapolation, interpolation and professional judgement. The information and interpretations are given as a guideline only. There is no guarantee that the information given is totally representative of the entire area in every respect and no responsibility will be accepted for consequences arising out of the fact that actual conditions vary from those inferred.

### *2.2.8 Visual*

- Given the nature of the receiving environment and the height of the proposed PV panels and associated infrastructure elements, the study area or visual assessment zone is assumed to encompass an area of 5km from the boundary of the application site. This limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus, although the proposed development may still be visible beyond 5km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.
- In assessing the potential visual impacts for the proposed 132kV power line, the visual assessment zone is assumed to encompass a zone of 5km from the outer boundary of the combined power line assessment corridors.
- Due to the extent of the study area and the potentially large number of receptor locations, the identification of visual receptors was undertaken via desktop means only, using Google Earth imagery. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development. It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.
- Site visits were undertaken during the initial phase of the project in October 2016 and again in August 2020 with the aim of verifying the visual character and level of transformation in the area and conducting a photographic survey of the area.
- For the purposes of the VIA, all analysis is based on a worst-case scenario where PV panel heights are assumed to be 4m and the tower heights for the proposed overhead power line is assumed to be 30m.
- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for the study area derived from the National Geo-Spatial Information (NGI)'s 25m DEM is fairly coarse and somewhat inconsistent and as such, minor topographical features or small undulations in the landscape may not be depicted on the DEM.
- No viewsheds were generated during this visual study, as the topography within the study area is relatively flat and no detailed contour information was available. Within this context, minor topographical features, vegetative screening, or man-made structures would be the most important factors influencing the degree of visibility and these would not be factored into the viewsheds.
- The impact rating assessment of the proposed development on some of the potentially sensitive visual receptor locations was undertaken via desktop means. Although the use of the farmsteads / residential

dwellings could not be established during the field investigation, they were still regarded as being potentially sensitive to the visual impacts associated with the proposed development and were assessed as part of the VIA.

- The potential visual impact at each visual receptor location was assessed, via desktop means, using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides a reasonably accurate indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.
- The assessment of receptor-based impacts has been based on the solar PV power plant layout and power line route alignment provided by the proponent. It is recognised however that this layout is preliminary, and is subject to changes based on a number of potential factors, including the findings of the BA studies. The PV panel areas, associated infrastructure and power line corridors may thus move, which may result in greater or lesser visual impacts on receptor locations.
- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of the Wildebeestkuil DBAR will however be incorporated into further drafts of this report, if relevant.
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed development and therefore the potential impact of lighting at night has not been assessed at a detailed level. However, lighting requirements are relatively similar for all Solar PV Energy Facilities (SPEFs) and as such, general measures to mitigate the impact of additional light sources on the ambiance of the nightscape have been provided.
- This study includes an assessment of the potential cumulative impacts of other renewable energy developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments.
- SiVEST made every effort to obtain information for the surrounding planned renewable energy developments (including specialist studies, assessment reports and Environmental Management Programmes), however, some of the documents are not currently publicly available for download. The available information was factored into the cumulative impact assessment (**Section 9.4.6**).
- No photomontages (visualisation models) were undertaken for the proposed development. This can however be provided should the Public Participation process identify the need for this exercise.
- Most rainfall within the area occurs from October to March, during the summer months. During winter months, the visual impact of the proposed development may be greater, particularly from farmhouses surrounded by tall deciduous trees. The surrounding vegetation is however expected to provide only minimal potential screening. Hence the site visit (in August 2020), was undertaken at a time when the local vegetation cover would provide little screening of the proposed development.
- Clear weather conditions tend to prevail throughout most of the year in this area, and in these clear conditions, PV panels and power lines would present a greater contrast with the surrounding landscape than they would on an overcast day. Weather conditions were clear during the site visit and this was taken into consideration when undertaking this VIA.

# 3 LOCATION OF THE ACTIVITY

The proposed development is located approximately 4 km east of the town of Leeudoringstad, within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District Municipality of the North West Province of South Africa. The proposed development is located directly west of the Harvard Substation, where the current supply of electricity for the local areas and businesses is extracted from.

The development assessed as part of the BA process incorporates fifteen (15) properties / farm portions within the Maquassi Hills Local Municipality in the Dr Kenneth Kaunda District Municipality. However, only fourteen (14) properties / farm portions are affected by the solar PV plant and power line corridor route associated with the 'preferred' power line corridor alternative (namely Option 1). These include the following:

- Portion 13 of the Farm Wildebeestkuil No. 59
- Portion 14 of the Farm Wildebeestkuil No. 59;
- Remainder of Portion 22 of the Farm Wildebeestkuil No. 59
- Remainder of Portion 5 of the Farm Wildebeestkuil No. 59;
- Remainder of Portion 7 of the Farm Leeuwbosch No. 44;
- Portion 35 of the Farm Leeuwbosch No. 44;
- Portion 36 of the Farm Leeuwbosch No. 44;
- Portion 37 of the Farm Leeuwbosch No. 44;
- Portion 38 of the Farm Leeuwbosch No. 44;
- Portion 42 of the Farm Leeuwbosch No. 44***;
- Portion 43 of the Farm Leeuwbosch No. 44***;
- Portion 44 of the Farm Leeuwbosch No. 44***;
- Portion 45 of the Farm Leeuwbosch No. 44***; and
- Portion 28 of the Farm Wildebeestkuil No. 59***.

******Properties / farm portions are road / rail servitudes***

The total area of the application site for the solar PV plant which was assessed by the respective specialists as part of the BA process is approximately 115.540ha in extent and includes the following properties / farm portions:

- Portion 13 of the Farm Wildebeestkuil No. 59;
- Portion 14 of the Farm Wildebeestkuil No. 59; and
- Remainder of Portion 22 of the Farm Wildebeestkuil No. 59.

**Table 5:** Summary of properties / farm portions affected by proposed development

| FARM DESCRIPTION | 21-DIGIT SURVEYOR GENERAL (SG) CODE |
|---|---|
| Portion 13 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900013 |
| Portion 14 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900014 |
| Remainder of Portion 22 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900022 |
| Remainder of Portion 5 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900005 |
| Remainder of Portion 7 of the Farm Leeuwbosch No. 44 | T0HP00000000004400007 |
| Portion 35 of the Farm Leeuwbosch No. 44 | T0HP00000000004400035 |
| Portion 36 of the Farm Leeuwbosch No. 44 | T0HP00000000004400036 |
| Portion 37 of the Farm Leeuwbosch No. 44 | T0HP00000000004400037 |
| Portion 38 of the Farm Leeuwbosch No. 44 | T0HP00000000004400038 |

| FARM DESCRIPTION | 21-DIGIT SURVEYOR GENERAL (SG) CODE |
|---|---|
| Portion 42 of the Farm Leeuwbosch No. 44 | T0HP00000000004400042 |
| Portion 43 of the Farm Leeuwbosch No. 44 | T0HP00000000004400043 |
| Portion 44 of the Farm Leeuwbosch No. 44 | T0HP00000000004400044 |
| Portion 45 of the Farm Leeuwbosch No. 44 | T0HP00000000004400045 |
| Portion 28 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900028 |

| APPLICATION SITE FOR SOLAR PV PLANT ASSESSED AS PART OF BA PROCESS | | |
|---|---|---|
| **CENTRE POINT COORDINATES (DD MM SS.sss)** | | |
| **POINT** | **SOUTH** | **EAST** |
| CENTRE | S27° 13' 26.675" | E26° 17' 8.295" |
| **PV SITE AREA[13]** | | |
| **CENTRE POINT COORDINATES (DD MM SS.sss)** | | |
| **POINT** | **SOUTH** | **EAST** |
| CENTRE | S27° 13' 31.275" | E26° 17' 4.620" |

| PREFERRED 132kV POWER LINE CORRIDOR ALTERNATIVE | | | | |
|---|---|---|---|---|
| **CENTRE LINE COORDINATES (DD MM SS.sss)** | | | | |
| **CORRIDOR ALTERNATIVE** | **START POINT** | **MIDDLE POINT** | **END POINT (LEEUDORINGSTAD SOLAR PLANT SUB)** | **APPROX LENGTH (KM)** |
| Option 1 (Overhead Power Line) | S27° 13' 17.571" | S27° 12' 47.378" | S27° 12' 15.722" | 2.49 |
| | E26° 17' 27.090" | E26° 17' 47.372" | E26° 18' 24.623" | |

Refer to **Appendix 9A** for the full list of coordinates (including all the bending points of the proposed preferred power line corridor alternative, from the starting point to the finishing point).

[13] Area where PV panels will be erected. It should be noted that although the PV array area will cover an area of up to approximately 23.864ha, the entire area will not be cleared as the PV panels only require small areas of vegetation to be cleared. It should be noted that less than 20ha of indigenous vegetation will ultimately be cleared.

The proposed development location is shown in the locality map (

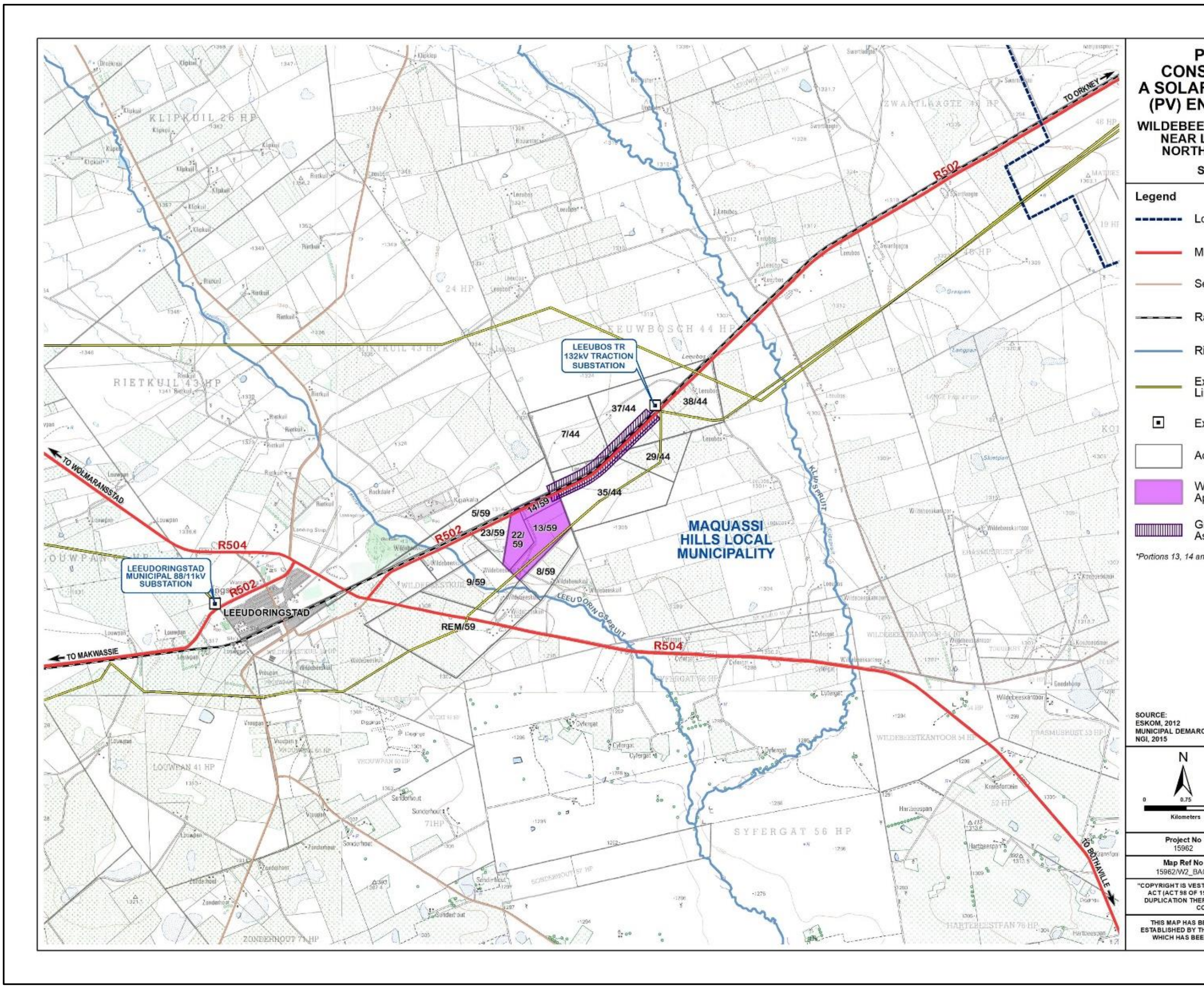


**Figure 3**) below

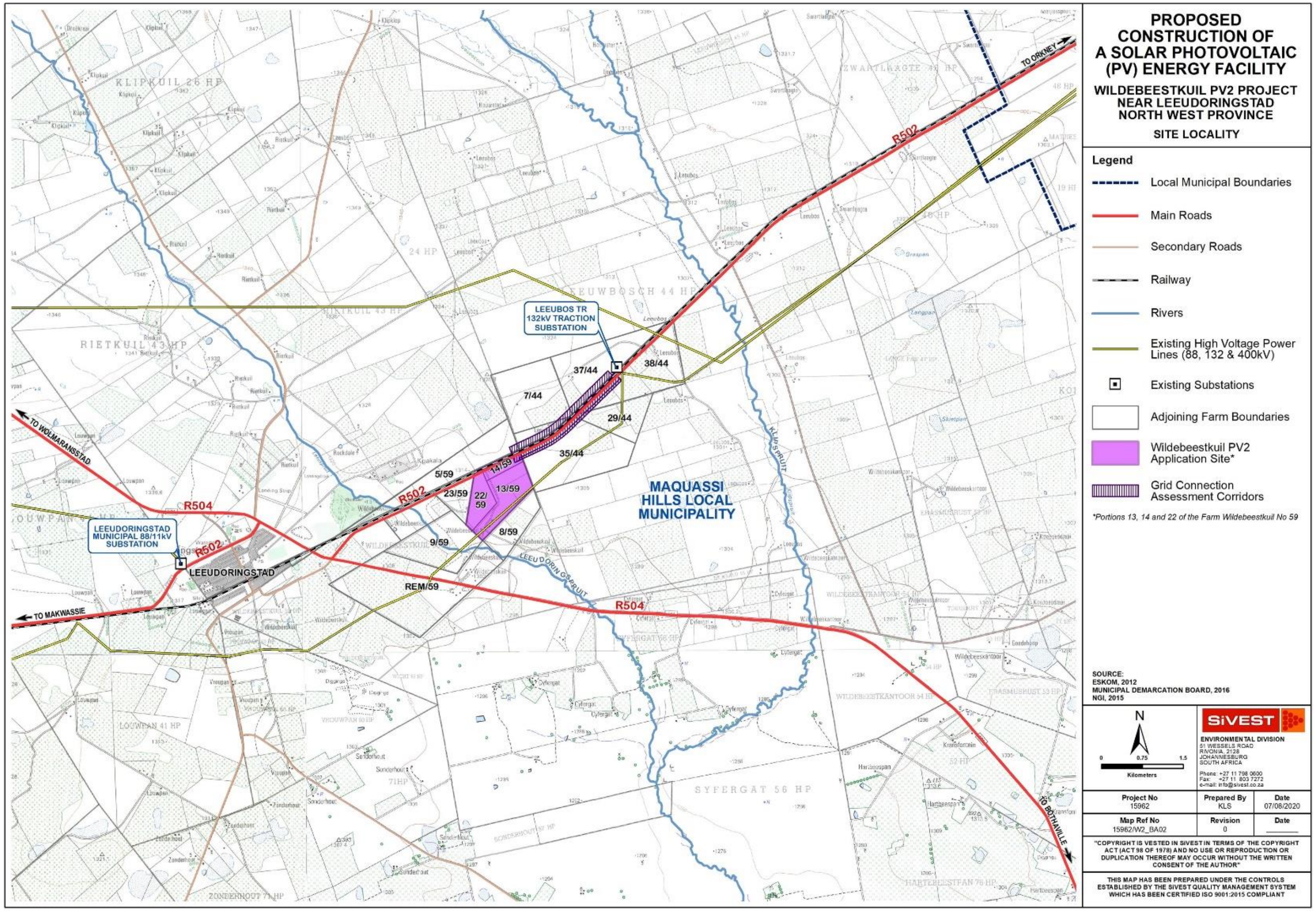


**Figure 3:** Proposed 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line site locality map

# 4 ACTIVITY INFORMATION

Wildebeestkuil PV Generation is proposing the construction of a solar PV plant, 132kV overhead power line and associated infrastructure (which includes, but is not be limited to, internal access roads, a switching substation, permanent guard house and temporary building zone) on the development site near the town of Leeudoringstad in the North West Province.

The proposed solar PV plant will have a maximum total generation capacity of up to approximately 9.9MW, while the proposed associated overhead power line will have a capacity of up to approximately 132kV. For the purpose of this BA, corridors between approximately 60m and 150m wide were assessed for the proposed power line corridor route alternatives. This is to allow for flexibility to route the power line within the assessed corridor. Based on the option chosen as 'preferred' for the power line corridor route alternative (namely Option 1), the proposed preferred power line corridor will run for a length of approximately 2.49km from the proposed on-site switching substation (located on Portion 13 of the Farm Wildebeestkuil No. 59) and finally to the Leeudoringstad Solar Plant Substation (located on Portion 37 of the Farm Leeuwbosch No. 44) (part of a separate BA process with **Department Ref No.:** To be Allocated). It should be noted that the final servitude width of the proposed 132kV power line will be determined during the BA process, however, it expected that it will not exceed 32m. As such, the selected preferred power line will be routed within the assessed corridor.

Where transmission lines cross South African National Roads Agency SOC Ltd (SANRAL) and/or Transnet infrastructure, this will be done by means of underground cabling. At this stage it is anticipated that this will involve pipe jacking under these existing linear structures.

The proposed on-site switching substation will have a voltage capacity of more than 33kV but less than 275kV and will be a step-up substation. The exact capacity of the proposed on-site switching substation will be determined and confirmed at a later stage. The switching substation will connect the proposed Wildebeestkuil 2 Solar PV Plant to the 132kV power line, which will then connect to the Leeudoringstad Solar Plant Substation (part of separate BA process).

The typical electricity generation process associated with a solar PV plant and power line development (such as the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line) is illustrated in **Figure 4** below.

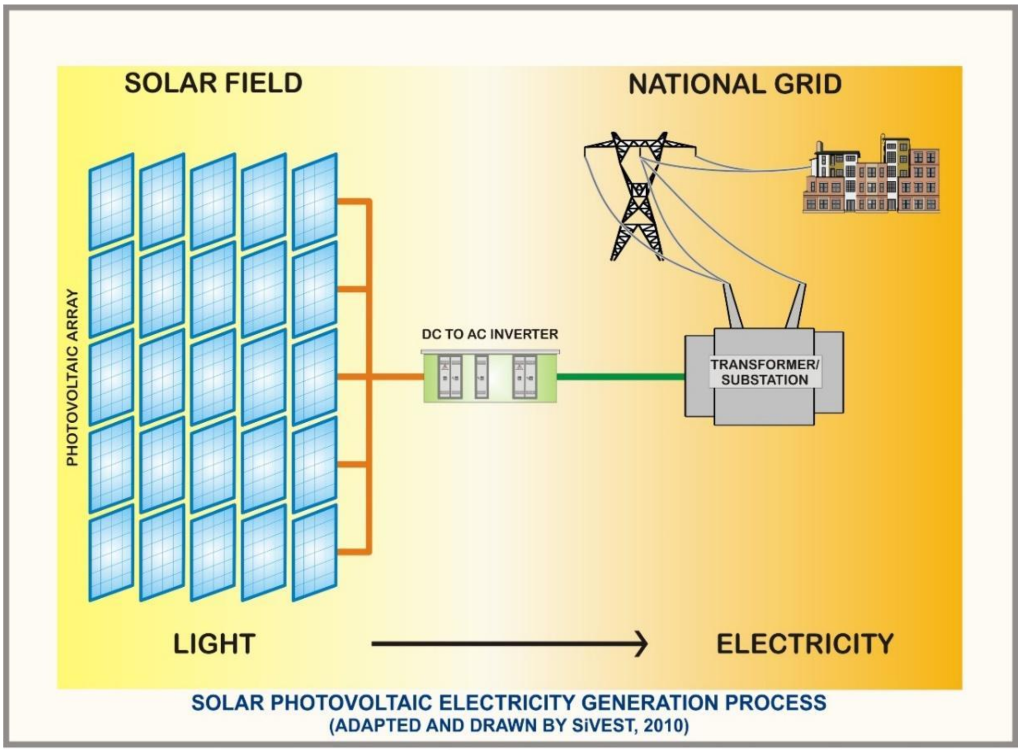


**Figure 4:** Conceptual PV electricity generation process showing electrical connections (for illustration purposes and not necessarily an accurate depiction of the final layout of infrastructure components)

## 4.1 Solar Field

The proposed solar PV plant will include a PV field (array) comprising of multiple PV modules. The PV modules are arranged in rows and columns, some of which may require levelling of the terrain and associated slope stabilisation measures. At this stage the orientation of the solar PV panels is unknown. It is however anticipated that the PV panels will be single axis tracking, will not be fixed and will be able to rotate in order to 'track' the sunlight. the modules will be either crystalline silicon or thin film technology. Each PV module will be approximately 2274mm (≈2.3m) long and 1134mm (≈1.1m) wide and mounted on supporting structures above ground. The foundations for the PV panels will most likely be either concrete or rammed piles. The final design details (including the structure orientation and foundation design) will finalised during the detailed design phase of the proposed development, prior to construction.

The typical components of a solar PV panel using tracking technology are illustrated in **Figure 5** below.

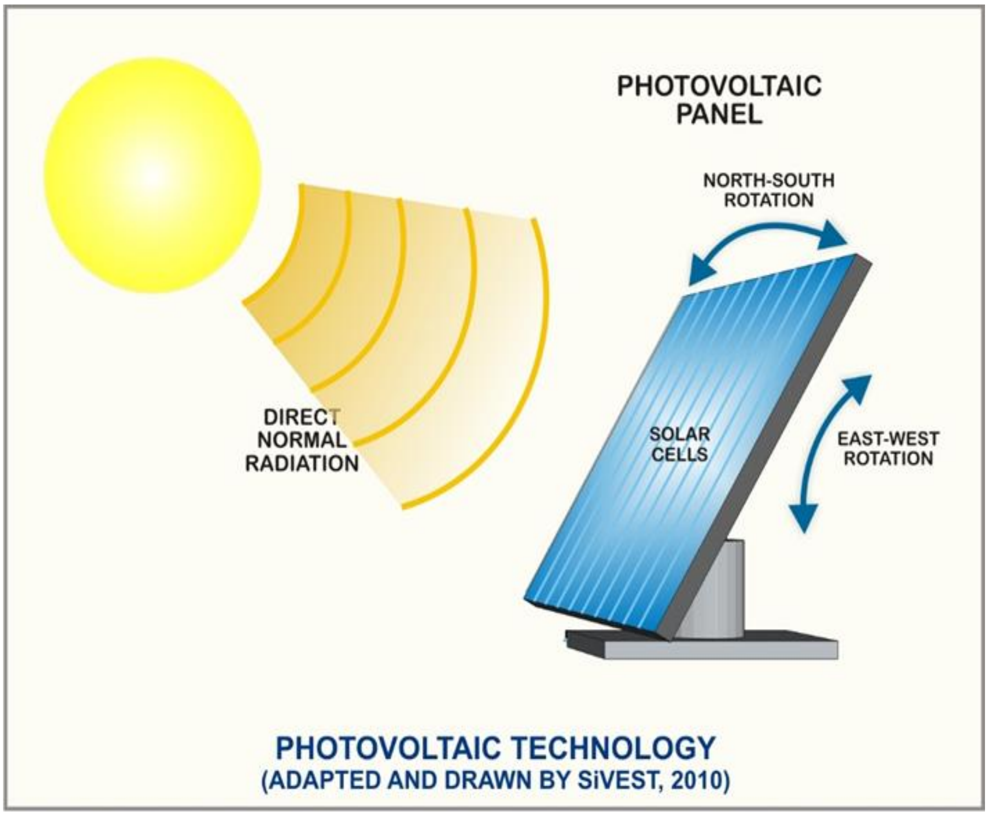


**Figure 5:** Typical components of a solar PV panel using tracking technology

## 4.2 On-site Switching Substation

The proposed development will include the construction of one (1) new on-site switching substation, occupying an area of up to approximately 0.2003ha (i.e. 2 003m$^2$). The substation will have a capacity of more than 33kV but less than 275kV. The voltage capacity of the on-site switching substation will be confirmed throughout the BA process. As mentioned, the proposed on-site switching substation will contain transformer(s) for voltage step-up from medium voltage to high voltage. Direct Current (DC) power from the modules will be converted into Alternating Current (AC) power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers.

## 4.3 Underground Cabling

Medium voltage cabling (anticipated to be approx. 0.8m x 0.6m wide at this stage) will link the various PV arrays to the on-site switching substation. These cables will be laid underground, wherever technically feasible.

In addition, where transmission lines cross South African National Roads Agency SOC Ltd (SANRAL) and/or Transnet infrastructure, this will also be done by means of underground cabling. At this stage it is anticipated that this will involve pipe jacking under these existing linear structures.

## 4.4 Electrical Infrastructure (Overhead Power Line)

One (1) overhead power line with a voltage capacity of up to approximately 132kV is being proposed. Based on the option chosen as 'preferred' for the power line corridor alternative (namely Option 1), the proposed preferred power line corridor will run for a length of approximately 2.49km from the proposed on-site switching substation (located on Portion 13 of the Farm Wildebeestkuil No. 59) and finally to the Leeudoringstad Solar

Plant Substation (located on Portion 37 of the Farm Leeuwbosch No. 44) (part of separate BA process). As mentioned, where transmission lines cross SANRAL and/or Transnet infrastructure, this will be done by means of underground cabling. At this stage it is anticipated that this will involve pipe jacking under these existing linear structures.

At this stage, the type of towers being considered for the proposed power line includes both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The type of power line towers will be determined during the final design stages of the proposed development, prior to construction commencing. The height will vary based on the terrain, but will ensure minimum overhead line (OHL) clearances with buildings and surrounding infrastructure. It should be noted that final design details are yet to be confirmed. These details (including the exact height and location of the power line towers) will be confirmed during the final design stages of the power line design process, before construction commences.

The typical electricity generation process associated with a solar PV plant and power line is illustrated in **Figure 4** above.

## 4.5 Internal Roads

Access to the solar PV plant and power line towers will be via existing gravel roads which connect to the tarred R502 road. Existing internal gravel site roads will be used to access the PV arrays as well as the on-site switching substation. However, where required, new internal gravel roads of up to approximately 4m wide may be constructed.

## 4.6 Temporary Infrastructure

Temporary infrastructure may be constructed to obtain water from available local sources. At this stage it is anticipated that existing boreholes will be utilised. Water will potentially be stored in temporary water storage tanks. The necessary approvals from the DWS will be applied for separately (should this be required).

In addition, one (1) temporary building zone, of up to approximately 0.2944ha (i.e. 2 944m$^2$), is also being proposed.

## 4.7 Other Associated Infrastructure

Other associated infrastructure includes the following:

- One (1) permanent guard house, occupying a site of approximately 0.0876ha (i.e. 876m$^2$);
- Fencing will surround the entire proposed solar PV plant. At this stage it is anticipated that the fencing will be approximately 2.1m high and will be made of galvanised steel with electrification on top. It is anticipated that fencing will cover an area of up to approximately 18ha. It should be noted that the 132kV power line will not be fenced; and
- Two (2) rail / road crossings will also be required for the proposed 132kV power line and will occupy areas of up to approximately 1.51ha and 0.54ha respectively.

# 5 ALTERNATIVES

As per the 2014 EIA Regulations (as amended), feasible and reasonable alternatives are required to be considered during the BA process. Alternatives are defined in Chapter 1 of the 2014 EIA Regulations (as amended) as "*different means of meeting the general purpose and requirements of the activity*". These alternatives may include:

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity;
(e) The operational aspects of the activity; and
(f) The option of not implementing the activity.

Each of the alternatives in relation to the proposed development is discussed in the sections below.

## 5.1 The properties on which or location where it is proposed to undertake the activity

No site alternatives for the proposed development are being considered as the placement of solar PV installations and power lines is dependent on several factors, all of which are favourable at the proposed site location. This included land availability and topography, environmental sensitivities, distance to the national grid, solar resource site accessibility and current land use. The project site has been identified based on solar resource, grid connection suitability, competition, topography, land availability and site access. The North West Province in South Africa has favourable solar irradiation potential. The project site receives an annual Global Horizontal Irradiation (GHI) ranging between 1972 and 2118kWh/m$^2$/year (**Figure 6**).

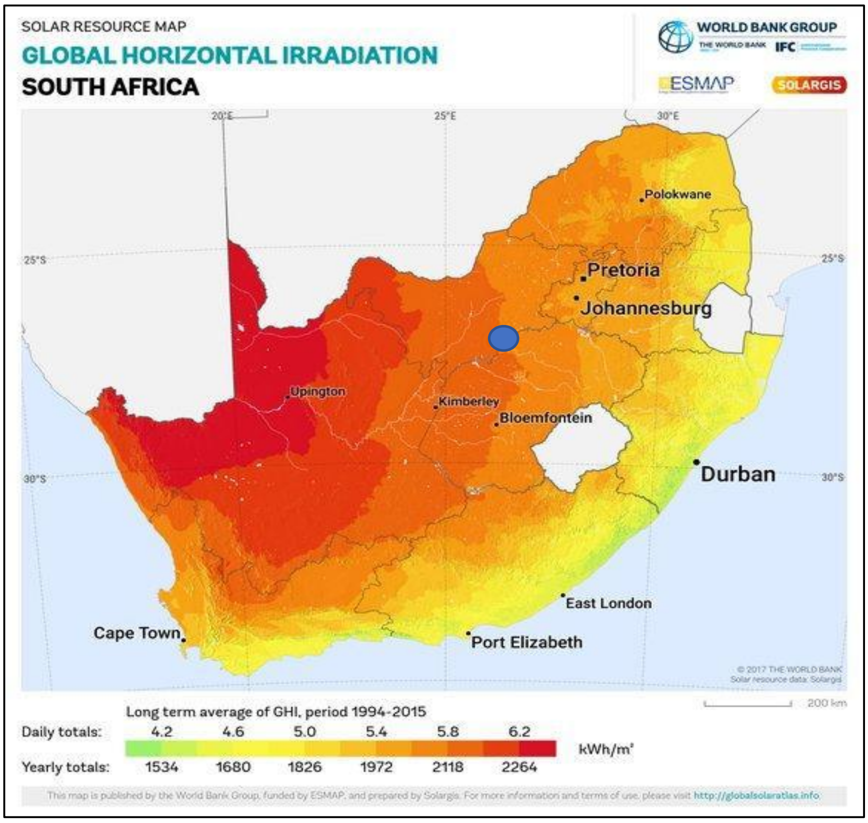


**Figure 6:** Global Horizontal Irradiation (GHI) map (Source - 2017 The World Bank, Solar resource data: SolarGis)

The project site has a flat topography which is suitable for the development of a solar PV plant and associated power line. In addition, the proposed development site also has low agricultural potential and is sparsely populated. The solar PV plant and associated power line is easily accessible via existing gravel roads which are linked to the tarred R502 road and allows direct access to the proposed solar PV plant. In addition, there is little existing infrastructure present within the solar PV plant application site and power line corridor routes that would constrain the proposed development. The project site will have access to the national grid via the Leeudoringstad Solar Plant Substation (part of separate BA process with **Department Ref No.:** To be Allocated), which is located within 3km of the proposed solar PV plant's application site.

The proposed site is therefore considered highly suitable for the proposed development and no other locations are being considered.

## 5.2 The type of activity to be undertaken

No other activity / technology alternatives are being considered. Renewable energy development in South Africa is highly desirable from a social, environmental and development point of view. Based on the flat terrain, the climatic conditions and current land use being agricultural, it was determined that the proposed site would be best-suited for a solar PV plant and associated power line, instead of any other type of renewable energy technology. It is generally preferred to install wind energy facilities (WEFs) on elevated ground. In addition, concentrated solar power (CSP) installations are not feasible because they have a high water requirement and the project site is located in a relatively arid area. There is also not enough rainfall in the area to justify a hydro-electric plant. Therefore, the only feasible technology alternative on this site is solar PV with associated power line, and as such this is the only technology alternative being considered. The associated overhead power line is also required in order to feed the electricity generated by the proposed solar PV plant into the national electricity grid. Therefore, no technology alternatives are feasible for assessment at this stage of the proposed development other than a solar PV plant and associated overhead power line.

One (1) type of activity is therefore considered (namely a solar PV plant and associated power line) in order to generate energy from a renewable source of energy, solar energy, and feed it onto the national electricity grid.

## 5.3 The design or layout of the activity

No design or layout alternatives for the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been considered or assessed as part of the current BA process. Design and layout alternatives were considered and assessed as part of a previous BA process that was never completed (see **section 1.2**), and as such the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been placed to avoid site sensitivities identified as part of a previous BA process as well as the current BA process. Specialist studies were originally undertaken in 2016 and the current layout being proposed was selected based on the environmental sensitivities identified as part of these studies in 2016. All specialist studies which were undertaken in 2016 were however updated in 2020 (including ground-truthing, where required) to focus on the impacts of the layout being proposed as part of the current BA application. The results of the updated specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or 'no-go' areas.

**Three (3) power line corridor route alternatives for the proposed 132kV power line were however identified and assessed by the respective specialists as part of the current BA process**. These alternatives essentially provide for different power line route alignments contained within an assessment corridor. For the purpose of this BA, corridors between approximately 60m and 150m wide were assessed for the proposed power line corridor route alternatives. This is to allow for flexibility to route the power line within the assessed corridor. The final servitude width of the proposed 132kV power line will be determined during the BA process, however, it expected that it will not exceed 32m. As such, the selected preferred power line will be routed within the assessed corridor.

Based on the specialist assessments, a few potentially sensitive and/or 'no-go' areas have been identified within the application site and power line corridor route alternatives. These areas were used to inform the development area for the PV panels and associated infrastructure (such as the on-site switching substation and guard house) as well as the 132kV overhead power line corridor route. The identified sensitive / 'no-go' areas were also used to perform a comparison of power line corridor alternatives. The power line corridor route alternatives were thus informed by the identified environmental sensitive and/or 'no-go' areas. The power line corridor alternatives and results of the comparative assessment of alternatives have been discussed in more detail in **section 9.5** and **9.6**.

It should be noted that the proposed layout (including overhead power line and other associated infrastructure) will avoid the environmental sensitivities which have been identified and assessed by the specialists (as listed in **section 1.4** above) as part of the BA process, where recommended by the respective specialist studies.

The proposed power line corridor alternatives which were investigated and comparatively assessed are presented in **Figure 7** below.

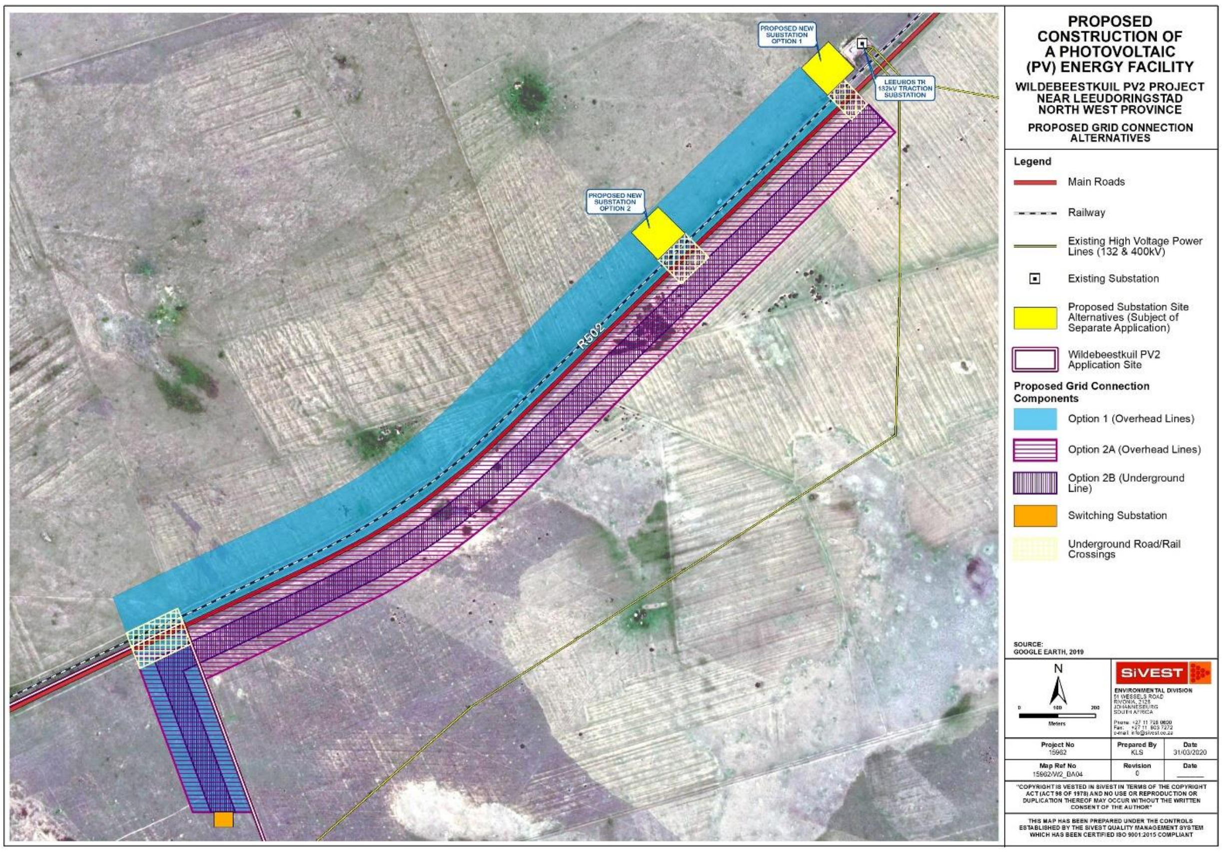


**Figure 7:** Layout map showing proposed power line corridor alternatives

Based on the findings of the comparative assessment of alternatives undertaken by the various specialists, a preferred power line corridor route alternative was selected. The preferred power line corridor route alternative, including maps, is presented in **section 9.5** and **9.6**. The selected preferred power line corridor alternative has been based on both environmental constraints and design factors.

## 5.4 The technology to be used in the activity

There are very few technological alternatives for PV technology. For the Wildebeestkuil 2 Solar PV Plant the PV panels being proposed at this stage will be single axis tracking mounting, and the modules will be either crystalline silicon or thin film technology.

No technology alternatives were considered for the proposed power line either. At this stage, the type of towers being considered includes both lattice and monopole towers. It is assumed that the proposed towers will be located approximately 200m to 250m apart. The type of power line towers will be determined during the final design stages of the proposed development, prior to construction commencing. The height will vary based on the terrain, but will ensure minimum OHL line clearances with buildings and surrounding infrastructure. It should be noted that final design details are yet to be confirmed. These details (including the exact height and location of the power line towers) will be confirmed during the final design stages of the power line design process, before construction commences.

The impacts on the environment of the different types of PV technology and power line towers are the same during construction, operation and decommissioning. Therefore, no technology alternatives will be considered during the BA process. The choice of technology used will ultimately be determined by technological and economic factors at a later stage.

One (1) technology alternative for PV panels with incremental amendments throughout planning phase for panel specifications has been proposed and assessed.

## 5.5 The operational aspects of the activity

No operational alternatives were assessed in the BA, as none are available for solar PV installations and power lines. As mentioned, final design details are yet to be confirmed. These details will be confirmed during the final design stages of the proposed development, before construction commences.

## 5.6 'No-go' alternative

The '*No-go*' alternative is the option of not implementing the proposed development. This alternative would result in no environmental impacts from the proposed development on the site or surrounding local area. It provides the baseline against which other alternatives are compared and will be considered throughout the BA report. The entire study area is largely in a natural state, but used for animal production. The vegetation in the study area is used primarily for livestock grazing and is affected to some degree by this usage, but not to the extent that any severe degradation was noted on site. The 'no-go' would therefore imply that the land would remain as per the *status quo*, undeveloped.

On a regional scale, the '*No-go*' alternative is not preferred. Renewable energy facilities are key to the success of South Africa's plan to build resilience against climate change. South Africa currently relies almost completely on fossil fuels as a primary energy source (approximately 72%). Coal combustion in South Africa is the main contributor to carbon dioxide emissions, which is one (1) of the main greenhouse gasses that has been linked to climate change. With the global focus on climate change, the government is under pressure to explore alternative energy sources in addition to coal-fired power stations.

An emphasis has therefore been placed on securing South Africa's future power supply through the diversification of power generation sources. Furthermore, South Africa would have to invest in a power generation mix, and not solely rely on coal-fired power generation, to honour its commitments made under the Copenhagen Accord and subsequent Paris Agreement (ratified during November 2016) to mitigate climate change challenges.

The Department of Forestry, Fisheries and the Environment (DFFE) acknowledges the risks posed to South Africa by climate change confirming that '*South Africa has been experiencing the severe effects of drought conditions catalysed by the worst El Nino event in decades. The rising sea temperatures in the Pacific Ocean that resulted in increased temperatures and reduced rainfall in many parts of the world, was exacerbated by rising global temperatures associated with climate change. South African scientists and weather forecasters warn that this is what can be expected in the decades to come, if ambitious global action is not taken urgently to reduce the concentration of greenhouse gases in the atmosphere'* (DEA, 2016b).

The current South African plan to achieve the goal set under the Paris Agreement, is rated as Highly Insufficient due to an unresolved strategy to secure a 'just transition' from coal to renewables, successfully and timeously implement a carbon tax and update the Integrated Resource Plan. In 2020, Climate Action Tracker rated South Africa's plan as 'Highly Insufficient' as at the time we committed to increasing renewable energy to enable our emissions to peak between 2020 and 2025. Based on the dismal performance to date downgrading our climate action plan from medium to highly insufficient, it is clear that the trajectory South Africa is on is insufficient to reach the goals set to avoid catastrophic climate change.

With an increasing demand in energy predicted, as confirmed by the emergency procurement of 2 000MW under the recent Risk Mitigation Integrated Power Producer Procurement Programme (RMIPPPP) and South Africa's looming Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) round 5, and growing environmental concerns about fossil fuel-based energy systems, the development of large-scale renewable energy supply schemes such as this one (1) is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports in the country.

Although solar power is not the only solution to solving the energy crisis in South Africa, not establishing the proposed solar PV plant and associated power line would be detrimental to the mandate that the government has set to promote the implementation of greener energy generation. It is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This proposed development will aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation. It will also assist in reducing the procurement of fossil fuels and ensure that renewable energy has a role to play in the future south African Energy mix.

An assessment of the *'No-Go'* alternative was undertaken by the specialists (where possible) and is incorporated in **Section 9.2** of the DBAR.

# 6 LEGAL REQUIREMENTS AND GUIDELINES

## 6.1 Key Legal and Administrative Requirements Relating to the Proposed Development

### *6.1.1 Constitution of South Africa*

The Constitution of South Africa (No. 108 of 1996) provides environmental rights and includes implications for environmental management. Section 24 of the Constitution states that:

*'Everyone has the right –*
- *To an environment that is not harmful to their health or well-being; and*
- *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
  - *Prevent pollution and ecological degradation;*
  - *Promote conservation; and*
  - *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.*'

The Constitution is the overarching legislation for South Africa. Although it provides for certain rights and obligations, the NEMA has been promulgated in order to manage the various spheres of both the social and natural environment.

### *6.1.2 National Environmental Management Act (NEMA) (Act No. 107 of 1998) – NEMA EIA Requirements*

The National Environmental Management Act (NEMA) (Act No. 107 of 1998) was promulgated in 1998 but has since been amended on several occasions from this date. This Act replaces parts of the Environment Conservation Act (ECA) (Act No. 73 of 1989) with exception to certain parts pertaining to Integrated Environmental Management.

The act intends to provide for:

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;
- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment; and
- to provide for matters connected therewith.

The NEMA is the overarching legislation which governs the BA process and environmental management in South Africa. Sections 24 and 44 of the NEMA make provision for the promulgation of regulations that identify activities which may not commence without an EA. Activities that may significantly affect the environment must be considered, investigated and assessed prior to implementation. Comprehensive lists of such activities were gazetted and the proposed 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line triggers activities from two (2) of the three (3) listing notices (namely GN R. 324 and 327, as published on 7 April 2017) gazetted on 7 April 2017 (Government Gazette 326) (the 'EIA Regulations').

Therefore, a BA process is required for the proposed development in terms of Section 21 to 24 of the 2014 EIA Regulations (as amended).

### 6.1.3 NEMA EIA Regulations, 2014 (as amended)

In terms of these Regulations, a BA is required for the proposed development based on triggered activities. The proposed development is therefore subject to a BA in terms of Section 21 to 24 of the 2014 EIA Regulations (as amended).

The following Schedules of the Government Notice No. R. 983 and 985 of 4 December 2014 (as amended) are of relevance to the proposed development in question. All of the Listed Activities identified in terms of Sections 24(2) and 24D include:

**Table 6:** Listed activities in terms of the NEMA Regulations

| Activity No(s): | Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended | Describe the portion of the proposed project to which the applicable listed activity relates |
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| 1 (ii) | **GN R. 327 Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where–<br><br>(ii) the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; | The proposed development will entail the construction of a solar photovoltaic (PV) plant within the proposed application site which will have a capacity of up to approximately 9.9 megawatts (MW). The proposed solar PV plant development will occupy an area in excess of 1 hectare (ha). In addition, the proposed solar PV plant development will be located outside an urban area. |
| 11 (i) | **GN R. 327 Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity—<br><br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. | The proposed development involves the construction of an on-site switching substation within the proposed application site which will be located outside an urban area. The proposed switching substation will have a capacity of more than 33 but less than 275 kilovolts (kV). The exact capacity of the proposed on-site switching substation will be determined and confirmed at a later stage.<br><br>The proposed development also involves the construction of one (1) new overhead power line with a voltage capacity of up to 132kV. The proposed power line will be located outside an urban area.<br><br>In addition, the proposed development will also involve the construction of medium voltage cabling within the proposed application site to link the various PV arrays to the switching substation. These cables will be located outside an urban area and will have a capacity of more than 33 but less than 275kV. The exact capacity of the proposed medium voltage cabling will be determined and confirmed at a later stage. |
| 12 (ii) (a) (c) | **GN R. 327 Item 12:** The development of:<br><br>ii) infrastructure or structures with a physical footprint of 100 square metres or more;<br><br>where such development occurs-<br>(a) within a watercourse;<br>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. | The proposed development involves the construction of a solar PV plant within the proposed application site as well as other associated infrastructure (including overhead power lines) which will have a physical footprint of 100 square metres ($m^2$) or more and will occur within a watercourse or within 32m of a watercourse.<br><br>The Surface Water Assessment revealed that there are two (2) artificial depression wetlands as well as one (1) drainage line within the study site. There is also one (1) natural depression wetland within the proposed power line corridors. The proposed PV development area and other associated infrastructure within the application site (i.e. guard house, temporary building zone and switching substation) are **not** located within or within 32m of any of the identified |

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| | | watercourses / surface water features. It should however be noted that the proposed site access point in the northern part of the application site is also situated within the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'12.21"S; 26°16'58.39"E). In addition, the proposed power line corridors also traverse Natural Depression Wetland 1 as well as the associated 50m buffer zone (27°12'46.34"S; 26°17'54.05"E).<br><br>Refer to *"Proposed Site Layout with Environmental Sensitivity Overlay"* map provided in **Appendix 5** for location of infrastructure associated with proposed development in relation to identified surface water features / watercourses.<br><br>In light of the above, development will take place within or within 32m of watercourses / surface water features identified within the application site (namely Artificial Depression Wetland 1) as well as power line corridors (namely Natural Depression Wetland 1).<br><br>In addition, new internal gravel roads may be constructed, where necessary, and development of these new internal gravel roads may thus take place within or within 32m of watercourses / surface water features identified within the application site. At this stage it is however not clear whether these roads will be constructed, as well as the possible position of these roads. This can only be confirmed at a later stage (prior to submission of Final BA Report for decision-making).<br><br>A Surface Water Impact Assessment has been undertaken to assess the impacts of the proposed development on the identified surface water features / watercourses. |
| 19 | **GN R. 327 Item 19**: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; | The proposed development involves the construction of a solar PV plant within the proposed application site as well as other associated infrastructure (including an overhead power line) which will require the infilling or depositing of any material of more than $10m^3$ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than $10m^3$ from a watercourse.<br><br>The Surface Water Assessment revealed that there are two (2) artificial depression wetlands as well as one (1) drainage line within the study site. There is also one (1) natural depression wetland within the proposed power line corridors. The proposed PV development area and other associated infrastructure within the application site (i.e. guard house, temporary building zone and switching substation) are <u>**not**</u> located within or within 32m of any of the identified watercourses / surface water features. It should however be noted that a section of the existing site access road within the application site which will be upgraded traverses the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'16.65"S; 26°17'0.70"E), while another section of this road traverses Drainage Line 1, which was identified in the southern section of the application site (27°13'34.97"S; 26°17'5.27"E). The proposed site access point in the northern part of the application site is also situated within the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'12.21"S; 26°16'58.39"E). In addition to the existing site access road and site access point, the proposed |

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| | | power line corridors also traverse Natural Depression Wetland 1 as well as the associated 50m buffer zone (27°12'46.34"S; 26°17'54.05"E).<br><br>Refer to "*Proposed Site Layout with Environmental Sensitivity Overlay"* map provided in **Appendix 5** for location of infrastructure associated with proposed development in relation to identified surface water features / watercourses.<br><br>In light of the above, soil will need to be removed from watercourses / surface water features identified within the application site and power line corridors (namely Artificial Depression Wetland 1, Drainage Line 1 and Natural Depression Wetland 1) and thus the proposed development will involve the excavation, removal, infilling, depositing and moving of more than $10m^3$ of soil, sand, pebbles or rock from watercourses / surface water features identified within the application site and power line corridors.<br><br>In addition, new internal gravel roads may be constructed, where necessary, and development of these new internal gravel roads may thus take place within watercourses / surface water features identified within the application site. This will lead to soil being removed from watercourses / surface water features identified within the application site. At this stage it is however not clear whether these roads will be constructed, as well as the possible position of these roads. This can only be confirmed at a later stage (prior to submission of Final BA Report for decision-making).<br><br>A Surface Water Impact Assessment has been undertaken to assess the impacts of the proposed development on the identified surface water features / watercourses. |
| 27 | **GN R. 327 Item 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—<br><br>(i) the undertaking of a linear activity; or<br>(ii) maintenance purposes undertaken in accordance with a maintenance<br>management plan. | The proposed development will include the clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation within the proposed application site. The extent of this clearance will be determined during the BA process, however, at this stage it is expected that an area greater than 1ha but less than 20ha within the proposed application site will be cleared. |
| 28 (ii) | **GN R. 327 Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:<br><br>(ii) will occur outside an urban area, where the total land to be | The proposed development site is currently used and zoned for agricultural purposes. The proposed development will result in an area of agricultural land greater than 1ha being transformed to industrial / commercial use for the proposed facility. |

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| | developed is bigger than 1 hectare; | |
| 48 (i) (a) (c) | **GN R. 327 Item 48:** The expansion of-<br><br>(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more;<br><br>where such expansion occurs—<br><br>(a) within a watercourse; or<br>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; | The proposed development will entail the expansion (upgrading) of existing roads within the proposed application site by 100m$^2$ or more within a watercourse or within 32m from the edge of a watercourse.<br><br>The Surface Water Assessment revealed that there are two (2) artificial depression wetlands as well as one (1) drainage line within the study site. It should be noted that a section of the existing site access road within the application site which will be upgraded traverses the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'16.65"S; 26°17'0.70"E), while another section of this road traverses Drainage Line 1, which was identified in the southern section of the application site (27°13'34.97"S; 26°17'5.27"E). The proposed site access point in the northern part of the application site is also situated within the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'12.21"S; 26°16'58.39"E).<br><br>Refer to *"Proposed Site Layout with Environmental Sensitivity Overlay"* map provided in **Appendix 5** for location of infrastructure associated with proposed development in relation to identified surface water features / watercourses.<br><br>In light of the above, construction (more specifically the upgrading of the existing site access road within the application site) will take place within or within 32m of watercourses / surface water features identified within the application site (namely Artificial Depression Wetland 1 and Drainage Line 1).<br><br>A Surface Water Impact Assessment has been undertaken to assess the impacts of the proposed development on the identified surface water features / watercourses. |
| 56 (ii) | **GN R. 327 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre –<br><br>(ii) where no reserve exists, where the existing road is wider than 8 metres | Internal gravel access roads will be required to access the PV panels, on-site switching substation, guard house and power line. Existing roads will be used wherever possible, although new roads will be constructed where necessary. The existing access road within the proposed application site will thus need to be upgraded by widening them more than 6m, or by lengthening them by more than 1km. |
| **Activity No(s):** | **Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended** | **Describe the portion of the proposed project to which the applicable listed activity relates.** |
| 12 h. vi. | **GN R. 324 Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation.<br><br>**h. North West**<br>vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland | The proposed development will involve the clearance of an area of 300m$^2$ or more of indigenous vegetation within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland. Clearance will be required for the proposed PV development area, internal access roads, power line and other associated infrastructure (i.e. guard house, temporary building zone and switching substation). Clearance of vegetation will thus take place within the proposed application site and power line corridors.<br><br>The Surface Water Assessment revealed that there are two (2) artificial depression wetlands as well as one (1) drainage line within |

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| | | the study site. There is also one (1) natural depression wetland within the proposed power line corridors. The proposed PV development area and other associated infrastructure within the application site (i.e. guard house, temporary building zone and switching substation) are **<u>not</u>** located within any of the identified watercourses / surface water features. Parts of the proposed PV development area are however within 100m from the edge of Artificial Depression Wetland 1 (27°13'18.04"S; 26°16'59.81"E), Drainage Pathway 1 (27°13'26.57"S; 26°16'58.83"E) (27°13'39.56"S; 26°16'58.78"E) (27°13'32.45"S; 26°17'9.15"E) and Artificial Depression Wetland 2 (27°13'36.49"S; 26°17'10.31"E), which were identified in the northern and western parts of the application site respectively. The northern corners of the proposed guard house (27°13'20.69"S; 26°17'2.51"E) and temporary building zone (27°13'25.46"S; 26°17'8.06"E) are also within 100m from the edge of Artificial Depression Wetland 1.<br><br>In addition, a section of the existing site access road within the application site which will be upgraded traverses the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'16.65"S; 26°17'0.70"E), while another section of this road traverses Drainage Line 1, which was identified in the southern section of the application site (27°13'34.97"S; 26°17'5.27"E). The proposed site access point in the northern part of the application site is also situated within the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'12.21"S; 26°16'58.39"E). In addition to the existing site access road and site access point, the proposed power line corridors also traverse Natural Depression Wetland 1 as well as the associated 50m buffer zone (27°12'46.34"S; 26°17'54.05"E).<br><br>Refer to *"Proposed Site Layout with Environmental Sensitivity Overlay"* map provided in **Appendix 5** for location of infrastructure associated with proposed development in relation to identified surface water features / watercourses.<br><br>In light of the above, clearance of indigenous vegetation will take place within watercourses or wetlands identified within the application site and power line corridors, or within 100m from the edge of watercourses or wetlands identified within the application site and power line corridors (namely Artificial Depression Wetland 1, Drainage Line 1 and Natural Depression Wetland 1).<br><br>A Surface Water Impact Assessment has been undertaken to assess the impacts of the proposed development on the identified surface water features / watercourses. In addition, a Terrestrial Ecology Impact Assessment has also been undertaken to assess the impacts of the proposed development on the indigenous vegetation. |
| 18 h. ix. | **GN R. 324 Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometer-<br><br>**h. North West**<br>ix. Areas within a watercourse or wetland, or within 100 metres from | Internal gravel access roads will be required to access the PV panels, guard house, on-site switching substation and 132kV overhead power line. Existing roads will be used wherever possible, although new roads will be constructed where necessary. Existing access roads will thus need to be upgraded by widening them by more than 4m, or lengthening them by more than 1km. The proposed development will thus involve the widening or lengthening of an existing internal gravel access road within watercourses or wetlands identified within the proposed application site, or within 100m from the edge of |

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| | the edge of a watercourse or wetland | watercourses or wetlands identified within the proposed application site. The upgrading of this road will occur within the North West Province.<br><br>The Surface Water Assessment revealed that there are two (2) artificial depression wetlands as well as one (1) drainage line within the study site. A section of the existing site access road within the application site which will be upgraded traverses the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'16.65"S; 26°17'0.70"E), while another section of this road traverses Drainage Line 1, which was identified in the southern section of the application site (27°13'34.97"S; 26°17'5.27"E). The proposed site access point in the northern part of the application site is also situated within the 50m buffer zone of Artificial Depression Wetland 1, which was identified in the northern part of the application site (27°13'12.21"S; 26°16'58.39"E).<br><br>Refer to *"Proposed Site Layout with Environmental Sensitivity Overlay"* map provided in **Appendix 5** for location of infrastructure associated with proposed development in relation to identified surface water features / watercourses.<br><br>In light of the above, the widening and lengthening of the existing site access road will take place within watercourses or wetlands identified within the application site, or within 100m from the edge of watercourses or wetlands identified within the application site (namely Artificial Depression Wetland 1 and Drainage Line 1).<br><br>A Surface Water Impact Assessment has been undertaken to assess the impacts of the proposed development on the identified surface water features / watercourses. In addition, a Terrestrial Ecology Impact Assessment has also been undertaken to assess the impacts of the proposed development on the indigenous vegetation. |

#### *6.1.4 Environmental Impact Assessment (EIA) Guideline for Renewable Energy Projects, DFFE Notice 989 of 2015*

The purpose of this document is primarily to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);
- Joint public sector authorities and project funders (e.g., Eskom, IDC, etc.);
- Private Sector Entities (as project funder / developer / consultant); and
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline seeks to identify activities requiring authorisation prior to commencement of that activity and provide an interface between national EIA Regulations and other legislative requirements of various authorities.

The guidelines are applicable for the construction, installation and/or development of the following renewable energy projects:

- Concentrating Solar Power (CSP) Plant;
- Wind Energy Facility (WEF);
- Hydropower Station; and
- **Photovoltaic (PV) Power Plant (Applicable to this development)**.

As the proposed development is for a solar PV plant and associated power line, it is subject to the recommendations proposed in the guidelines.

#### *6.1.5 National Energy Act (Act No. 34 of 2008)*

South Africa has two (2) acts that direct the planning and development of the country's electricity sector, namely:

i. The National Energy Act of 2008 (Act No. 34 of 2008); and
ii. The Electricity Regulation Act (ERA) of 2006 (Act No. 4 of 2006) (see **section 6.1.6**).

The National Energy Act (Act No. 34 of 2008), promulgated in 2008, has, as one (1) of its key objectives, the promotion of diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the renewable energy (RE) sector, with a mention of the solar energy sector included. The aim is to ensure that the South African economy is able to grow and develop, fast-tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

#### *6.1.6 Electricity Regulation Act (Act No. 4 of 2006)*

In 2011, the electricity regulation on new generation capacity was published under Section 35(4) of the Electricity Regulation Act (ERA) (Act No. 4 of 2006). These regulations apply to the procurement of new generation capacity by organs of state.

The objectives of the regulations include:

- To facilitate planning for the establishment of new generation capacity;
- The regulation of entry by a buyer and a generator into a Power Purchase Agreement (PPA);
- To set minimum standards or requirements for PPAs;
- The facilitation of the full recovery by the buyer of all costs efficiently incurred by it under, or in connection with, a PPA including a reasonable return based on the risks assumed by the buyer thereunder and to ensure transparency and cost reflectivity in the determination of electricity tariffs; and
- The provision of a framework for implementation of an Independent Power Producer (IPP) procurement programme and the relevant agreements concluded.

The Act establishes a National Energy Regulator as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licenses and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated.

#### *6.1.7 National Heritage Resources Act (NHRA) (Act No. 25 of 1999)*

This Act requires investigation to determine the impact of heritage resources when developments exceed the thresholds listed in section 38(1) of the act:

(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50m in length;

(c) any development or other activity which will change the character of a site—
(i) exceeding 5000m$^2$ in extent; or
(ii) involving three (3) or more existing erven or subdivisions thereof; or
(iii) involving three (3) or more erven or divisions thereof which have been consolidated within the past five (5) years; or
(iv) the costs of which will exceed a sum set in terms of regulations by the South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10000m$^2$ in extent; or
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

The proposed development would involve; (a) the construction of linear infrastructure exceeding 300m in length, (c) the development of a solar PV plant and power line that will change the character of more than 0.5ha, three (3) or more erven and (d) the rezoning of a site that will exceed 1ha.

The law ensures community participation in the protection of national heritage resources and will involve all three (3) levels of government in the management of the country's national heritage. The SAHRA will establish and maintain a national policy, strategy plans and standards for heritage resources management and will monitor the system as a whole.

The NHRA has applicability as the study forms part of an overall Heritage Impact Assessment (HIA) in terms of the provisions of Section 34, 35, 36 and 38 of the NHRA and forms part of a heritage scoping study that serves to identify key heritage resources, informants, and issues relating to the palaeontological, archaeological, built environment and cultural landscape, as well as the need to address such issues during the impact assessment phase of the HIA process.

*Section 35 – Archaeology, Palaeontology and Meteorites*
According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the NHRA, Palaeontological Impact Assessment (PIAs) and Archaeological Impact Assessments (AIAs) are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period.

*Section 36 – Burial Grounds & Graves*
A section 36 permit application is made to the SAHRA or the competent provincial heritage authority which protects burial grounds and graves that are older than 60 years and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials.

Permitting requirements for burial grounds and graves older than 60 years (prehistoric) and historic burials to the South African Heritage Resources Agency:

a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves.
b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

d) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant.

*Section 38 HIA as a Specialist Study within the BA in Terms of Section 38(8)*
In this instance, the heritage assessment for the property is to be undertaken as a component of the BA for the projects. Provision is made for this in terms of Section 38(8) of the NHRA, which states that:

This is an HIA submitted to the relevant authority in terms of Section 38(8) of the National Heritage Resources Act. The commenting authority is the SAHRA. The authorising government agency is the North West Department of Economic Development, Environment, Conservation and Tourism (NW DEDECT).

An HIA report is required to identify, and assess archaeological resources as defined by the Act, assess the impact of the proposal on the said archaeological resources, review alternatives and recommend mitigation.

Section 38 (3) Impact Assessments are required, in terms of the statutory framework to conform to basic requirements as laid out in Section 38(3) of the NHRA. These are:

- The identification and mapping of heritage resources in the area affected
- The assessment of the significance of such resources
- The assessment of the impact of the development on the heritage resources
- An evaluation of the impact on the heritage resources relative to sustainable socio/economic benefits
- Consideration of alternatives if heritage resources are adversely impacted by the proposed development
- Consideration of alternatives
- Plans for mitigation in the future

A HIA (including Archaeology, Palaeontology and Cultural Landscapes) (**Appendix 6D**) has subsequently been conducted to explore how the proposed development may impact on heritage resources as protected by the Act.

In addition, the SAHRA will be consulted throughout the BA process in order to obtain comments on the proposed development from a heritage perspective. It should be noted that the SAHRA confirmed via telephonic communication that the provincial heritage authority (namely the North West Provincial Heritage Resources Authority – NWPHRA) is not deemed to be competent to comment on section 38 applications in terms of the NHRA (Act No. 25 of 1999). Since this proposed BA application forms part of a section 38 application in terms of the NHRA, the SAHRA will be the only commenting authority from a heritage perspective for this proposed BA application.

### *6.1.8 National Water Act (NWA) (Act No. 36 of 1998, as amended)*

The National Water Act (NWA) (Act No. 36 of 1998), as amended, was promulgated on the 20$^{th}$ of August 1998. This Act was created in order to ensure the protection and sustainable use of water resources (including wetlands) in South Africa. This Act is important in that it provides a framework to protect water resources against over-exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people. The NWA recognises that the ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users. Bearing these principles in mind, there are a number of stipulations within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. These stipulations are explored below and are discussed in the context of the proposed development.

It is important to note that water resources (including wetlands) are protected under the Act. Under the NWA, a 'water resource' includes a watercourse, surface water, estuary, or aquifer. Specifically, a watercourse is defined as (*inter alia*):

- A river or spring;
- A natural channel in which water flows regularly or intermittently; and
- A wetland, lake or dam into which, or from which, water flows.

One (1) of the main aims of the Act is the protection of water resources. In this context, it is important to note that reference to a watercourse includes, where relevant, the bed and banks. Furthermore, it is important to note that water resources, including wetlands, are protected under the NWA. 'Protection' in relation to a water resource entails:

- Maintenance of the quality and the quantity of the water resource to the extent that the water use may be used in a sustainable way;
- Prevention of degradation of the water resource; and
- The rehabilitation of the water resource.

In light of the above, there are a number of stipulations within the NWA that are relevant to the potential impacts on rivers, streams and wetlands that may be associated with the proposed development. A Surface Water Impact Assessment (**Appendix 6B**) has however been conducted to explore how the proposed development may impact on identified water resources as protected by the Act. Should the proposed development require a GA or Water Use Licence (WUL), it will be determined and applied for separately prior to construction. **It should be noted that the Applicant is in the process of applying for a WUL in terms of section 21 of the NWA from the competent authority (namely DWS).**

#### *6.1.9 Convention on Biodiversity (CBD)*

South Africa became a signatory to the United Nations Convention on Biological Diversity (CBD) in 1993, which was ratified in 1995. The CBD requires signatory states to implement objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14 (a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

#### *6.1.10 National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004, as amended)*

As the principal national act regulating biodiversity protection, the National Environmental Management: Biodiversity Act (NEM:BA) (Act No. 10 of 2004), which is administered by the DFFE, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. The term biodiversity, according to the Convention on Biodiversity (CBD) (**section 6.1.9**), refers to the variability among living organisms from all sources including, inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity in genes, species and ecosystems.

The overarching aim of the NEM:BA, within the framework of the NEMA, is to provide for:

- The management and conservation of biological diversity within South Africa, and of the components of such biological diversity;
- The use of indigenous biological resources in a sustainable manner; and

- The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

In terms of this Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations);
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

The South African National Biodiversity Institute (SANBI) was established in terms of the NEM:BA, its purpose being (*inter alia*) to report on the status of the country's biodiversity and the conservation status of all listed threatened or protected species and ecosystems.

The NEM:BA provides for a range of measures to protect ecosystems and for the protection of species that are threatened or in need of protection to ensure their survival in the wild, including a prohibition on carrying out a '*restricted activity'* involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7 of the Act. According to Section 57 of the Act, '*Restricted activities involving listed threatened or protected species'*:

- A person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7.

Such activities include any that are '*of a nature that may negatively impact on the survival of a listed threatened or protected species*'. Lists of critically endangered, endangered, vulnerable and protected species have been published and a permit system for listed species has been established. **It should be noted that at this stage it is not anticipated that any permits from the respective conservation departments are required, as the Ecologist confirmed that there are no plant species occurring on site or likely to occur on site that are protected according to the NEM:BA. In addition, there are no plant species occurring on site that are protected according to the North West Biodiversity Management Act (section 6.1.18). The Applicant will however apply for the relevant permits from the respective conservation departments, should this be required.**

The NEM:BA is relevant to the proposed development as the construction of the solar PV plant, power line and other components (such as the on-site switching substation and permanent guard house) may impact negatively on biodiversity. Additionally, the power line corridor traverses an Ecological Support Area (ESA) 1 area (**Figure 23**). Therefore, the proposed development may impact negatively on these areas, if not avoided. The project proponent is therefore required to take appropriate reasonable measures to limit the impacts on biodiversity, to obtain permits if required and to also invite the SANBI to provide commentary on any documentation resulting from the proposed development.

It should be noted that a Terrestrial Ecology Impact Assessment (**Appendix 6G**) was undertaken to explore how the proposed development may impact on biodiversity as protected by the Act. **Based on site characteristics and the impact assessment undertaken, no offsets were considered to be required for the current project. In addition, as mentioned, the Ecologist confirmed that there are no plant species occurring on site or likely to occur on site that are protected according to the NEM:BA. There are also no plant species occurring on site that are protected according to the North West Biodiversity Management Act. Lastly, it was confirmed that there are no protected tree species that are likely to occur in the study area. The Applicant will however apply for the relevant permits from the respective conservation departments, should this be required. In addition, all relevant conservation departments**

**(such as the SANBI) have been invited to provide comments with regards to the proposed development.**

*6.1.11 National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended)*

The overarching aim of the National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended), within the framework of the NEMA, is to:

- provide for the declaration and management of protected areas;
- provide for co-operative governance in the declaration and management of protected areas;
- affect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- provide for a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- provide for the continued existence of South African National Parks.

The proposed development falls **outside** of any formally protected areas and outside the areas earmarked as part of the National Protected Areas Expansion Strategy (NPAES).

*6.1.12 National Forests Act (NFA) (Act No. 84 of 1998)*

The National Forest Act (NFA) (Act No. 24 of 1998) was enacted to:
- Provide for the protection, management and utilisation of forests;
- The protection of certain plant and animal life;
- The regulation of trade in forest produce; and
- The control and management of a national hiking way system and National Botanic Gardens.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21 November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

**<u>Protected trees</u>**
According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that *'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.*

**<u>Forests</u>**
Prohibits the destruction of indigenous trees in any natural forest without a licence.

The NFA is relevant to the proposed development as the removal and/or disturbance and/or clearance of indigenous vegetation will be required and a license in terms of the NFA may be required for this to be done.

As mentioned, the Ecologist confirmed that there are no plant species occurring on site or likely to occur on site that are protected according to the NEM:BA. In addition, there are no plant species occurring on site that are protected according to the North West Biodiversity Management. Lastly, it was confirmed that there are no protected tree species that are likely to occur in the study area.

### *6.1.13 National Veld and Forest Fire Act (Act No. 101 of 1998)*

Provides requirements for veldfire prevention through firebreaks and required measures for firefighting. Chapter 4 of the Act places a duty on landowners to prepare and maintain firebreaks. Chapter 5 of the Act places a duty on all landowners to acquire equipment and have available personnel to fight fires.

### *6.1.14 Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983)*

The Conservation of Agricultural Resources Act (CARA) (Act No. 43 of 1983) controls the utilisation of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants. The Act requires the protection of land against soil erosion and the prevention of water logging and salinization of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

The primary objective of the Act is to conserve natural agricultural resources by:

- maintaining the production potential of land;
- combating and preventing erosion and weakening or destruction of the water resources;
- protecting vegetation; and
- combating weeds and invaders plants.

In terms of this Act, no degradation of natural land is permitted. Rehabilitation after disturbance to agricultural land is also managed by this Act. The CARA is relevant to the proposed development as the construction of a solar PV plant as well as other components (such as the on-site switching substation and permanent guard house) may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

Declared Weeds and Invaders in South Africa are categorised according to one (1) of the following categories:

- <u>Category 1 plants</u>: are prohibited and must be controlled.
- <u>Category 2 plants</u>: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.
- <u>Category 3 plants</u>: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

An Agricultural and Soils Impact Assessment (**Appendix 6A**) has been conducted to explore how the proposed development may impact on the agricultural production potential of the proposed site. According to this assessment, the potential impact on the loss of agricultural land will be low and there is not expected to be any significant soil erosion hazard, if standard mitigation measures are followed. In addition, cumulative soil-related impacts are expected to be low. As such, no application in terms of CARA was recommended.

### *6.1.15 Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended)*

The Subdivision of Agricultural Land Act (SALA) (Act No. 70 of 1970, as amended) controls the subdivision of all agricultural land in South Africa, prohibiting certain actions pertaining to agricultural land. Under the Act, the owner of agricultural land is required to obtain consent from the Minister of Agriculture in order to subdivide agricultural land.

The SALA is limited to long term leases and subdivision and is therefore not applicable in this case. However, the relevant Department of Agriculture, Land Reform and Rural Development will be notified as an I&AP.

### *6.1.16 National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended)*

The National Road Traffic Act (NRTA) (Act No. 93 of 1996, as amended) provides for all road traffic matters and is applied uniformly throughout South Africa. The Act enforces the necessity of registering and licensing motor vehicles. It also stipulates requirements regarding fitness of drivers and vehicles as well as making provision for the transportation of dangerous goods.

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed development.

### *6.1.17 Civil Aviation Act (CAA) (Act No. 13 of 2009)*

The Civil Aviation Act (CAA) (Act No. 13 of 2009) controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority (SACAA) and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of a solar PV plant and associated power line may impact on aviation and air traffic safety, if located directly within aircraft flight paths.

The Air Traffic and Navigation Services Company Limited (ATNS) and the SACAA will be consulted throughout the BA process and the required approvals will be obtained, where necessary. It is not however anticipated that any approvals will be required.

### *6.1.18 North West Biodiversity Management Act (Act No.4 of 2016)*

This Act provides for the management and conservation of the North West Province's biophysical environment and protected areas within the framework of the NEMA, to provide for the protection of species and ecological systems that warrant provincial protection, and to provide for the sustainable use of indigenous biological resources. Amongst other regulations, the following may apply to the current project:

- Protects threatened or protected ecosystems, riparian habitats and aquatic systems (Chapter 3, Part 2, sections 10 - 12);
- Protects species by listing those that require protection and restricting activities involving listed species (Chapter 4, sections 13 - 23);
- Provides for the management of species and organisms posing potential threats to biodiversity (Chapter 5, sections 27 - 37) through listing invasive species, restricting activities involving listed invasive species, and providing guidelines and requirements for control and eradication, including control plans and invasive species status reports.

The Act provides lists of protected species for the Province (Schedule 2). A permit is required for the removal of any species on this list. As mentioned, the proposed power line corridor traverses an ESA 1 area (**Figure 23**), and therefore the proposed development may impact negatively on these areas. A Terrestrial Ecology Impact Assessment (**Appendix 6G**) has however been conducted to explore how the proposed development may impact on biodiversity as protected by the Act. In addition, the relevant provincial environmental authority (namely the NW DEDECT) will be consulted throughout the BA process. **As mentioned, the Ecologist**

**confirmed that there are no plant species occurring on site or likely to occur on site that are protected according to the NEM:BA as well as the North West Biodiversity Management Act.**

#### *6.1.19 Astronomy Geographic Advantage Act (Act No. 21 of 2007)*

The Astronomy Geographic Advantage Act (Act No. 21 of 2007) provides for:

- The preservation and protection of areas that are uniquely suited for optical and radio astronomy; and
- Intergovernmental cooperation and public consultation on matters concerning nationally significant astronomy advantage areas and matters connected therewith.

Under Section 22(1) of the Act, the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central Astronomy Advantage Area (AAA). These activities include the construction, expansion or operation; of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavours.

In terms of section 7(1) and 7(2) of this Act, national government established the following AAAs:

- Central Karoo AAA (GN 198 of 2014) – proposed development falls outside this AAA
- Sutherland Central AAA – proposed development falls outside this AAA
- Northern Cape AAA (GN 115 of 2010) – proposed development falls outside of this AAA

Even though the proposed development falls outside the respective AAAs, the relevant authorities, including the Square Kilometre Array (SKA) and South African Large Telescope (SALT), will be consulted throughout the BA process.

#### *6.1.20 Renewable Energy Development Zones (REDZs) and Strategic Transmission Corridors*

The Strategic Environmental Assessment (SEA) for Wind and Solar PV Energy in South Africa (CSIR, 2015) originally identified eight (8) formally gazetted[14] Renewable Energy Development Zones (REDZs) that are of strategic importance for large-scale wind and solar PV development in terms of *Strategic Integrated Project 8: Green Energy in Support of the South African Economy*, as well as associated strategic transmission corridors[15], including the rollout of its supporting transmission and distribution infrastructure, in terms of *Strategic Integrated Project 10: Electricity Transmission and Distribution*.

- REDZs for large-scale wind and solar photovoltaic development;
- associated Strategic Transmission Corridors which support areas where long-term electricity grid will be developed;
- process of basic assessment to be followed and reduced decision-making timeframe for processing of applications for environmental authorisation in terms of the NEMA; and
- acceptance of routes which have been pre-negotiated with all landowners as part of applications for environmental authorisations for power lines and substations.

In addition to the eight (8) formally gazetted REDZs mentioned above, the Phase 2 SEA for Wind and Solar Photovoltaic Energy in South Africa (2019) identified three (3) additional REDZs (namely REDZ 9, REDZ 10 and REDZ 11) that are of strategic importance for large scale wind and solar photovoltaic energy

[14] Formally gazetted on 16 February 2018 (Government Notice 114)

[15] Formally gazetted on 16 February 2018 (Government Notice 113)

development. These REDZs were published under Government Notice No. 786, Government Gazette No. 43528 of 17 July of 2020, and were officially gazetted under Government Notice No. 144, Government Gazette No. 44191 of 26 February 2021[16].

**Table 7:** The SEA for Wind and Solar PV Energy in South Africa (Phase 1 and Phase 2) (CSIR, 2015; CSIR, 2019) identified the following eleven (11) geographic areas for REDZs

| REDZ Number | Name | Applicability of REDZ |
|---|---|---|
| REDZ 1 | Overberg | Large-scale wind and solar photovoltaic energy facilities |
| REDZ 2 | Komsberg | Large-scale wind and solar photovoltaic energy facilities |
| REDZ 3 | Cookhouse | Large-scale wind and solar photovoltaic energy facilities |
| REDZ 4 | Stormberg | Large-scale wind and solar photovoltaic energy facilities |
| REDZ 5 | Kimberley | Large-scale solar photovoltaic energy facilities |
| REDZ 6 | Vryburg | Large-scale solar photovoltaic energy facilities |
| REDZ 7 | Upington | Large-scale solar photovoltaic energy facilities |
| REDZ 8 | Springbok | Large-scale wind and solar photovoltaic energy facilities |
| REDZ 9 | Emalahleni | Large scale solar photovoltaic energy facilities |
| REDZ 10 | Klerksdorp | Large scale solar photovoltaic energy facilities |
| REDZ 11 | Beaufort West | Large scale wind and solar photovoltaic energy facilities |

It should be noted that the proposed PV plant is not located within any of the above-mentioned REDZs formally gazetted[14 and 16] in South Africa for the purpose of development of solar and wind energy generation facilities (**Figure 8**). It should however be noted that the power line component of the proposed development is located within the Central Corridor of the Strategic Transmission Corridors (**Figure 8**) as defined and in terms of the procedures laid out in Government Gazette No. 41445[15] and No. 44191[17]. Ultimately, the proposed development will be subject to a full BA process in terms of the NEMA, as amended, and the EIA Regulations, 2014 (as amended).

[16] Formally Gazetted on 26 February 2021 (Government Notice 144)

[17] Formally Gazetted on 26 February 2021 (Government Notice 145)

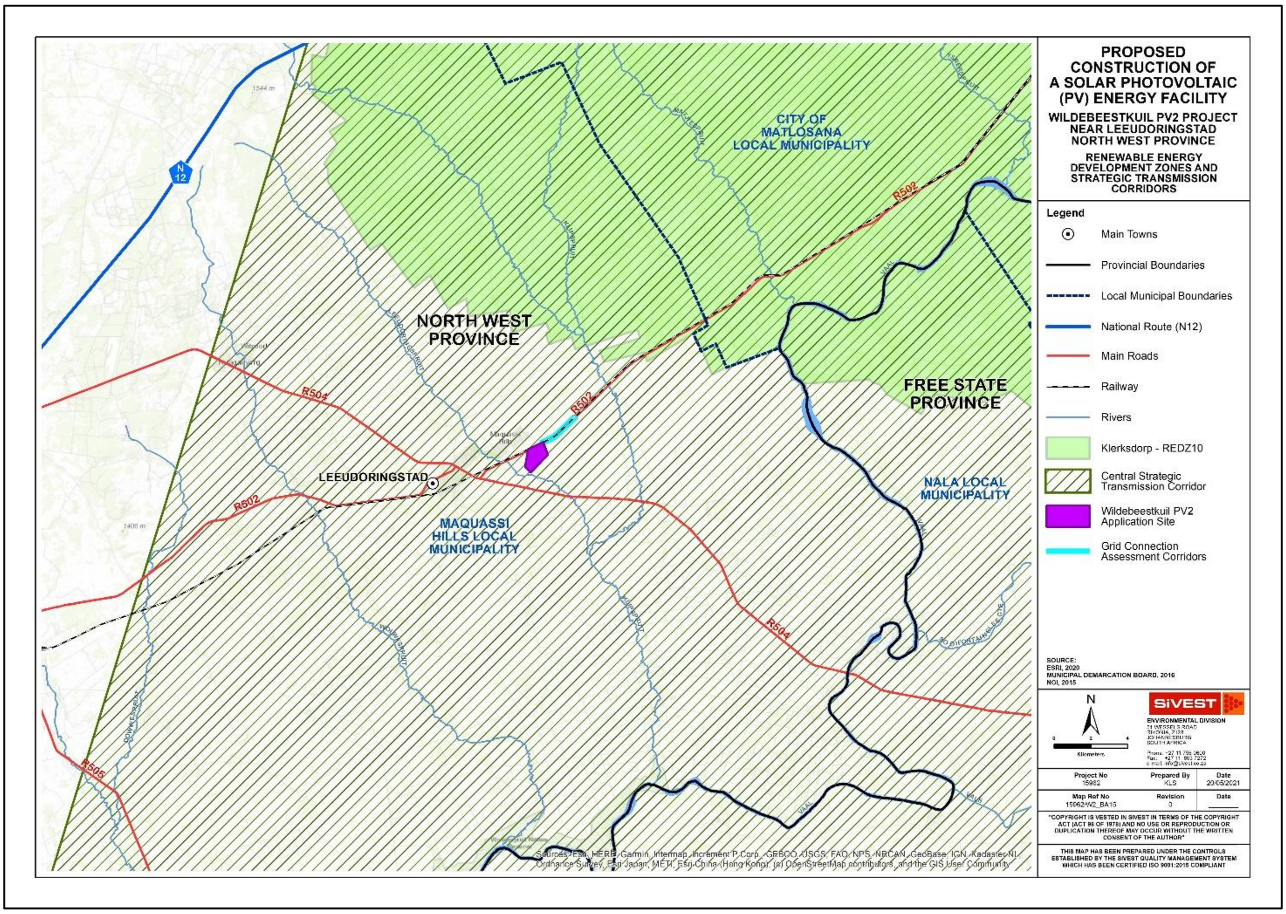


**Figure 8:** Formally gazetted REDZs and Strategic Transmission Corridors in South Africa and the proposed Wildebeestkuil 2 Solar PV Plant and 132kV Power Line location in relation to the REDZs and corridors

Although the project falls outside of the REDZs, it is located within one (1) of the Strategic Transmission Corridors (**Figure 8**) and will thus contribute towards the requirement of renewable energy highlighted by the development of these zones and corridors.

### *6.1.21 Additional Relevant Legislation*

- Occupational Health and Safety Act (OHSA) (Act No. 85 of 1993);
- Road Safety Act (Act No. 93 of 1996);
- National Road Traffic Regulations Act (Act No. 22 of 2000);
- National Environmental Management: Air Quality Act (NEM:AQA) (Act No. 39 of 2004);
- National Environmental Management: Waste Act (NEM:WA) (Act No. 59 of 2008, as amended);
- The National Environmental Management: Biodiversity Act, 2014 (Alien and Invasive Species Regulations, 2014);
- Development Facilitation (Act No. 67 of 1995);
- National Ports Act (Act No. 12 of 2005);
- The Hazardous Substances Act (Act No. 15 of 1973);
- Water Services Act (Act No. 108 of 1998);
- Electricity Regulation Act (ERA) (Act No. 4 of 2006, as amended);
- Municipal Systems Act (Act No. 32 of 2000); and
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended).

## 6.2 Key Development Strategies and Guidelines

### *6.2.1 National Development Plan*

The National Development Plan (NDP), 2011 – 2030, aims to address parts of the South African triple development challenges of poverty and inequality by 2030. In order to achieve this, numerous enabling milestones and critical actions have been formulated. One (1) of the critical actions is the formulation and implementation of interventions that aim to ensure environmental sustainability and resilience to future shocks.

The emphasis is on South African investment and assistance in the exploitation of various opportunities for low-carbon energy in the clean energy sources of Southern Africa (National Planning Commission, 2011).

A more efficient and competitive infrastructure is envisaged, particularly infrastructure that facilitates economic activity and is conducive to growth and job creation. The plan identifies key services that need strengthening; namely commercial transport, energy, telecommunications and water, while ensuring their long-term affordability and sustainability. The National Planning Commission argues that South Africa has missed a generation of capital investment in many infrastructure including electricity. Therefore, one (1) infrastructure investment priority is in the procurement of at least 20000MW of renewable energy-efficiency (National Planning Commission, 2011).

The proposed development is thus well aligned with the aims of the NDP.

### *6.2.2 New Growth Path (2011-2030)*

The purpose of the New Growth Path (2011 – 2030) is to provide a framework that enables the achievement of the vision of 'jobs and decent work placed at the centre of economic policy'. One (1) of the identified job drivers is in the green economies. The green economy necessitates profound changes in energy infrastructure. The framework states that public investment can create 250 000 jobs annually in energy, transport, water and communications infrastructure and in housing. These jobs are said to be in four (4) activities, the construction of new infrastructure; the operation of new facilities; expanded maintenance; and the manufacture of components for the infrastructure programme. Most of these activities correspond to those in the proposed project. The strategy developed to achieve employment creation is essentially in offering comprehensive support for energy efficiency and renewable energy, including appropriate pricing policies, combined with programmes to encourage the local production of inputs, commencing with solar water heaters (Department of Economic Development, 2011).

### *6.2.3 National Spatial Development Framework (NSDF) (2018)*

The National Spatial Development Framework (NSDP) (2018) is a government document that seeks to make a bold and decisive contribution to bringing about peaceful, prosperous and truly transformed South Africa, as articulated in the Freedom Charter, the Reconstruction and Development Programme (RDP) and the National Development Plan (Department of Planning, 2018). It does so in full recognition of:

- The stranglehold that the unjust national spatial development paradigms, logics and patterns of the past have placed on many attempts at breaking the back of poverty, unemployment and inequality.
- The valuable, and often hard lessons learnt over the last twenty-four years in the pursuit of national reconstruction, inclusive economic growth and spatial transformation.
- The necessity for decisive, collaborative and targeted state action in national space, to drive South Africa towards the shared, inclusive and sustainable future we desire and require.

### 6.2.4 Integrated Resource Plan for Electricity (2019)

The Integrated Resource Plan for Electricity (2019) notes that the 2008 electricity supply crisis emerged from Eskom's maintenance delay on the generation fleet. The resultant deterioration in performance of the ageing fleet and the exacerbation of the current electricity crisis has had a long-term impact on the effectiveness of the fleet to meet future demand. Solar power was thus, outlined as an alternative and additional source of energy. Furthermore, a solar corridor linking the Northern Cape to the North West is envisaged. The goal is to reduce dependence on coal used in electricity generation to below 50% by 2030 (Energy, 2013). The proposed project is therefore well in line with this plan.

### 6.2.5 South African National Infrastructure Plan (2012)

The South African National Infrastructure Plan (2012) speaks of 'greening the economy'. In terms of electricity generation, transmission and distribution, three Strategic Integrated Projects (SIP) are relevant:

- SIP 4: Unlocking the economic opportunities in the North West Province
- SIP 9: Accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy
- SIP 10: Expanding the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development (Presidential Infrastructure Coordinating Commission, 2012).

### 6.2.6 Industrial Policy Action Plan (2018/2019–2020/2021)

The Industrial Policy Action Plan (2018/2019–2020/2021) provides an economic analysis of prevailing global and domestic economic conditions relevant to industrial policy; time bound action plans and programmes across a range of sectors and listing the key constraints to an optimal industrial strategy (DTI, 2018). The South African electro-technical sector is largely dependent on imported content. As a result, South Africa needs to increase the design and production capabilities through the following:

- Attract and maintain investments in certain areas of production.
- Localise production of inputs where local capacity and capability exists.
- Focus on potentially highly lucrative export markets across the African continent.

All of these are aimed at addressing historical imbalances. The proposed project is evidently in line with this plan.

### 6.2.7 Integrated Development Plan (IDP)

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act (Act No. 32 of 2000), as an inclusive and strategic plan that:

- Links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality;
- Aligns the resources and capacity of the municipality with the implementation of the plan
- Forms the policy framework on which annual budgets must be based; and
- Is compatible with national and provincial development plans and planning requirements binding on the municipality in terms of legislation.

Considering the nature and location of the proposed development, there is clear alignment with international, national, provincial and local (district and municipal) policy and legislation.

In September 2015 the world's governments signed a historic agreement to eradicate poverty, improve the living standards and well-being of all people, promote peace and more inclusive societies and to reverse the trend of environmental degradation. The 2030 Agenda for Sustainable Development commits to promoting development in a balanced way—economically, socially and environmentally—in all countries of the world, leaving no one behind and paying special attention to those people who are poorest or most excluded. It contains 17 Sustainable Development Goals with associated targets to assess progress.

The 17 goals, ranging from alleviating poverty and reducing inequality through job creation and economic growth, as well as ensuring access to affordable, reliable, sustainable and modern energy for all, are in many ways interrelated and cross-cutting in nature. The role of the Dr Kenneth Kaunda District Municipality and Maquassi Hills Local Municipality in the electricity provision and production industry (including consideration of renewable energy, reticulation, and municipal debt and tariff structures) will be critical in the above regards.

In his 2020 State of the Nation Address, President Cyril Rhamaposa announced government are taking the following measures to rapidly and significantly increase generation capacity outside of Eskom:

- A Section 34 Ministerial Determination will be issued shortly to give effect to the Integrated Resource Plan 2019, enabling the development of additional grid capacity from renewable energy, natural gas, hydro power, battery storage and coal.
- We will initiate the procurement of emergency power from projects that can deliver electricity into the grid within 3 to 12 months from approval.
- The National Energy Regulator will continue to register small scale distributed generation for own use of under 1 MW, for which no licence is required.
- The National Energy Regulator will ensure that all applications by commercial and industrial users to produce electricity for own use above 1MW are processed within the prescribed 120 days. It should be noted that there is now no limit to installed capacity above 1MW.
- We will open bid window 5 of the renewable energy IPP and work with producers to accelerate the completion of window 4 projects.
- We will negotiate supplementary power purchase agreements to acquire additional capacity from existing wind and solar plants.
- We will also put in place measures to enable municipalities in good financial standing to procure their own power from independent power producers.

The North West Provincial Spatial Development Framework and Environmental Management Plan (PSDF – EMP) of 2008, is closely aligned to the National Spatial Development Perspective, and as such places key importance on economic growth and poverty eradication (**section 6.2.11**). In addition, the West Provincial Development Plan (2013) further acknowledges that energy provision is a concern in some areas, given that the mining sector consumes a great portion of the available electricity. The objective developed is therefore to produce sufficient energy to support industry at competitive prices ensuring access for poor households, while reducing carbon emissions per unit of power by approximately one-third (**section 6.2.11**).

The proposed solar PV plant and associated power line is located within the Maquassi Hills Local Municipality and greater Dr Kenneth Kaunda District Municipality. On a municipal level, wide support is evident across the affected municipalities as the proposed development supports the objectives of the Dr Kenneth Kaunda District Municipality Integrated Development Plan (2017/18 - 2021/22), which identifies the comparative advantage of electricity provision and production that the region has in the provincial context. The 2019/20 IDP amendments ensures municipalities adopt a single, inclusive and strategic plan for the development of the municipality which links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality (Municipality D. K., Dr Kenneth Kaunda District Municipality Integrated Development Plan 2017/18 - 2021/22, 2017). One (1) of the key strategic goals for the district is to promote physical infrastructure development and services. The proposed solar project can thus accentuate the comparative advantage of the region and is additionally in sync with one (1) of the key strategic goals.

The Maquassi Hills Local Municipality (LM) Integrated Development Plan, 2013 - 2016 (latest available IDP) recognises that the municipality's electricity network has aged. In line with the National Electrification Programme as a key spending programme, a total operational expenditure of R48.4 million was allocated for the provision of electricity services (Maquassi Hills Local Municipality, 2016). A further rationale for alternative sources of electricity is that 3 970 households do not have access to electricity in the Maquassi Hills LM (Quantec, 2020). The Maquassi Hills LM is the electricity supply authority in the towns and townships of Wolmaransstad, Makwassie, Leeudorinstad, Witpooort, Tswelelang, Kgakala, Lebaleng. Furthermore, the Maquassi Hills LM is a service provider in the areas of Wolmarannstad, Leeudoringstad, Makwassie and the villages of Boskuil and Oeronskraal. The minimum level of level of electricity service connections is 80% (Maquassi Hills Local Municipality, 2016). There is a total of 2 571 customers that are supplied by the Maquassi Hills LM. The other areas are directly supplied by Eskom. In total, Eskom supplies in excess of 14 000 customers. The major growth in demand for residential supply is in the Eskom supplied areas (Maquassi Hills Local Municipality, 2016).

In light of the above, the proposed project is relevant and will contribute to the LM's plan as the overall objective is to generate electricity (by capturing solar energy) to feed into the national electricity grid and 'wheel' the power to customers based on a PPA. As mentioned, the electricity generated by the proposed solar PV plant (part of this application) will be sold by the Authorisation Holder to a second party, as part of a PPA. In addition, the purchased electricity will be sold directly to commercial and light industrial consumers within the Maquassi Hills Local Municipality. This means that the customers' electricity bills will get off-set by the Maquassi Hills Local Municipality.

Similar to the North West Provincial Development Plan (PDP), the Renewable Energy Strategy for the North West Province (2012) argues that the generation of clean energy is one (1) of the responses to climate change and it is a way to meet the commitments of the Kyoto Protocol. The Dr Kenneth Kaunda District Municipality is identified as having a high PV prioritisation; therefore, the proposed project is relevant and will assist in this quest. The strategy further concurs with the PDP in that solar technologies hold the greatest potential for the province since there is a favourable solar insulation and suitable area to install solar energy technologies. The Strategy targets 50% of renewable energy consumption (Department of Economic Development, 2012).

The proposed development is therefore aligned with the vision and goals of the Local and District Municipalities, as well as the North West Provincial Development Plan (2013) and provincial Spatial Development Framework and Environmental Management Plan (**section 6.2.11**). It will also stimulate the creation of employment which is much needed in the municipal area. It will therefore be supportive of the North West Provincial Spatial Development Framework and Environmental Management Plan's (PSDF – EMP) (2008) objective of economic growth and poverty eradication. In addition, it will also contribute to the North West Provincial Development Plan's objective of producing sufficient energy to support industry at competitive prices ensuring access for poor households, while reducing carbon emissions per unit of power by approximately one-third. The proposed development will also contribute to electricity provision and production within the district and local municipalities.

Upon reviewing the spatial planning component, the Dr Kenneth Kaunda District Municipality as well as the Maquassi Hills Local Municipality IDPs do not suggest any potential conflicts between the planned spatial development visions and the proposed solar PV plant development. In addition, the site where the proposed development will be constructed is not located near any significant tourist attraction that might be sensitive to the environmental effects of the proposed development. The proposed development is however located approximately 500m north-west of the Kgakala Township, while the nearest town is the town of Leeudoringstad which is situated approximately 4km east of the solar PV plant application site. Although the proposed development is located within close proximity to the Kgakala Township, this area is expected to benefit from job opportunities created during the construction of the proposed development. In addition, despite being located within relatively close proximity to small patches of agricultural land, it is not expected to affect these areas significantly and the current agricultural activities can thus continue.

After considering the reviewed documentation, the proposed development is in alignment with national, provincial and local objectives, plans and strategies relating to socio-economic development of the areas under analysis. There were no fatal flaws or contraventions identified as all spheres of government prioritise the development of renewable energy (RE) projects. The proposed development fits well with the plans to diversify the provincial, district and local economies through investment in RE projects.

Policy decisions taken in the next decade will largely determine the dimension of the impact of climate change. Local government is in the front line of implementation and service delivery, and thus needs to pursue adequate mitigation and adaptation strategies which should include participation from the public sector, the private sector and NGOs. Therefore, it is evident that the proposed development is aligned with the goals of the municipal IDPs in the study area.

#### *6.2.8 Draft Integrated Energy Plan (IEP) for the Republic of South Africa, 2016*

The Draft Integrated Energy Plan (IEP), developed by the Department of Energy (DoE), is anchored in the National Energy Act (Act No. 34 of 2008). The purpose of the Draft IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development, while:

- Maintaining control over economic costs;
- Serving national imperatives such as job creation and poverty alleviation; and
- Minimising the adverse impacts of the energy sector on the environment.

The Draft IEP takes into consideration the crucial role that energy plays in the entire economy and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple objectives, some of which include:

- To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector;
- To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels);
- To guide investment in and the development of energy infrastructure in South Africa; and
- To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

The Draft IEP considers the national supply and demand balance and proposes alternative capacity expansion plans based on varying sets of assumptions and constraints. While infrastructural matters are briefly discussed, the Draft IEP does not explicitly consider supply and demand at specific geographical locations within the country, nor does it take into account infrastructure bottlenecks at specific locations. These are, or will be, covered in detail as follows:

- Electricity infrastructure (transmission and distribution) is dealt with in other plans and the Integrated Resource Plan (IRP) should assess these in detail, taking into consideration the grid planning currently conducted by Eskom;
- Electricity supply is dealt with in the IRP;
- Liquid fuels will be dealt with in the 20-Year Liquid Fuel Infrastructure Roadmap which will cover logistical matters relating to pipelines and storage facilities for petroleum products; and

- The Gas Utilisation Master Plan (GUMP) will take into consideration the bottlenecks and capacity constraints of the current natural gas infrastructure. All the above will inform the integrated energy planning process and will enable overall enhancement through ongoing periodic iterations to ensure alignment.

### *6.2.9 Integrated Resource Plan (IRP), 2019*

South Africa's National Development Plan (NDP) 2030 defines a desired destination where inequality and unemployment are reduced and poverty is eliminated so that all South Africans can attain a decent standard of living. Electricity is one (1) of the core elements of a decent standard of living. The NDP envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, that is socially equitable through expanded access to energy at affordable tariffs and that is environmentally sustainable through reduced emissions and pollution. In formulating its vision for the energy sector, the NDP took as a point of departure the Integrated Resource Plan (IRP) (IRP, 2019).

The Integrated Resource Plan (IRP) was created in order to plan for projected national electricity demand and is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, taking into account security of supply and the environment (minimise negative emissions and water usage) (IRP, 2019).

| | Coal | Coal (Decommissioning) | Nuclear | Hydro | Storage | PV | Wind | CSP | Gas & Diesel | Other (Distributed Generation, CoGen, Biomass, Landfill) |
|---|---|---|---|---|---|---|---|---|---|---|
| Current Base | 37 149 | | 1 860 | 2 100 | 2 912 | 1 474 | 1 980 | 300 | 3 830 | 499 |
| 2019 | 2 155 | -2373 | | | | | 244 | 300 | | Allocation to the extent of the short term capacity and energy gap. |
| 2020 | 1 433 | -557 | | | | 114 | 300 | | | |
| 2021 | 1 433 | -1403 | | | | 300 | 818 | | | |
| 2022 | 711 | -844 | | | 513 | 400 1000 | 1600 | | | |
| 2023 | 750 | -555 | | | | 1000 | 1600 | | | 500 |
| 2024 | | | 1860 | | | | 1600 | | 1000 | 500 |
| 2025 | | | | | | 1000 | 1600 | | | 500 |
| 2026 | | -1219 | | | | | 1600 | | | 500 |
| 2027 | 750 | -847 | | | | | 1 600 | | 2000 | 500 |
| 2028 | | -475 | | | | 1000 | 1 600 | | | 500 |
| 2029 | | -1694 | | | 1575 | 1000 | 1 600 | | | 500 |
| 2030 | | -1050 | | 2 500 | | 1 000 | 1 600 | | | 500 |
| TOTAL INSTALLED CAPACITY by 2030 (MW) | 33364 | | 1860 | 4600 | 5000 | 8288 | 17742 | 600 | 6380 | |
| % Total Installed Capacity (% of MW) | 43 | | 2.36 | 5.84 | 6.35 | 10.52 | 22.53 | 0.76 | 8.1 | |
| % Annual Energy Contribution (% of MWh) | 58.8 | | 4.5 | 8.4 | 1.2* | 6.3 | 17.8 | 0.6 | 1.3 | |

Installed Capacity
Committed / Already Contracted Capacity
Capacity Decommissioned
New Additional Capacity
Extension of Koeberg Plant Design Life
Includes Distributed Generation Capacity for own use

- 2030 Coal Installed Capacity is less capacity decommissioned between years 2020 and 2030
- Koeberg power station rated / installed capacity will revert to 1926 MW (original design capacity) following design life extension work.
- Other / Distributed generation includes all generation facilities in circumstances in which the facility is operated solely to supply electricity to an end-use customer within the same property with the facility
- Short term capacity gap is estimated at 2000 MW

**Figure 9:** Proposed updated generation plan for the period ending 2030 (IRP, 2019)

The updated IRP 2019 recommends that 10.5% of installed generation capacity should be from solar PV energy by 2030, as indicated in **Figure 9** above.

South Africa continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. The extent of decommissioning of the existing coal fleet due to end of design life, could provide space for a completely different energy mix relative to the current mix. In the period prior to 2030, the system requirements are largely for incremental capacity addition (modular) and flexible technology, to complement the existing installed inflexible capacity.

In the long run and taking into account the policy of a diversified energy mix, the annual build limits will have to be reviewed in line with demand and supply requirement. As such, the current annual build limits on renewables (wind and PV) will need to be retained pending the finalisation of a just transition plan (IRP, 2019).

#### *6.2.10 Department of Energy (DoE) White Paper on Renewable Energy, 2003*

The DoE gazetted its White Paper on Renewable Energy in 2003 and introduced it as a '*policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy*.' At that time, the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should to be utilised for power generation and non-electric technologies such as solar water heating and biofuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependent, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

#### *6.2.11 The North West Provincial Spatial Development Framework (SDF)*

The proposed project falls within the North West Province. The main aim of the Spatial Development Framework (SDF) for the North West Province is to improve the quality of life for the population, particularly the disadvantaged poor within the North West Province. The SDF is one (1) of the fundamental implementation instruments, which provides the spatial dimensions for achieving the strategies of the province.

The NW Province has targeted Solar Power as a way of increasing energy generation, with a target of increasing renewable energy consumption to 37% by 2030. Under the REIPPP programme an allocation of 1,450MW has been made towards solar photovoltaic systems. The use of solar energy is ultimately one (1) of the most readily accessible renewable energy resources in the North West province. The province has a high average daily solar radiation (**Figure 10**). Even though the majority of solar photovoltaic projects under the current REIPPP programme are targeting the Northern Cape due to its preferable levels of solar irradiation, the North West province has levels of solar irradiation that is between 5% and 11% lower than the optimal locations in the Northern Cape province. Solar PV consequently forms one (1) of the key areas that the North West province needs to focus on. In this way, the proposed development is aligned with the provincial SDF.

The North West Provincial Spatial Development Framework and Environmental Management Plan (PSDF – EMP) of 2008, is closely aligned to the National Spatial Development Perspective, and as such places key importance on economic growth and poverty eradication. The spatial rationale is centred on the need to address issues related to; spatial planning, socio-economic development, infrastructure, and the sustainable and conservative use of natural resources. The PSDF – EMP highlights the fact that the legacy of the Apartheid-era policy is the key issue, with parts of the Province being significantly underdeveloped.

Although the PSDF – EMP does not include any land use or bioregional mapping, it does provide information on the required natural resources and socio-economic issues that must be addressed. The most prominent natural resource problems include; inadequate water resources (impacting future development), bush encroachment and alien invasive species, land and soil degradation, and overgrazing. The most significant socio-economic issues highlighted in the PSDF – EMP are as follows (Department of Economic Development, Environment, Conservation, and Tourism, 2008):

- The creation of employment opportunities - including increased economic opportunities for the youth and women.
- The eradication of poverty.
- Attraction investment into the Province.
- Achieving sustainable economic growth.
- The fight against, and prevention of HIV/Aids and other diseases.
- Achieving food security.
- Improved physical infrastructure, including the availability of industrial land.
- Decreasing the Province's illiteracy levels.
- Development of the Province's tourism potential.
- Managing population growth, urbanisation, and migration.

The proposed project therefore supports the objectives of the PSDF – EMP.

The detriments of climate change are reflected in the North West province and it is dominantly the poorer communities who could be exposed if development challenges are not addressed in a manner that ensures environmental sustainability and builds resilience. The Province significantly depends on non-renewable sources and experiences pollution and environmental degradation. The North West Provincial Development Plan (2013) further acknowledges that energy provision is a concern in some areas, given that the mining sector consumes a great portion of the available electricity.

Energy is undisputedly considered an economic enabler and due to the critical role it plays in socio-economic development, it forms part of the Sustainable Development Goals (i.e. SDF7). Renewable energy sources have the potential to be implemented in smaller units that can function in a more decentralised way. The objective developed is therefore to produce sufficient energy to support industry at competitive prices ensuring access for poor households, while reducing carbon emissions per unit of power by approximately one-third. Furthermore, the specific targets are to:

- Increase the population with access to electricity from 84% in 2011 to 95% by 2030, with non-grid options available for the rest
- Increase renewable energy consumption to 37% by 2030
- Ensure that 67% of households have a solar water heater installed
- The actions set out to achieve this are:
- Develop energy infrastructure and service provision
- Expand renewable energy with special reference to solar power
- Increase energy efficiency (reduce demand)

Furthermore, the job creation potential of the renewable energy industry is not so much in the operation and maintenance of such facilities but rather in the manufacturing of such technologies. Thus, the goal is to promote renewable energy throughout the province in order to increase demand and resultantly increase jobs in the manufacturing of PV panels (Commission N. W., 2013).

The proposed Wildebeestkuil solar PV and power line project near the town of Leeudoringstad in the North West Province fulfils the operation and maintenance of PV plants aims. Nonetheless, the successful implementation of the project will stir the demand and serve as an indicator of the advantages of solar power. The plan further states that renewable energies, particularly solar and waste/biomass-to-energy initiatives will play an increasingly important role in the following two (2) decades and will contribute a much greater share to the provincial energy consumption (Commission N. W., 2013). The North West Province is the second most receptive province following Northern Cape in terms of radiation, thus the location of the proposed project is appropriate.

### *6.2.12 Dr Kenneth Kaunda District Municipality Integrated Development Plan (2017/18-2021/22)*

The Dr Kenneth Kaunda District Municipality Integrated Development Plan (2017/18-2021/22) identifies the comparative advantage of electricity provision and production that the region has in the provincial context. The 2019/20 IDP amendments ensures municipalities adopt a single, inclusive and strategic plan for the development of the municipality which links, integrates and co-ordinates plans and takes into account proposals for the development of the municipality (Municipality D. K., Dr Kenneth Kaunda District Municipality Integrated Development Plan 2017/18 - 2021/22, 2017). One (1) of the key strategic goals for the district is to promote physical infrastructure development and services. The proposed solar project can thus accentuate the comparative advantage of the region and is additionally in sync with one (1) of the key strategic goals.

### *6.2.13 Maquassi Hills Local Municipality Integrated Development Plan (2013 – 2016)*

The Maquassi Hills Local Municipality Integrated Development Plan (2013–2016) (latest available IDP) recognises that the municipality's electricity network has aged. In line with the National Electrification Programme as a key spending programme, a total operational expenditure of R48.4 million was allocated for the provision of electricity services (Maquassi Hills Local Municipality, 2016). A further rationale for alternative sources of electricity is that 3 970 households do not have access to electricity in the Maquassi Hills Local Municipality (Quantec, 2020). The Maquassi Hills Local Municipality is the electricity supply authority in the towns and townships of Wolmaransstad, Makwassie, Leeudorinstad, Witpooort, Tswelelang, Kgakala, Lebaleng. Furthermore, the Maquassi Hills Local Municipality is a service provider in the areas of Wolmarannstad, Leeudoringstad, Makwassie and the villages of Boskuil and Oeronskraal. The minimum level of level of electricity service connections is 80% (Maquassi Hills Local Municipality, 2016). There is a total of 2 571 customers that are supplied by the Maquassi Hills Local Municipality. The other areas are directly supplied by Eskom. In total, Eskom supplies in excess of 14 000 customers. The major growth in demand for residential supply is in the Eskom supplied areas (Maquassi Hills Local Municipality, 2016).

The proposed development is therefore relevant as the electricity generated by the proposed solar PV plant (part of this application) will be sold by the Authorisation Holder to a second party, as part of a PPA. The purchased electricity will be sold directly to commercial and light industrial consumers within the Maquassi Hills Local Municipality.

### *6.2.14 National Infrastructure Plan (2012)*

The National Infrastructure Plan (2012) supports green energy initiatives on a national scale through a diverse range of clean energy options as outlined in the Integrated Resource Plan IRP2010 through the Strategic Integrated Project (SIP 8). Electricity transmission and distribution for all is supported by SIP 10, which seeks to expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development. As such, the proposed development falls in line with the National Infrastructure Plan.

# 7 PROJECT NEED AND DESIRABILITY

The EIA Regulations, 2014 (as amended) [Appendix 3 Section 3 (f)] requires that the need and desirability of a project (including viable alternatives) are considered and evaluated against the principles of sustainability. Need and desirability answers the question of whether the activity is being proposed at the right time and in the right place. This requires investigation of the effect of the project on social, economic and ecological systems; and places emphasis on consideration of a project's justification not only in terms of financial viability (which is often implicit in a [private] proponent's intention to implement the project), but also in terms of the specific needs and interests of the community and the opportunity cost of development (DEA&DP, 2013).

It is therefore an important requirement in this BA process to review the need and desirability of the proposed development. Guidelines on Need and Desirability were published in the Government Gazette of 20 October 2014. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a proposed development and assists in explaining that need and desirability at the provincial and local context. It should be noted that the Guidelines on Need and Desirability (published in the Government Gazette of 20 October 2014) have subsequently been used in order to assist in explaining the need and desirability at the provincial and local context in terms of Key Development Strategies and Guidelines (refer to **section 6.2** above). In addition, the need and desirability of the project was informed by the outcomes of the BA process and is discussed further below.

Current energy supply in South Africa is primarily coal-based (72%, IRP 2019) and, although these resources will last for more than a century if used at current rates, large power plants will need to be replaced over the next 30 years. Coal and other fossil fuels, including oil, produce Carbon Dioxide ($CO_2$) when burned to produce energy. It is now widely accepted that climate change, partially caused by human-generated $CO_2$, is to blame for the higher-than-usual incidence of extremely damaging weather experiences (e.g. storms, droughts, melting polar ice-caps). Local air pollution is strongly related to energy supply options, with coal and oil products being major contributors to urban and rural air pollution and acid rain.

**One (1) of the primary reasons for promoting renewable energy developments is the desire to make South Africa compliant with international treaties regarding climate-change effects and reduce our risk of a climate crises and frequency and intensity of severe weather events**

Renewable energy options are a sustainable energy supply option that can significantly reduce reliance on fossil fuels. Other advantages include employment creation, proximity to point-of-use, minimal demand for water and less reliance on fossil fuel based sources of energy. Greater use of renewable energy would also reduce South Africa's economic vulnerability to the variable costs of imported fuels. International and local communities are increasingly trying to find ways to shift economies towards greater reliance on renewable energy. Greater uptake of renewable energy would furthermore reduce the global risk of climate change, one (1) of the factors taken into account in designing the conservation network in South Africa.

The combined generation capacity of all the renewable energy developments considered here in this BA (50km buffer) is less than 1 000MW (maximum of 439.6MW within the 50km radius), which is more than the average size of one (1) of the 14 coal power stations in South Africa (Eskom's Generation Division has 14 coal-fired power stations with an installed capacity of 37 149MW: www.eskom.co.za).

As discussed in **section 6.2**, although little mention of developing the renewable energy sector is made within the Maquassi Hills Local Municipality and Dr Kenneth Kaunda District Municipality IDPs, the North West Provincial Development Plan (2013) acknowledges that energy provision is a concern in some areas, given that the mining sector consumes a great portion of the available electricity. Furthermore, the job creation potential of the renewable energy industry is in the manufacturing of such technologies and therefore the goal is to promote renewable energy throughout the province in order to increase demand and resultantly increase jobs in the manufacturing of PV panels (Commission N. W., 2013). The proposed project fulfils the operation and maintenance of PV plants aims and will thus stimulate the creation of employment which is much needed in the municipal areas. The plan further states that renewable energies, particularly solar and waste / biomass-to-energy initiatives will play an increasingly important role in the following two (2) decades and will contribute a much greater share to the provincial energy consumption (Commission N. W., 2013).

The Dr Kenneth Kaunda District Municipality Integrated Development Plan (2017/18-2021/22) identifies the comparative advantage of electricity provision and production that the region has in the provincial context. The proposed project can accentuate the comparative advantage of the region and is additionally in sync with one (1) of the key strategic goals. The Maquassi Hills Local Municipality is the electricity supply authority in the towns and townships of Wolmaransstad, Makwassie, Leeudorinstad, Witpooort, Tswelelang, Kgakala, Lebaleng. Furthermore, the Maquassi Hills Local Municipality is a service provider in the areas of Wolmarannstad, Leeudoringstad, Makwassie and the villages of Boskuil and Oeronskraal. Since 3 970 households do not have access to electricity in the Maquassi Hills Local Municipality (Quantec, 2020), the proposed development is seen as a suitable alternative source of electricity. In addition, the purchased electricity (which is generated by the proposed development) will be sold directly to commercial and light industrial consumers within the Maquassi Hills Local Municipality and thus the proposed development will assist with providing electricity supply within the local municipality.

Based on the review of provincial and local policy, the proposed development is in alignment with national, provincial and local objectives, plans and strategies relating to socio-economic development of the areas under analysis. In addition, considering the nature and location of the proposed development, there is clear alignment with international, national, provincial and local (district and municipal) policy and legislation. In summary, the proposed development is aligned with the vision and goals of the Local and District Municipalities, as well as the North West Provincial Development Plan. The need and desirability of the project has been discussed further in the sub-sections below.

## 7.1 National Renewable Energy Requirement

In 2019, South Africa had 51 504MW of power generation capacity installed (IRP, 2019). Current forecasts indicate that by 2030, the expected growth in demand will require the current installed power generation capacity to be increased to approximately 77 834MW (IRP,2019).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding Green House Gas (GHG) emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the country’s renewable energy resources remain largely untapped. There is therefore an increasing need to establish a new source of generating power in South Africa within the next decade.

The use of renewable energy technologies, as one (1) of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that solar energy is plentiful, renewable, widely distributed, clean and reduces GHG emissions when it displaces fossil-fuel derived from electricity. In this light, renewable solar energy can be seen as desirable.

The competitive nature of the Renewable Energy Independent Power Producer Procurement Programme’s (REIPPPP’s) bidding process has resulted in significant lowering of solar and wind tariff prices since 2011. For example, the bidding tariffs of solar PV have decreased from R2.80/kWh in 2011 to sub-60c/kWh at present. Further projects will increase the competitive nature and further result in cost savings to South African consumers. It should also be noted that the Minister of Mineral Resources and Energy welcomed the concurrence by the NERSA to the second Section 34 Ministerial Determination issued in February 2020. This is another milestone that gives effect to commitments made by President Cyril Ramaphosa in his 2020 State of the Nation Address (SONA) to increase generation capacity and ensure security of energy supply to society rapidly and significantly. The Section 34 Determination enables the Department to undertake procurement of additional electricity capacity in line with the Integrated Resource Plan (IRP 2019). This will open-up various

Bid Windows (BW), including BW 5 of renewable energy. 6 800MW of capacity is determined to be generated from renewable energy sources (PV and Wind), 513MW from storage, 3 000MW from gas and 1 500MW from coal. This will enable the development of an additional 11 813MW of power in total from the year 2022. This is in addition to the 2 000MW already being procured under the RMIPPP (as per media statement released 10 September 2020[18]).

### 7.2 National Renewable Energy Commitment

In support of the need to find solutions for the current electricity shortages, the increasing demand for energy, as well as the need to find more sustainable and environmentally-friendly energy resources, South Africa has embarked on an infrastructure growth programme supported by various government initiatives. These include the National Development Plan (NDP), the Presidential Infrastructure Coordinating Commission (PICC), the DoE's IRP, the National Strategy for Sustainable Development, the National Climate Change Response White Paper, the Presidency of the Republic of South Africa's Medium-Term Framework, and the National Treasury's Carbon Tax Act.

The Government's commitment to growing the renewable energy industry in South Africa is also supported by the *White Paper on Renewable Energy* (2003), which sets out the Government's principals, goals and objectives for promoting and implementing renewable energy in South Africa. In order to achieve the long-term goal of achieving a sustainable renewable energy industry, the DoE has set a target of contributing 40% of renewable energy to the final energy consumption by 2030. This target is to be produced mainly through, wind and solar; but also, through small-scale hydro and CSP. According to the IRP 2019, 1 474MW of solar PV energy output capacity had been installed by 2018 already (**Figure 9**). Additionally, the IRP 2019 states that new installed energy capacity to 2030 will include approximately 6 484MW solar PV. It is also recommended that 10.5% of the generation capacity should be from solar PV energy by 2030 (IRP, 2019).

### 7.3 Reduced Dependency on Fossil Fuels

At present, more than 72% of South Africa's energy is generated by coal-fired power stations (based on installed capacity). Apart from the fact that these are finite resources that will eventually run out, fossil fuels are also harmful to the environment when used to produce electricity. During combustion, fossil fuels such as coal emit many by-products into the atmosphere, two (2) of which are $CO_2$ and sulphur dioxide ($SO_2$). Both of these gases have been shown to contribute to the worsening climate crisis. Solar is a free and infinite resource that occurs naturally in the environment. Converting solar energy into electricity releases no harmful by-products into the environment and will reduce South Africa's dependence on fossil fuels.

As the 14$^{th}$ largest emitter of $CO_2$ in the world, South Africa needs to divert from coal and reduce reliance on non-renewable resources in order to reduce the frequency and intensity of extreme weather events.

### 7.4 Stimulate the Economy

A significant portion of the capital expenditure envisaged for the proposed development will be spent on procurement of goods and services within South Africa and specifically within the North West Province. If goods and services are procured locally (i.e. within South Africa), it increases the production of the respective industries. This has a positive impact on the national economy and economies of the municipalities where inputs are procured.

The proposed development has the potential to stimulate the demand for other industries, among others construction services, engineering services, transport services, steel structures, cement and other

[18] Issued by Department of Mineral Resources and Energy (DMRE): mediadesk@energy.gov.za; media@dmre.gov.za

aggregates, and electrical equipment. At the local level, increase in demand for accommodation, personal services, perishable and non-perishable goods is expected, which will stimulate the local economies of the towns and settlements, where labour will be procured from or where migrant workers will be temporarily located.

At this stage, it is anticipated that the proposed development will attract an investment of approximately R135million. This is crucial considering that our economy is crippled as a result of CoVID-19 and looming load-shedding. There's very few infrastructure builds programmes that can attract that magnitude of much-needed investment.

Some of the local businesses could benefit from sub-contracting opportunities, if the construction companies appointed by the developer implement a local community procurement policy, and consumer expenditure of the construction crew. Furthermore, the demand for hospitality services (including accommodation and catering in the town of Leeudoringstad and other nearby towns) is expected to increase and provide much-needed stimulus for the local economy.

## 7.5 Job opportunities and Household Livelihoods

Solar PV and power line developments create temporary and permanent job opportunities in South Africa for both skilled and unskilled workers. At this stage, it is anticipated that approximately 25 local people will be employed during the construction phase of the proposed development. In addition, approximately five (5) local people will be employed on a permanent basis during the operational phase of the proposed development. This includes cleaning and security staff. It should however be noted that for certain highly skilled positions, employees may need to be sourced from outside the local communities.

In addition to those benefitting from direct employment created at the proposed development, various multiplier effects will assist in temporarily supporting existing jobs in the businesses offering services and goods that will be procured during construction activities. The increased temporary income earned by these businesses will, in turn, stimulate consumer spending, creating another round of multiplier effect, positively impacting employment in the area.

Household earnings are linked closely with trends in employment and, as such, will be affected positively by the creation of jobs as discussed above. The creation of temporary jobs during the construction period will temporarily increase affected households' income. Some of this income will be earned by workers from the local communities. Given that most local households earn between R1- R3 200, a significant boost in household income may prevail. A temporary increase in living standards based on the additional monthly income is therefore expected. Employees working for local businesses that the Applicant aim to sub-contract to supply goods and services to the solar PV plant during construction, are also expected to benefit indirectly.

## 7.6 Skills Development

In addition to job creation, there is valuable opportunities for skills enhancement and knowledge transfer as quite often input from experts are required in this field. Therefore, opportunities for guiding and training of local workers will be created. A variation of skill-sets is required, ranging from semi-skilled construction workers to highly skilled engineers. The majority of the municipality's residents are low-skilled, which means that with proper planning and recruitment strategies, many of the local unemployed residents could be hired as temporary construction workers provided they satisfy any other recruitment criteria.

Those employed will either develop new skills or enhance current skills. This implies that inexperienced workers will have the opportunity to attain and develop new skills, while experienced workers will further improve their existing skills. Albeit the employment is temporary, the skills attained will be of long-term benefit to employees. However, these skills will need to be supported and practised on a regular basis to remain current.

### 7.7 Site Specific Suitability

The selection of a potential site for the proposed solar PV plant included several key aspects, namely solar resource, climate, topography, environmental, grid connections and access to the site. As mentioned, no site alternatives for the proposed development are being considered as the placement of solar PV installations and power lines is dependent on several factors, all of which are favourable at the proposed site location. This included land availability and topography, environmental sensitivities, distance to the national grid, solar resource site accessibility and current land use. The project site has been identified based on solar resource, grid connection suitability, competition, topography, land availability and site access.

According to the Direct Normal Solar Irradiation (DNI) map below (**Figure 10**), the North West Province of South Africa has a relatively high predicted DNI, ranging between 2191 to 2556kWh/m$^2$/year. In addition, as mentioned, the project site receives an annual GHI ranging between 1972 and 2118kWh/m$^2$/year (**Figure 6**).

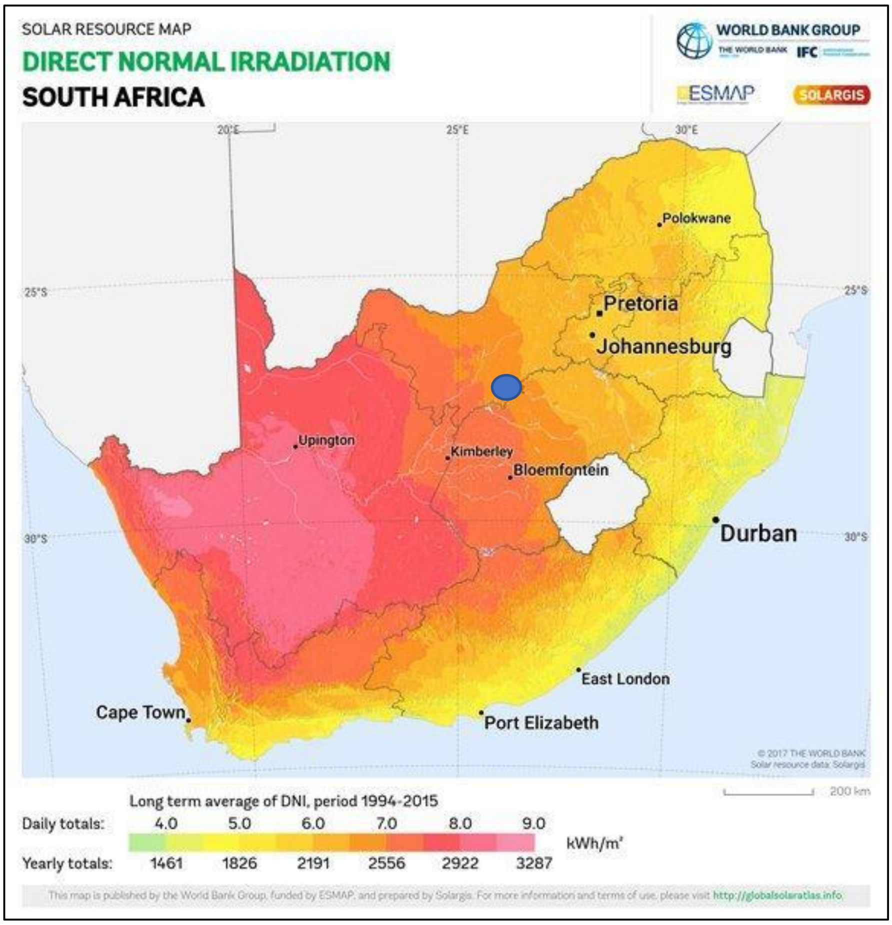


**Figure 10:** Direct Normal Solar Irradiation (DNI) map (Source - 2017 The World Bank, Solar resource data: SolarGis)

Based on the PV Power Potential map below (**Figure 11**), the North West province of South Africa has relatively high solar potential. The project site is thus suitable for the establishment of the proposed solar PV plant. Based on an estimation of the solar energy resource as well as weather, dust, dirt, surface albedo and the pre-feasibility studies conducted by Wildebeestkuil PV Generation, the site has been identified as optimal for the proposed solar PV plant and associated power line.

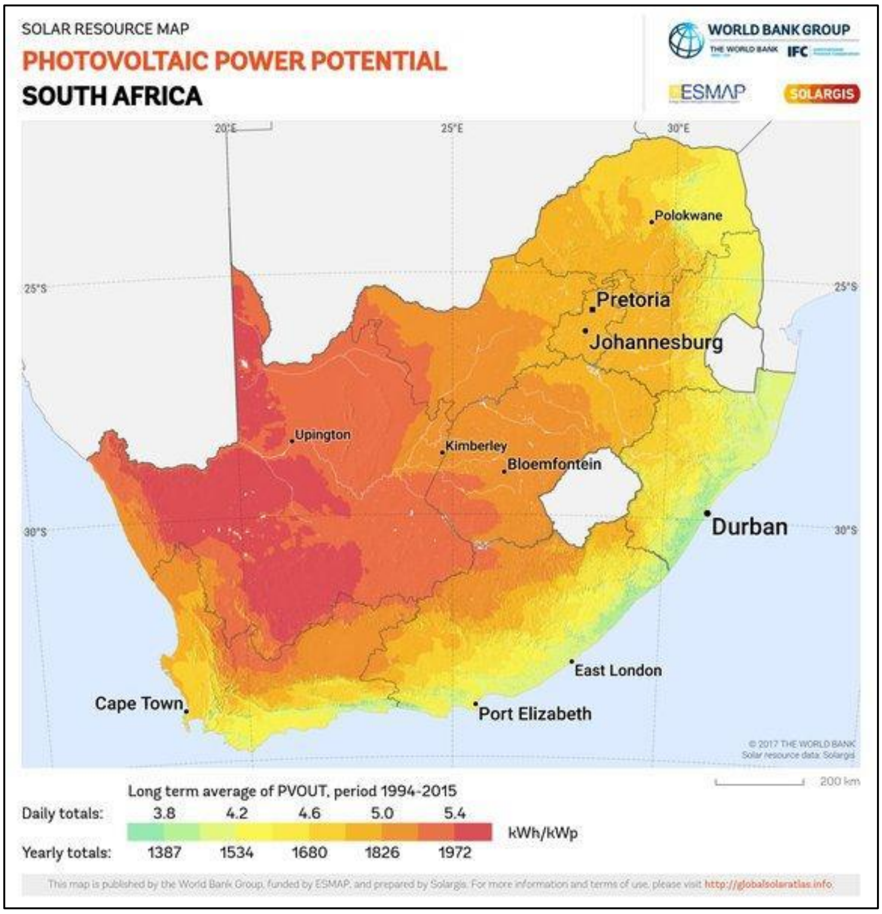


**Figure 11:** PV Power Potential map (Source - © 2017 The World Bank, Solar resource data: SolarGis)

The proposed project site is not located in any of the eleven (11) identified REDZs, which are geographical areas that have been identified on a strategic planning level to have reduced negative environmental impacts but high commercial attractiveness (due to its proximity to, *inter alia*, the national grid) and socio-economic benefit to the country. The associated overhead power line is however located within the Central Corridor of the Strategic Transmission Corridors as defined and in terms of the procedures laid out in Government Notice No. 113 and Government Notice 145. As such, the development of the proposed solar PV plant and associated power line is considered to be important for South Africa as it will reduce the country's overall environmental footprint from power generation (including externality costs), and thereby steer the country on a pathway towards sustainability. The proposed development will provide socio-economic benefits to the region it is situated in and will have a high commercial attractiveness. In addition, the negative environmental impacts associated with the proposed development can be mitigated to acceptable levels.

Solar resource is only one (1) driver of site selection. The other aspects should be considered when holistically evaluating a proposed development.

Environmental suitability is the second key aspect that the Applicant considers when evaluating a solar PV plant development. The proposed development should be developed in a sustainable and ecologically friendly manner ensuring its development has the least possible impact on the land on which it will be built. As mentioned, the power line traverses an ESA 1 area. The appropriate mitigation measures / recommendations will however be implemented in order to ensure that the impacts will be reduced to acceptably low levels. In addition, the recommended buffer zones would also be placed around any sensitive and/or 'no-go' areas within the development site and/or power line corridor which would need to be avoided. These areas would thus not be impacted by the proposed development.

Grid connection suitability, or capacity on the local transmission system to evacuate the power into the municipal electricity grid, is the third primary driver which assists in choosing the project location. Long connection lines have increased environmental impacts as well as add increased costs to the proposed development. The proposed development site has good grid connection potential as the proposed development will connect to the Leeudoringstad Solar Plant Substation (part of separate BA process), which is situated within 3km of the proposed solar PV plant's application site. This thereby minimises the need for an extensive grid network upgrade or long power line. In addition, a SEA for Electricity Grid Infrastructure (EGI) in South Africa was conducted and identified five (5) Strategic Transmission Corridors which are of strategic importance for the rollout of large scale electricity transmission and distribution (as per GN 113 of 2018 and GN 145 of 2021). As mentioned, the overhead power line associated with the project falls entirely within the Central Strategic Transmission Corridor.

Other key criteria which refine the site selection on a micro level include competition, topography and site access. The project site has topography which is suitable for the development of a solar PV project and associated overhead power line. The topography in the immediate vicinity of the proposed development is characterised by flat terrain, which is suitable for the development of a solar PV plant and associated power line. The project site can also be accessed easily via the tarred R502 road. The region also has eight (8) renewable energy projects which are either being proposed or have already received approval within a 50km radius of the proposed solar PV plant's application site. These include the Leeuwbosch 1 Solar PV Plant, Leeuwbosch 2 Solar PV Plant, Wildebeestkuil 2 Solar PV Plant and 132kV Power Line, Wolmaransstad Solar Energy Facility, Bokamoso PV Energy Facility, Orkney PV Solar Energy Facility, Kabi Vaalkop Solar PV Facility and Kabi Witkop Solar PV Facility.

The proposed site is currently being used for agricultural purposes, predominantly livestock farming. The climate supports cultivation, however, irrigation is required for year round cropping. In addition, farmsteads, including farm worker's dwellings, and ancillary farm buildings can also be found within the greater Leeudoringstad study area. It should also be noted no sensitive visual receptor linked to leisure or nature-based activities can be found within the application site. It is expected that the small patches of irrigation will be unaffected by the proposed development as these should be considered 'no-go' areas for any footprint of development that will exclude cultivation. As such, it is not envisioned that farming activities will be impacted after the construction phase has been completed. It is not anticipated that any of the farmsteads, farm worker's dwellings or ancillary farm buildings located within the application site will need to be moved or decommissioned. The Applicant is however willing to relocate any farm workers' dwellings or any other farm buildings, if needed. Should infrastructure changes be required, this will be discussed with the relevant landowner. It must be noted that the affected landowner is in support of the proposed development as he understands the importance of building generation capacity. The proposed project site is therefore considered to be suitable from a land use perspective.

# 8 DESCRIPTION OF THE RECEIVING ENVIRONMENT

## 8.1 Topography

The topography within and in the immediate vicinity of the proposed application site is characterised by a mainly flat to gently undulating landscape, sloping down in a south-easterly direction.

In addition, the topography in the wider visual assessment zone is largely characterised by level plains with little noticeable relief and very gradual slopes.

The topography of the proposed site and surrounding area is shown in **Figure 12** below. The degree of slope of the site and surrounding area is shown in **Figure 13** below.

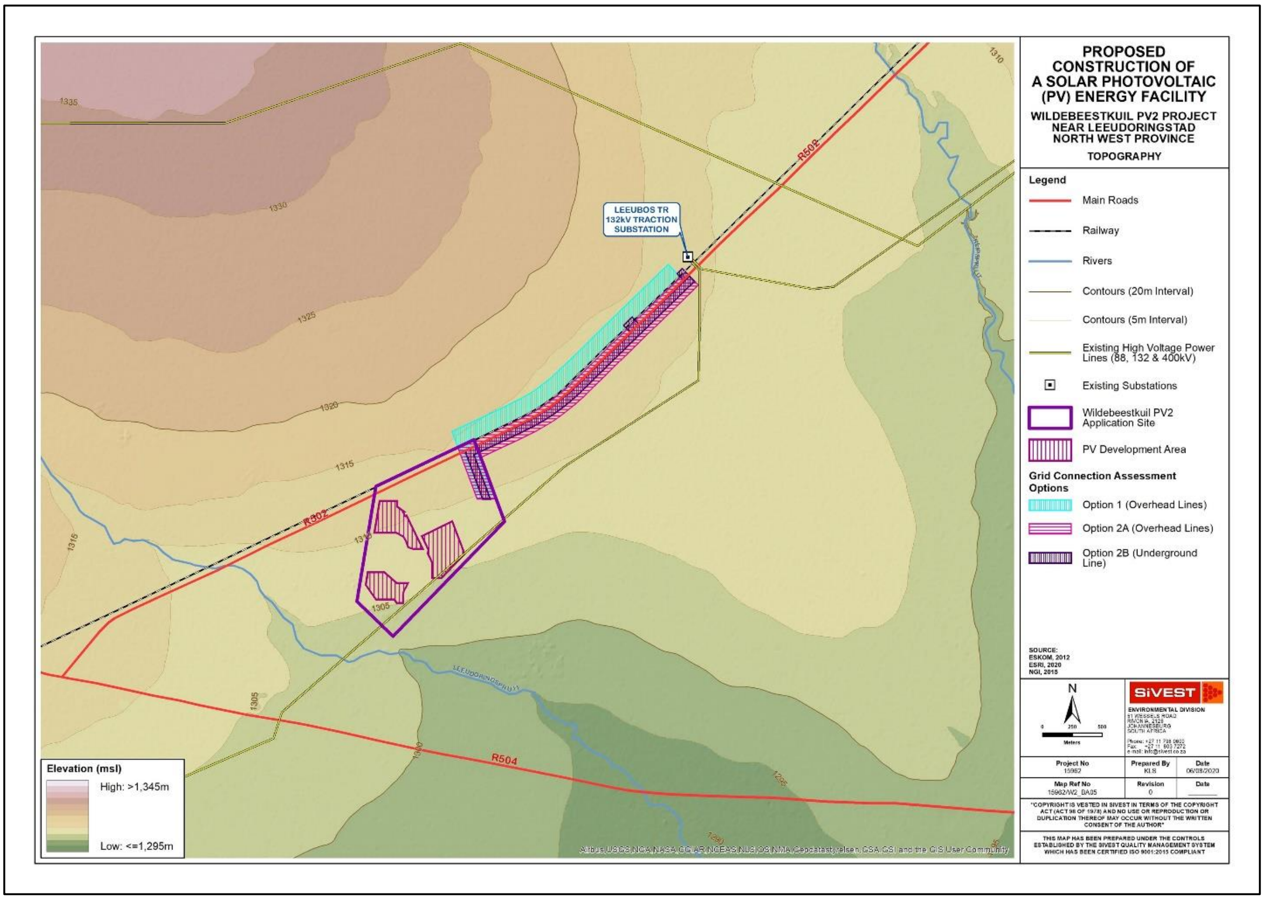

**Figure 12:** Topography of study area

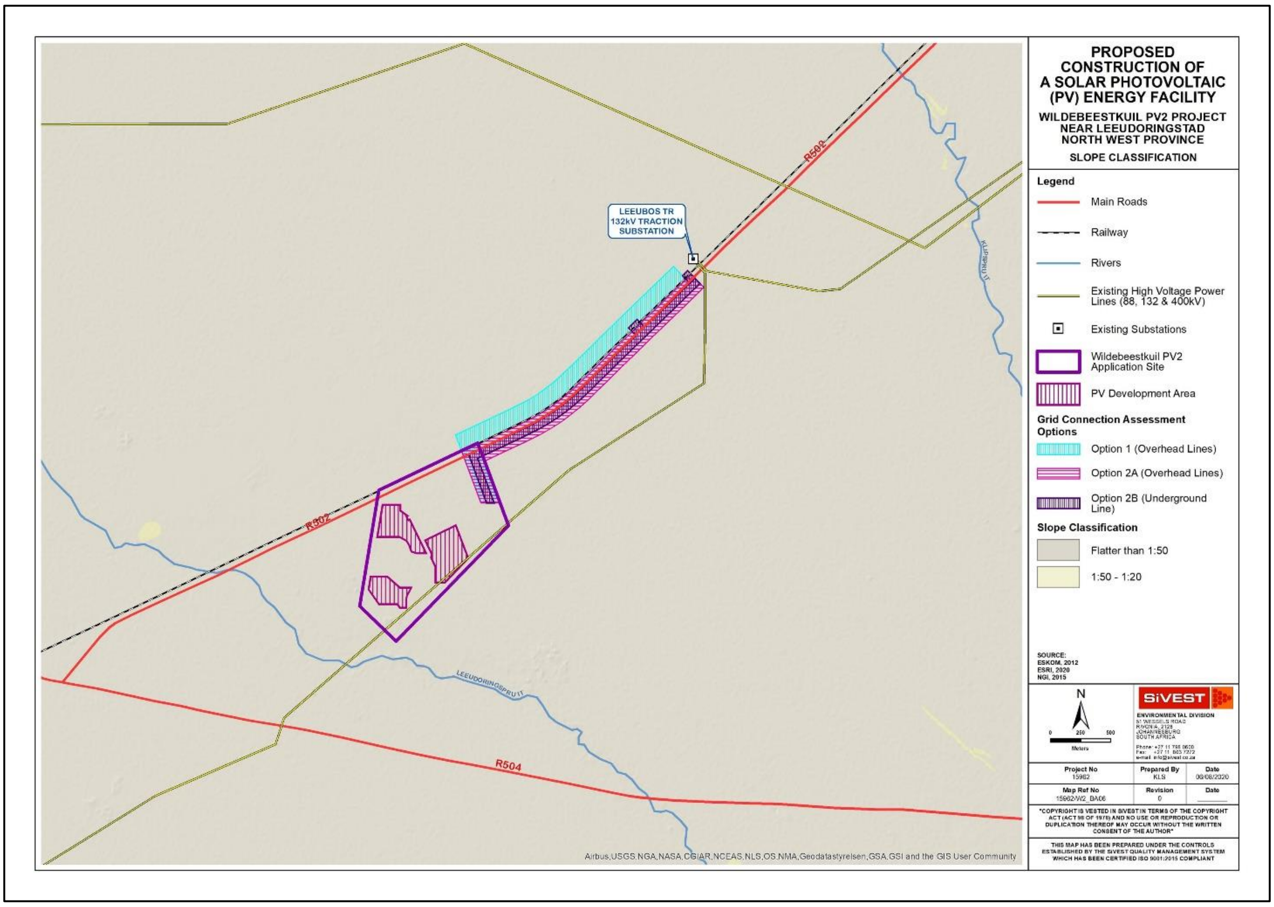


**Figure 13:** Degree of slope in region of study area

## 8.2 Geology

Based on the Geotechnical report compiled by Keval Singh (JG Afrika) in March 2021 (**Appendix 6F**), the baseline geotechnical status of the application is described in detail below.

According to the 1: 250 000 Geological Map of Kroonstad (2726 C) compiled by the Council for Geoscience. The study area is underlain by the Ventersdorp Supergroup, which comprises amygaloidal lava, agglomerate and tuff. The Ventersdorp Supergroup is predominantly an accumulation of andesitic to basaltic lavas with related pyroclastic rocks (Brink, 1979).

No structural lineaments in the form of dykes or faults were observed during the review of Geological Maps and aerial photography.

The Ventersdorp Supergroup is represented in the study area by the Platberg Group. The Platberg Group consists of four formation of heterogeneous rock ranging from clastic and chemical sediments to mafic and felsic volcanics (Johnson *et al*., 2006). The volcanic rocks were developed during graben development and accumulated in numerous fault troughs. The Goedgenoeg Formation lavas which is anticipated in the study site, indicates contemporaneous volcanism and sedimentation. These mafic, andesitic lavas are interbedded with feldspar porphyries and become more prominent towards the top of the succession (Johnson *et al*., 2006). Minor tuffaceous rocks are sparsely interbedded with the porphyries and mafic lavas, while sedimentary rocks are rare (Johnson *et al*., 2006). In the Bothaville area the maximum lava thickness intersected was 1 777m (Johnson *et al*., 2006).

The feldspar porphry rock variants are dark green in colour due to the presence of chlorite.

A Geological Map is presented in **Figure 14** below, as well as Appendix A of the Desktop Geotechnical Report (**Appendix 6F**).

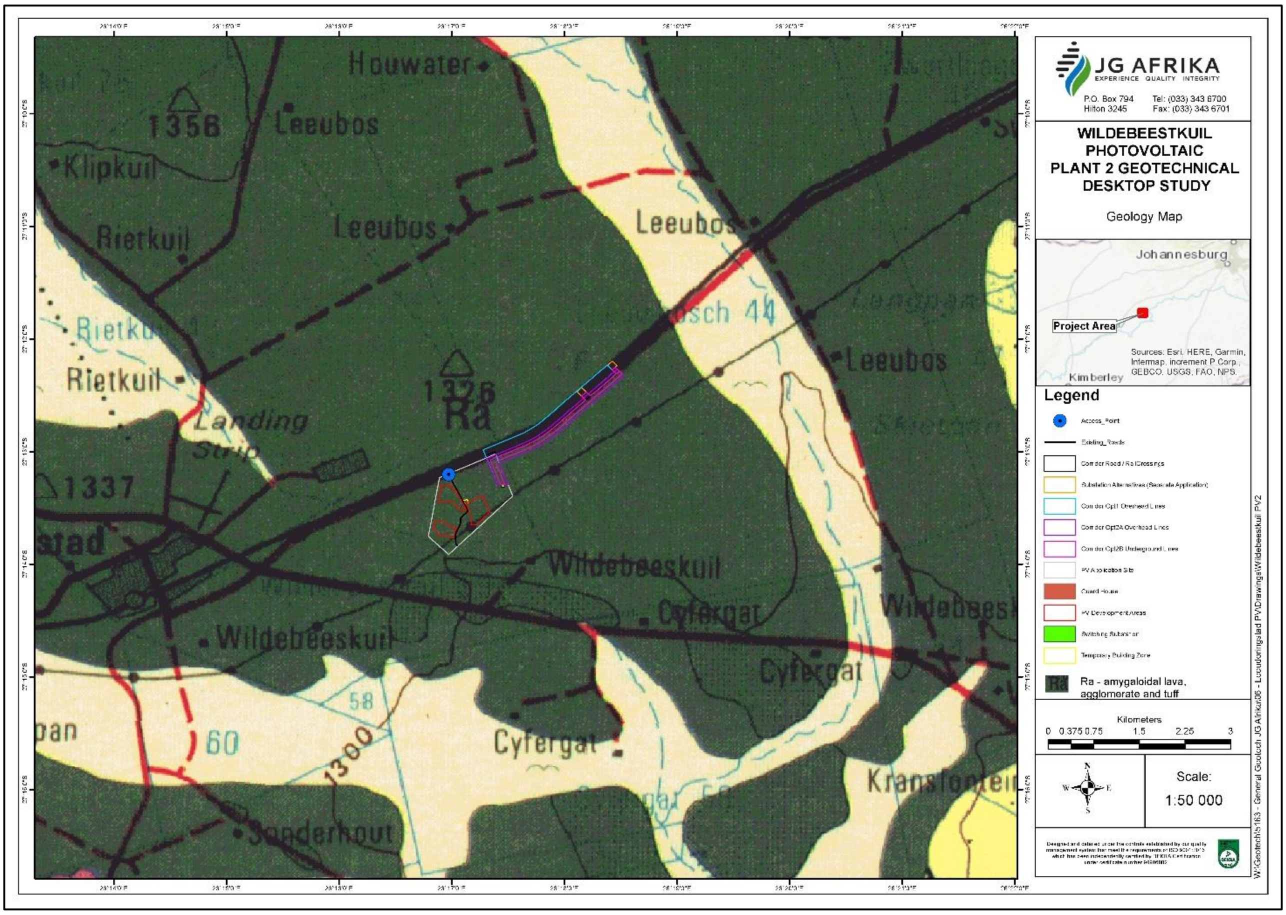


**Figure 14:** Geological Map (K Singh, 2021. **Appendix 6F** of DBAR)

## 8.3 Land Use

According to the South African National Land Cover dataset (GeoTerra Image 2018), much of the visual assessment area is characterised by natural vegetation which is dominated by natural grassland (**Figure 21**). There are however significant patches of land classified as 'cultivated land' throughout the study area, although much of this land appears to be fallow grasslands. Hence livestock farming is the dominant agricultural activity in the study area, although livestock densities appear to be relatively low.

Farm properties in the study area tend to be relatively large resulting in a low density of rural settlement. Built form is largely characterised by scattered farmsteads and ancillary farm buildings (**Figure 15**), gravel access roads, telephone lines, fences and the remnants of disused workers' dwellings. Other human influence is visible in the area in the form of road, rail and electricity infrastructure. This includes the R502 regional road which traverses the study area in a north-east to south-west direction (along the southern boundary of the application site) and the R504 regional road which traverses the south-western section of the study area. In addition, an operational railway line runs directly adjacent to the R502 (**Figure 16**) and several high voltage power lines (**Figure 17**) feed into the Leeubos TR 132kV Traction Substation located approximately 2.5km north-east of the application site. The tall steel structures of the Traction Substation, as well as the tall steel towers of the power lines are expected to be visible from various parts of the study area (**Figure 18**).

**Figure 15:** Isolated Farmhouse visible from R504 Main Road

**Figure 16:** Railway infrastructure adjacent to the R502 Main Road

**Figure 17:** High voltage power lines in the study area

**Figure 18:** Power lines feeding into the Leeubos TR 132kV Traction Substation

The closest built-up areas include the Kgakala Township and the town of Leeudoringstad. In addition, there some urban smallholdings on the outskirts of the town of Leeudoringstad as well as some mining / quarrying activity in the southern section of the visual assessment zone.

The town of Leeudoringstad, which is located approximately 3.3km south-west of the application site, is essentially a small agricultural service centre comprising a mix of commercial, service industrial and residential land use with associated road, rail and electricity infrastructure. Human influence within and also on the outskirts of the town has significantly altered the visual character in this sector of the study area.

The presence of Kgakala Township, located approximately 500m north-west of the application site, has further altered the visual character of this sector of the study area. Within close proximity to this township, human influence is visible in the form of urban development and electricity infrastructure (**Figure 19**). General degradation of the visual character of the area has been exacerbated by significant amounts of litter in the township and the surrounding area, and the presence of an informal dumping site located on the outskirts of the township (**Figure 20**) contributes to the overall disturbed nature of the Kgakala area.

**Figure 19:** Urban and infrastructural built form of Kgakala Township

**Figure 20:** Informal dumping site on the outskirts of Kgakala Township

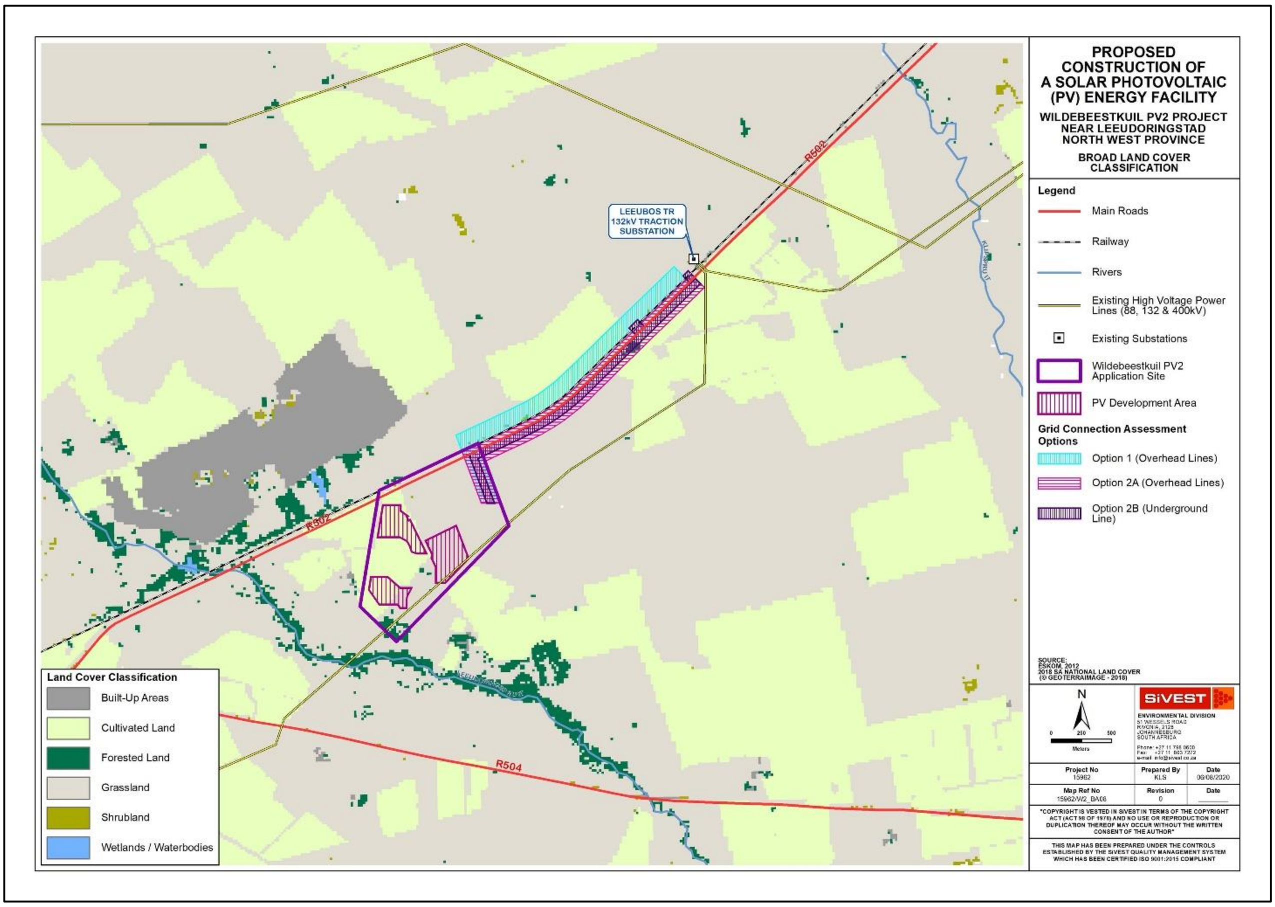

**Figure 21:** Land cover classification in the study area

## 8.4 Climate

The study area is characterized by a dry climate with a 'BSk' classification according to the Köppen-Geiger climate classification. Leeudoringstad receives a mean annual precipitation of 588mm. All areas with less than 400mm rainfall are considered to be arid and all areas with more than 600mm are moist. The study area can therefore be considered to be intermediate. The average lowest rainfall is received in July (6mm) and the highest in January (103mm), which is a seasonally variation of 97mm. Winter frost is common and severe and occurs on average 37 days per year.

The average maximum midday temperature for Leeudoringstad ranges from 23.2°C in January to 9.5°C in July, which is a seasonal variation of 13.7°C.

The average monthly distribution of rainfall and temperature is shown in **Table 8** below.

**Table 8:** Summary of climate conditions, Leeudoringstad (information extracted from "Climate-Data.org")

| Months | Average Rainfall (mm) | Temperature (°C) | | |
|---|---|---|---|---|
| | | Maximum | Minimum | Average |
| January | 103 | 30.2 | 16.3 | 23.2 |
| February | 93 | 28.6 | 15.8 | 22.2 |
| March | 80 | 27 | 13.7 | 20.3 |
| April | 50 | 24.4 | 9.5 | 16.9 |
| May | 23 | 21.4 | 5 | 13.2 |

| Months | Average Rainfall (mm) | Temperature (°C) | | |
|---|---|---|---|---|
| | | Maximum | Minimum | Average |
| June | 8 | 18.2 | 1.2 | 9.7 |
| July | 6 | 18.3 | 0.7 | 9.5 |
| August | 10 | 21.4 | 2.9 | 12.1 |
| September | 16 | 24.9 | 7.4 | 16.1 |
| October | 51 | 27.8 | 11.3 | 19.5 |
| November | 67 | 28.5 | 13.6 | 21 |
| December | 81 | 29.3 | 15.2 | 22.4 |

## 8.5 Terrestrial Ecology

The Terrestrial Ecology Impact Assessment was conducted by Dr David Hoare (David Hoare Consulting) and is included as **Appendix 6G**. The study commenced as a desktop-study followed by three (3) site-specific field studies undertaken on 13 September 2016, 15 May 2017 and 25 March 2021. The findings are detailed in the report dated 01 May 2021 (**Appendix 6G**). The study area was visited and assessed to confirm patterns identified from the desktop assessment. The site visits were undertaken at different times of the summer growing season. Vegetation was in a moderate to good state. Many plant species could be identified, and habitats were generally in a good state to assess. This means that botanical diversity and species composition were possible to assess.

Specific features of potential concern were investigated in the field. Key parts of the development sites were visited during the reconnaissance site visit in such a way as to ensure all major variation was covered and that any unusual habitats or features were observed. It should be noted that the season of the survey was favourable, and it there is high confidence that many of species present on site were identifiable at the time of the survey. The survey was of adequate duration and intensity to characterise the flora of the development site as per the regulations.

**It should be noted that the Ecologist has undertaken a detailed ground-truthing walk-through (during the correct season) in order to inform the final layout design which is being put forward for authorisation. The Ecologist confirmed that there are no fatal flaws associated with the proposed layout and that this layout should ultimately be authorised as part of the EA (should this be granted).**

The environmental baseline from a terrestrial ecological perspective is presented below.

### *8.5.1 Description of the Terrestrial Ecology Environment*

#### *8.5.1.1 Broad Vegetation Patterns*

There is one (1) regional vegetation type occurring on-site, namely Vaal-Vet Sandy Grassland. There are small patches of Highveld Salt Pans in nearby areas but not within the study area. The vegetation types that occur on-site and nearby areas are briefly described below.

The national vegetation map (Mucina & Rutherford, 2006) for the study area is depicted below in **Figure 22** below.

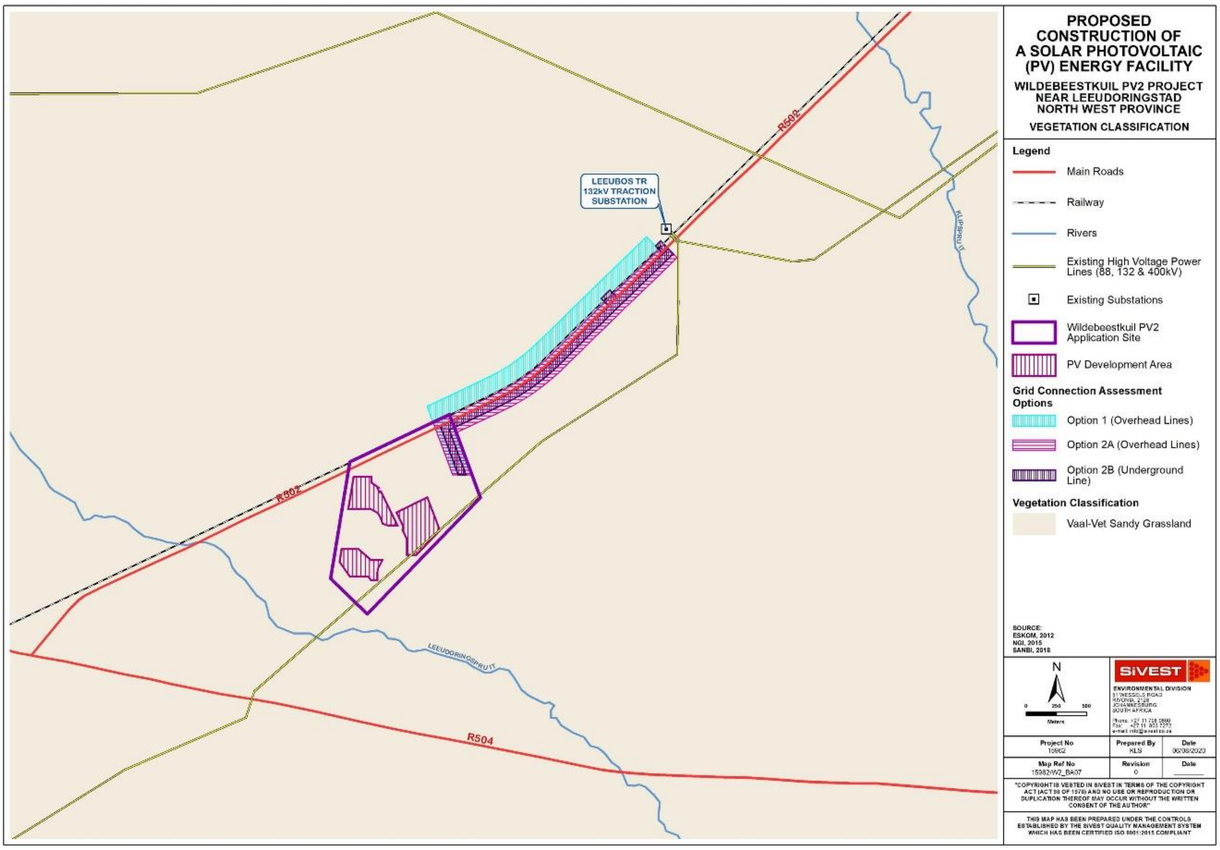


**Figure 22:** Vegetation types of the study area

**Vaal-Vet Sandy Grassland**

This vegetation type occurs in the North-West and Free State Provinces in the area south of Lichtenburg and Ventersdorp, stretching southwards to Klerksdorp, Leeudoringstad, Bothaville and to the Brandfort area north of Bloemfontein. It occurs on plains-dominated landscapes with some scattered, slightly irregular undulating plains and hills.

The vegetation is mainly a low-tussock grassland with an abundant karroid element (Mucina *et al.,* 2006). The dominance of *Themeda triandra* is an important feature of this vegetation type. Locally low cover of *Themeda triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall.

Important taxa include the grasses, *Anthephora pubescens* (d), *Aristida congesta* (d), *Chloris virgata* (d), *Cymbopogon caesius* (d), *Cynodon dactylon* (d), *Digitaria argyrograpta* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. lehmanniana* (d), *E. plana* (d), *E. trichophora* (d), *Heteropogon contortus* (d), *Panicum gilvum* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Tragus berteronianus* (d), *Brachiaria serrata*, *Cymbopogon pospischilii*, *Digitaria eriantha*, *Eragrostis curvula, E. obtusa, E. superba, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis* and *Triraphis andropogonoides*, the herbs, *Stachys spathulata* (d), *Barleria macrostegia, Berkheya onopordifolia var. onopordifolia, Chamaesyce inaequilatera, Geigeria aspera* var. *aspera*, *Helichrysum caespititium, Hermannia depressa*, *Hibiscus pusillus, Monsonia burkeana, Rhynchosia adenodes, Selago densiflora, Vernonia oligocephala*, the geophytic herbs, *Bulbine narcissifolia* and *Ledebouria marginata*, the succulent Herb, *Tripteris aghillana* var. *integrifolia*, the low shrubs, *Felicia muricata* (d), *Pentzia globosa* (d), *Anthospermum rigidum* subsp. *pumilum*, *Helichrysum dregeanum*, *H*. *paronychioides* and *Ziziphus zeyheriana*.

**Highveld Salt Pans**

The Highveld Salt Pans vegetation type is found in the Northern Cape, Eastern Cape, North-West, Free State and Gauteng Provinces and occurs in pans scattered on the broad Grassland / Karoo and Grassland / Savanna interface roughly between Mafikeng / Koster in the north and Britstown / Middelburg in the south. The highest concentrations of pans are found around Dealesville, Bultfontein, Wesselsbron, Delareyville and Petrusburg. The average size of the playas in the western Free State is 0.2 $km^2$, with a number of the largest ones (e.g. Florisbad Pan and Annaspan) measuring several kilometres across (Goudie & Thomas 1985). It is found in depressions in plateau landscapes containing temporary (and less frequently also permanent) water bodies. The central parts of the pans are often seasonally inundated and sometimes with floating macrophyte vegetation or the vegetation cover develops on drained bottoms of the pans and forms typical concentric zonation patterns. On the pan edges an open to sparse grassy dwarf shrubland may develop, especially when the pan is under heavy grazing pressure. (Mucina et al. 2006).

The bottoms of the pans are usually formed by shales of the Ecca Group giving rise to vertic clays. The environment of the pans undergoes dramatic changes from freshwater systems during the wet season to saline systems as the dry season progresses and evaporation intensifies. Wind erosion is of particular significance during the dry season, when the playa basin is dry and marginal vegetation is short and sparse (Allan *et al.,* 1995). Dense dust can reach several thousand metres into the air under such windy conditions.

Important species in this vegetation type include the following: Low Shrubs: *Atriplex vestita*, *Felicia filifolia*, *F. muricata*, *Nenax microphylla*, *Nestlera conferta*, *Pentzia globosa*, *P. incana*. Succulent Shrubs: *Salsola glabrescens* (d), *Lycium cinereum*, *Malephora herrei*, *Suaeda fruticosa*, *Titanopsis hugo-¬schlechteri*. Megagraminoids: *Cyperus congestus*, *Phragmites australis*, *Typha latifolia*. Graminoids: *Chloris virgata* (d), *Cynodon dactylon* (d), *C. transvaalensis* (d), *Cyperus laevigatus* (d), *C. marginatus* (d), *Diplachne fusca* (d), *Eragrostis bicolor* (d), *E. chloromelas* (d), *E. plana* (d), *Hemarthria altissima* (d), *Juncus rigidus* (d), *Panicum coloratum* (d), *P. laevifolium* (d), *P. schinzii* (d), *Setaria incrassata* (d), *Andropogon eucomus*, *Aristida adscensionis*, *Brachiaria marlothii*, *Cyperus longus*, *C. rigidifolius*, *Echinochloa holubii*, *Eleocharis palustris*, *Enneapogon desvauxii*, *Eragrostis curvula*, *E. micrantha*, *E. obtusa*, *E. stapfii*, *Fuirena coerulescens*, *F. pubescens*, *Juncus exsertus*, *Scirpoides dioecus*, *Sporobolus albicans*, *S. fimbriatus*, *S. ioclados*, *S. tenel¬lus*, *Tragus berteronianus*, *T. racemosus*. Herbs: *Alternanthera sessilis*, *Amaranthus praetermissus*, *Aponogeton rehmannii, Atriplex suberecta, Chenopodium mucronatum, Gnaphalium declinatum, Mollugo cerviana, Phyla nodiflora, Platycarpha parvifolia, Pterodiscus speciosus, Senecio reptans*. Succulent Herb: *Zygophyllum simplex*.

According to scientific literature (Driver *et al.,* 2005; Mucina *et al.,* 2006), Vaal-Vet Sandy Grassland is listed as '*Endangered*' and Highveld Salt Pans is listed as '*Least Threatened*' (see ***Biodiversity Conservation Plans*** section below).

#### *8.5.1.2 Broad status of broad vegetation types*

On the basis of a scientific approach used at national level by SANBI (Driver *et al*., 2005), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. The original extent of a vegetation type is as presented in the most recent national vegetation map (Mucina, Rutherford & Powrie, 2005) and is the extent of the vegetation type in the absence of any historical human impact. On a national scale the thresholds are as depicted in **Table 9** below, as determined by best available scientific approaches (Driver *et al*., 2005). The level at which an ecosystem becomes Critically Endangered differs from one (1) ecosystem to another and varies from 16% to 36% (Driver *et al*., 2005).

| **Determining ecosystem status (Driver *et al*., 2005).** *BT = biodiversity target (the minimum conservation requirement). | | | |
|---|---|---|---|
| Habitat remaining (%) | 80–100 | least threatened | LT |
| | 60–80 | vulnerable | VU |
| | *BT–60 | endangered | EN |
| | 0–*BT | critically endangered | CR |

**Table 9:** Conservation status of different vegetation types occurring in the study area.

| Vegetation Type | Target (%) | Conserved (%) | Transformed (%) | Conservation status | |
|---|---|---|---|---|---|
| | | | | Driver *et al*., 2005; Mucina *et al*., 2006 | National Ecosystem List (NEM:BA) |
| Vaal-Vet Sandy Grassland | 24 | 0.3 | 63 | Endangered | Endangered |
| Highveld Salt Pans | 24 | 0.2 | 4 | Least Threatened | Not listed |

According to scientific literature (Driver *et al*., 2005; Mucina *et al*., 2006), as shown in the table above, Vaal-Vet Sandy Grassland is listed as Endangered and Highveld Salt Pans is listed as Least Threatened.

The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the NEM:BA, lists national vegetation types that are afforded protection on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature. Vaal-Vet Sandy Grassland is listed as Endangered in the National List of Ecosystems that are Threatened and need of protection (GN 1002 of 2011).

#### *8.5.1.3 Biodiversity Conservation Plans*

The North-West Province Biodiversity Conservation Assessment (obtained from bgis.sanbi.org) provides maps that show CBAs, ESAs, corridors and hills. This shows a variety of features within the study area, including the following:

- ESA 1 & 2 areas: Parts of the power line corridors fall within this category. The Wildebeestkuil Solar PV Plant application site is outside of these areas (**Figure 23**).
- CBA nodes: Nodes of Provincial-level biodiversity corridor network aimed at retaining connectivity between geographical areas. **The eastern third of the study area falls within this biodiversity corridor node area, as well as a small section of the easternmost part of the power line corridor**.
- CBA SAVeg: Critical patches: Ecosystem Status - Endangered and Vulnerable Ecosystems: Remaining patches larger than 5ha of provincially Endangered and Vulnerable ecosystems (vegetation types), i.e., the amount of vegetation remaining intact (of these ecosystems) is less than 60%. Any further modification of these vegetation types should be limited to existing irreversibly modified or heavily degraded areas. **The entire study area falls within this category, including all parts of the power line corridor where there is still natural vegetation**.

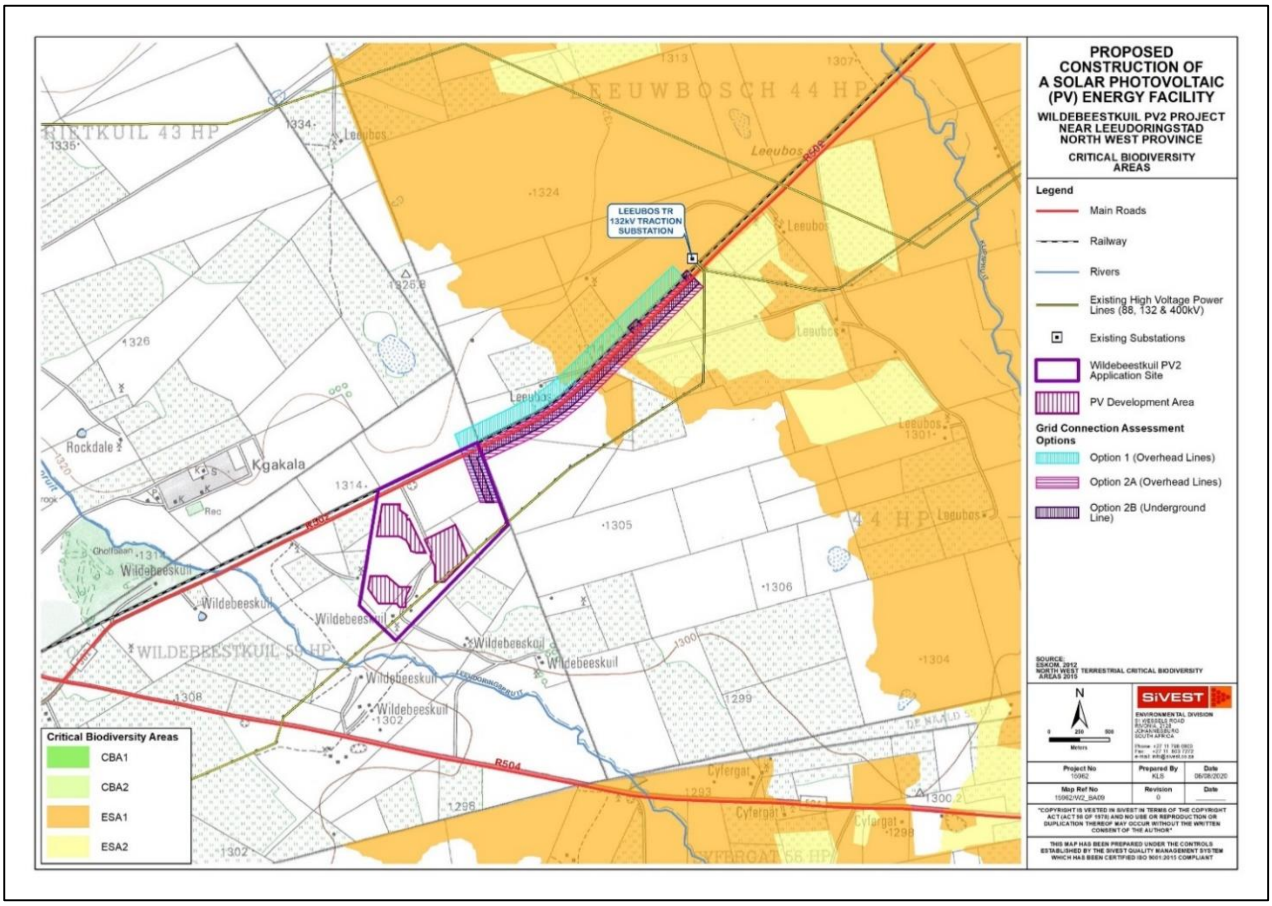


**Figure 23:** CBA map for the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line

#### *8.5.1.4 Proposed protected areas*

According to the National Parks Area Expansion Strategy (NPAES), there is an area that includes most of the site and extending eastwards (on the southern side of the R502 rod) for 14km and down to the Vaal River that has been identified as priority areas for inclusion in future protected areas (**Figure 24**). This particular component of the landscape is considered to be of high value for future conservation efforts by National Parks, and development of this area will partially affect future conservation planning. The site is, however, in the south-westernmost corner of this planned area so development of the site would not cause fragmentation of this area.

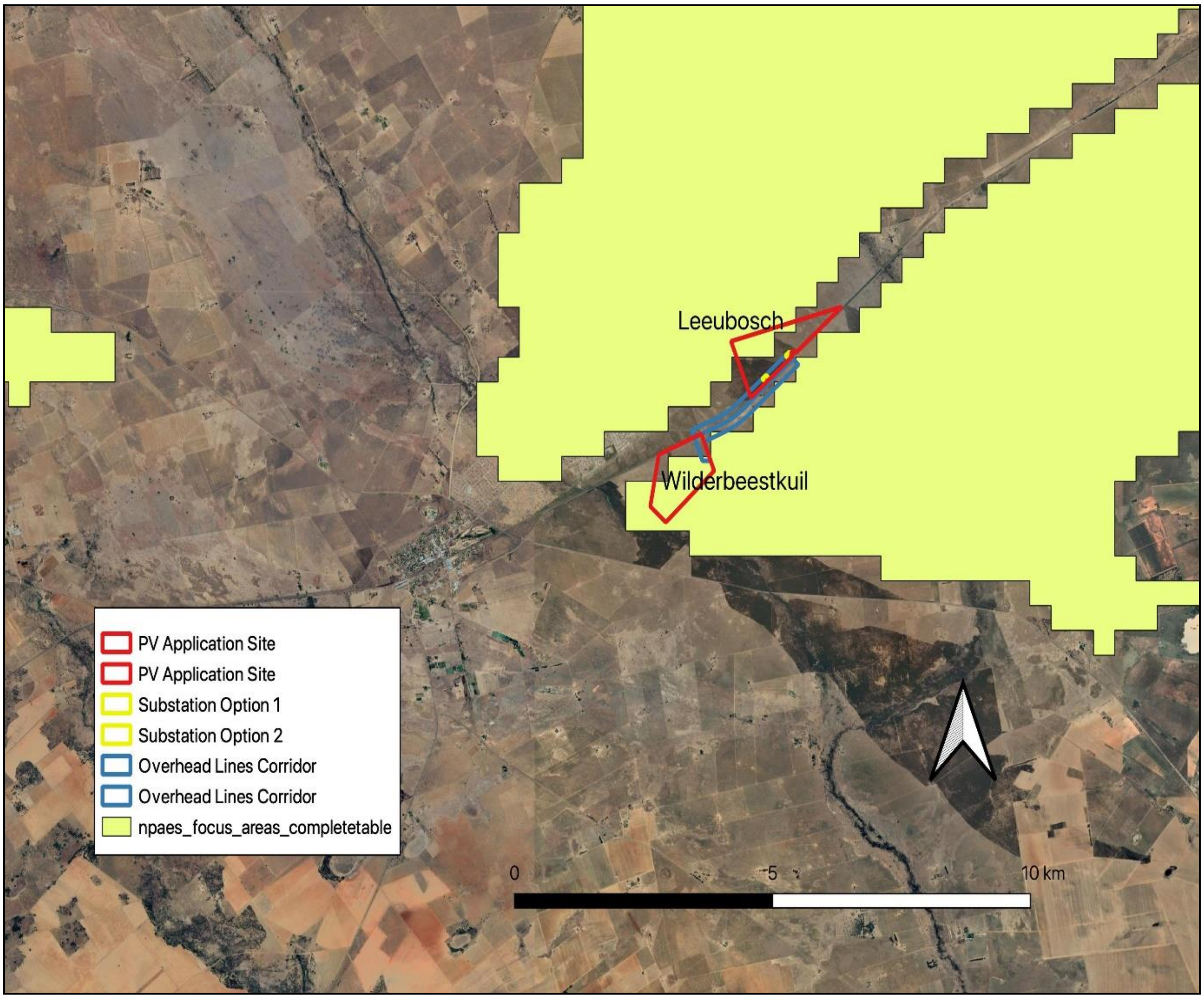


**Figure 24:** Proposed protected areas, according to the NPAES

#### *8.5.1.5 Red List plant species of the study area*

Lists of plant species previously recorded in the study area were obtained from the South African National Biodiversity Institute (SANBI) website (http://newposa.sanbi.org/). These are listed in Appendix 3 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**). There are very few collection records for this part of the country so a much larger area was searched for potential species of concern. Despite this broader search, there are very few species that were identified of conservation concern that could potentially occur in the broad area that includes the project area.

**Table 10:** Explanation of IUCN Version 3.1 categories (IUCN, 2001) and Orange List categories (Victor & Keith, 2004)

| IUCN / Orange List category | Definition | Class |
|---|---|---|
| EX | Extinct | Extinct |
| CR | Critically Endangered | Red List |
| EN | Endangered | Red List |
| VU | Vulnerable | Red List |
| NT | Near Threatened | Orange List |
| Declining | Declining taxa | Orange List |
| Rare | Rare | Orange List |
| Critically Rare | Rare: only one subpopulation | Orange List |
| Rare-Sparse | Rare: widely distributed but rare | Orange List |

| IUCN / Orange List category | Definition | Class |
|---|---|---|
| DDD | Data Deficient: well-known but not enough information for assessment | Orange List |
| DDT | Data Deficient: taxonomic problems | Data Deficient |
| DDX | Data Deficient: unknown species | Data Deficient |

There is one (1) species that may occur in the study area, the geophyte, *Eucomis autumnalis* subsp. *clavata*, listed as Declining (see **Table 10** above for explanation of categories). *Eucomis autumnalis* subsp. *clavata* is found in damp, open grassland and sheltered places from the coast to 2450m. The species has been recorded in the current grid near to the current site and the possibility of it occurring in the study area is therefore considered to be high. It was not seen on-site.

#### *8.5.1.6 Protected plants (National Environmental Management: Biodiversity Act)*

Plant species protected under the NEM:BA (Act No. 10 of 2004) are listed in Appendix 4 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**). Two (2) plant species that appear on this list that could potentially occur in the general region, although they have not previously been recorded in the grids of the study area, are *Crinum bulbispermum* and *Harpagophytum procumbens*.

*Crinum bulbispermum*
*Crinum bulbispermum* occurs from the Northern Cape eastwards to Mpumalanga and KwaZulu-Natal. It also occurs in Lesotho. It is found in grasslands and savanna near rivers, streams, seasonal pans and in damp depressions. There is a moderate to low probability that it occurs in the general study area, but it was not found on-site, although it could potentially occur there.

*Harpagophytum procumbens*
*Harpagophytum procumbens* occurs in Angola, Botswana, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe. Within South Africa this species occurs in the Northern Cape, North West, Free State, and Limpopo Provinces and the largest populations are found in the communally owned areas of the North West Province and the north eastern parts of the Northern Cape. The species is found in well drained sandy habitats in open savanna and woodlands. It has been previously recorded in this general area in which the site is located. It is considered possible that this species could occur on-site.

#### *8.5.1.7 Protected plants (North West Biodiversity Management Act)*

Plant species protected under the North West Biodiversity Management Act, 2016 (Act 4 of 2016) are listed in Appendix 5 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**). None of these species were found on-site.

#### *8.5.1.8 Protected trees*

Tree species protected under the National Forest Act are listed in Appendix 2 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**). There are two (2) species that are known to have a geographical distribution that includes the grids in which the proposed project is located, namely *Boscia albitrunca* and *Vachellia erioloba*.

*Vachellia erioloba* (Camelthorn / Kameeldoring) is found in savanna, semi-desert and desert areas with deep, sandy soils and along drainage lines in very arid areas, sometimes in rocky outcrops. None were found on-site in areas potentially affected by the proposed project, although it has been recorded in close proximity as well as in other nearby areas.

*Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi) occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. This species could potentially occur on-site in areas affected by the proposed project, but no individuals were found there. It has been previously recorded to the south of the current site

In summary, two (2) species of protected trees could occur in the geographical area that includes the site, and one (1) species was found to occur on-site.

##### *8.5.1.9 Vertebrate animal species of the study area*

Vertebrate species (mammals, reptiles, amphibians) with a geographical distribution that includes the study area are listed in Appendix 4 of the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**). All threatened (Critically Endangered, Endangered or Vulnerable) or near threatened vertebrate animals that could occur in the study area and have habitat preference that includes habitats available in the study area, are discussed further below.

In all cases, the site does not constitute important habitat for any of these species, but there is still a possibility that they may occur there. Development of the site is unlikely to cause a significant loss of habitat for any of these species, but care should still be taken to avoid or minimise impacts on them.

**Mammals**

There are 79 mammal species that have a geographical distribution that includes the study area, of which eleven are listed in a conservation category of some level (see Appendix 3 of the Terrestrial Ecology Impact Assessment Report - **Appendix 6G**). This is a relatively moderate diversity of mammals compared to other parts of South Africa. Based on the natural state of the study area and surrounding areas, it is considered likely that some of these species could occur on-site. Listed species with a geographical range that includes the site are listed below and the potential for them to occur on-site is provided. These species are discussed in more detail in the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**).

- **White-tailed Rat** - Based on distribution and habitat requirements, it is considered possible but unlikely that it could occur on-site.
- **Black Rhinoceros** - The habitat on site is not suitable for this species, it does not occur there and would not be found there unless deliberately introduced.
- **African Clawless Otter** - It is considered unlikely that it occurs on-site.
- **Black-footed Cat** - It is considered unlikely that it occurs on-site.
- **Brown Hyaena** - It is considered that there is a medium likelihood of it occurring on-site.
- **Spotted-necked Otter** - There is no suitable habitat on-site or nearby.
- **Honey Badger** - It could potentially occur on-site but is a mobile animal that forages over wide areas.
- **Leopard** - The proposed project could possibly displace individuals, in the unlikely event that they occur there, but is unlikely to have a significant effect on overall population densities.
- **Cape Fox** - It could potentially occur on-site but is a mobile animal that forages over wide areas.
- **Percival's Short-eared Trident Bat** - Based on habitat and roosting requirements, it is unlikely to occur on-site and, if so, only as foraging individuals.
- **Schreiber's Long-fingered Bat** - Based on the roosting requirements, it is unlikely to occur on-site and, if so, only as foraging individuals.
- **Southern African Hedgehog** - It is considered likely that it could occur on-site.
- **African Striped Weasel** - It is considered unlikely to occur in the study area.
- **Southern African Vlei Rat** - It is considered unlikely that it occurs on-site.

Of the species currently listed as threatened or protected [see Appendix 5 of Terrestrial Ecology Impact Assessment Report (**Appendix 6G**) for list of protected species], those listed in **Table 11** below are considered to have a probability of occurring on-site and being potentially negatively affected by proposed activities associated with the proposed projects. The only species of potential concern is the South African

Hedgehog. All other species have a low probability of occurring on-site, or they are mobile species that are unlikely to be resident on-site.

**Table 11:** Mammal species of conservation concern with a likelihood of occurring on-site

| Scientific name | Common name | Status | Likelihood of occurrence |
|---|---|---|---|
| *Atelerix frontalis* | South African Hedgehog | Near Threatened, protected | High |
| *Hyaena brunnea* | Brown hyaena | Near Threatened, protected | Medium |
| *Vulpes chama* | Cape Fox | Protected | Medium |
| *Mellivora capensis* | Honey Badger | Protected | Medium |
| *Mystromys albicaudatus* | White-tailed Rat | Vulnerable | Low |
| *Panthera pardus* | Leopard | Vulnerable, protected | Low |
| *Felis nigripes* | Black-footed Cat | Vulnerable, protected | Low |
| *Poecilogale albinucha* | African Striped Weasel | Near Threatened | Low |
| *Cloeotis percivali* | Percival's Short-eared Trident Bat | Endangered | Low |
| *Miniopterus schreibersii* | Schreiber's Long-fingered Bat | Near Threatened | Low |
| *Otomys auratus* | Southern African Vlei Rat | Near Threatened | Low |
| *Aonyx capensis* | African Clawless Otter | Near Threatened, protected | Zero |
| *Hydrictus maculicollis* | Spotted-necked Otter | Protected | Zero |

**Reptiles**

A total of 52 reptile species has a geographical distribution that includes the study area in which the project site is found (Alexander & Marais, 2007; Bates *et al*., 2014; Branch, 1988; Marais, 2004; Tolley & Burger, 2007). This is a moderate diversity compared to average diversity in other parts of the country. Of the reptile species that could potentially occur in the study area, none have been listed in a threat category.

There are therefore no reptile species of conservation concern that could potentially occur in the study area and that may therefore be affected by the proposed projects.

**Amphibians**

A total of only 17 frog species has a geographical distribution that includes the general study area in which the project site is found (Du Preez & Carruthers, 2009). Some of these species are only marginally present in the study area due to the fact that their distribution range ends close to the study area. Of the frog species that could potentially occur in the study area, none are listed in a threat category, but one (1) species is listed as protected, according to National and Provincial legislation, the Giant Bullfrog. Frog species that could potentially occur in the study area are listed below and discussed in more detail in the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**).

- **The Giant Bull Frog** - Based on habitat requirements, there is a medium probability that this species occurs in the study area.

It is concluded that the site contains habitat that is suitable for various frog species, although only one (1) species of conservation concern is likely to occur in the study area. One (1) frog species of concern is therefore potentially likely to be affected by development in the study area, as shown in **Table 12**.

**Table 12:** Amphibian species of conservation concern with a likelihood of occurring on-site

| Scientific name | Common name | Status | Likelihood of occurrence |
|---|---|---|---|
| *Pyxicephalus adspersus* | Giant Bullfrog | Protected | Medium |

**Birds**

There are a total of 30 bird species that have a geographical distribution that includes the study area that are listed in a conservation category. Due to habitat requirements, only 13 of these listed bird species could potentially occur on-site. All of them have wide ranges and forage over wide areas. None of these species are likely to breed on-site and none of them are likely to be dependent on the site relative to surrounding areas. The Blue Crane and Secretarybird are the species probably most likely to be found on the site itself.

Listed bird species could potentially occur on-site are listed below and discussed in more detail in the Terrestrial Ecology Impact Assessment Report (**Appendix 6G**).

- **White-backed Vulture -** The habitat on site is not entirely suitable and it is unlikely that the species would occur there or be dependent on the site for roosting or nesting.
- **Martial Eagle -** The species is moderately likely to occur in the study area. It is possible that the study area constitutes the home range of various individuals, however, no nesting or perching sites were seen on-site.
- **Tawny Eagle -** It enters the study area only marginally, so the study area is not considered to be important for the conservation of this species.
- **African Marsh Harrier -** Suitable habitat for the species does not occur on-site and it is only likely to occur there as a vagrant.
- **Black Harrier -** There is a moderate to low probability of the species being found in the study area and it breeds further south in fynbos areas only. In the study area it uses habitat only for foraging during non-breeding periods.
- **Yellow-billed Stork -** There is a low probability of the species being found in the study area. Suitable habitat for the species does not occur on-site and it is only likely to occur there as a vagrant.
- **Cape Vulture -** There is a low probability of the species being found in the study area.
- **Burchell's Courser -** There is a low probability of the species being found in the study area.
- **Lanner Falcon -** There is a low probability of the species being found in the study area.
- **White-backed Night Heron -** It is found mostly along clear, swift- or slow-flowing perennial rivers and streams with forested banks and overhanging vegetation. No such habitat occurs on-site.
- **African Grass Owl -** The species has not been recorded in the grid or in any of the surrounding grids. No suitable habitat occurs on-site. There is therefore a low probability of the species occurring in the study area.
- **Great White Pelican -** The species is therefore highly unlikely to occur on-site.
- **Pink-backed Pelican -** There is a low probability of the birds occurring on-site.
- **Secretarybird -** It is a very common resident in the study area. There is a high probability of the species occurring in the study area. The species occurs throughout South Africa and individual birds move large distances within the region.
- **Black Stork -** The species is found in most parts of South Africa and is a common resident in the study area. Due to lack of nesting and foraging habitat, there is a low probability of the species occurring on-site.
- **Caspian Tern -** It is highly unlikely to occur on-site, except as a travelling vagrant.
- **Kori Bustard-** Suitable habitat occurs nearby, but not on the site itself. It is therefore possible, but unlikely, that individuals may be seen on-site.
- **Blue Crane-** There is a moderate probability of the species occurring in the study area.
- **Eurasian Curlew-** No waterbodies occur on-site and it is unlikely that the species would be found on-site.
- **Maccoa Duck-** There is a high probability of the species occurring in the general study area, but due to the lack of suitable habitat, it is unlikely to occur on-site.
- **Red-footed Falcon-** The species is a common non-breeding migrant in the study area. The site is potentially suitable for the species, including some tall trees that could be used for roosting, although no individuals were seen during the field survey.
- **Greater Flamingo-** There is no suitable habitat on-site and the species will not occur there.
- **Lesser Flamingo-** There is no suitable habitat on-site and the species will not occur there.

- **Pallid Harrier-** It is an occasional visitor to the study area.
- **Short-clawed Lark-** It is considered unlikely that the species would occur on-site.
- **Greater Painted-Snipe-** It has an erratic occurrence in the study area. There is no suitable habitat on-site and the species is therefore highly unlikely to occur there.
- **Black-winged Pratincole-** There is no suitable habitat on-site and the species is therefore unlikely to occur on-site.
- **European Roller-** There is a moderate probability of the species occurring in the study area. The study area has limited amounts of suitable habitat.
- **Abdim's Stork-** It is a common non-breeding migrant in the study area.
- **Marabou Stork-** It only breeds at a limited number of localities throughout its range, which are located at Pongola Game Reserve and in Swaziland. No suitable carrion or waste dumps occur on site and the species is unlikely to occur there.

**Table 13:** Bird species of conservation concern with a likelihood of occurring on-site

| Scientific name | Common name | Status | Likelihood of occurrence |
|---|---|---|---|
| *Gyps africanus* | White-backed Vulture | Critically Endangered | Low |
| *Polemaetus bellicosus* | Martial Eagle | Endangered | Medium |
| *Aquila rapax* | Tawny Eagle | Endangered | Medium |
| *Circus ranivorus* | African Marsh Harrier | Endangered | Low |
| *Circus maurus* | Black Harrier | Endangered | Low |
| *Cursorius rufus* | Burchell's Courser | Vulnerable | Low |
| *Falco biarmicus* | Lanner Falcon | Vulnerable | Low |
| *Sagittarius serpentarius* | Secretarybird | Vulnerable | High |
| *Anthropoides paradiseus* | Blue Crane | Near Threatened | Medium |
| *Falco vespertinus* | Red-footed Falcon | Near Threatened | Medium |
| *Circus macrouras* | Pallid Harrier | Near Threatened | Low |
| *Croacius garrulus* | European Roller | Near Threatened | Low |
| *Ciconia abdimii* | Abdim's Stork | Near Threatened | Low |

For a full list of vertebrate species potentially occurring on-site, please refer to the Terrestrial Ecology Report (**Appendix 6G**).

#### *8.5.1.10 Protected animals*

There are a number of animal species protected according to the NEM:BA (Act No. 10 of 2004). According to this Act, '*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7*'. Such activities include any that are '*of a nature that may negatively impact on the survival of a listed threatened or protected species*'. This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the NEM:BA that have a geographical distribution that includes the site are listed in Appendix 6 of the Terrestrial Ecology Report (**Appendix 6G**), marked with the letter "N". Due to habitat and forage requirements, and the fact that some species are restricted to game farms and/or conservation areas, only the Brown Hyaena, Honey Badger, Cape Fox, South African Hedgehog, and Giant Bullfrog have a likelihood of occurring on-site. The first three (3) of these species are mobile animals that are likely to move away in the event of any activities on-site disturbing them. This means that only the South African Hedgehog and the Giant Bullfrog are likely to be affected by any construction activities, if they occur on-site.

#### 8.5.1.11 Habitats on-site

Transformed areas where no vegetation occurs included roads, farm buildings and similar existing disturbances. The broad natural habitat units on-site are as follows:

- Grassland;
- Secondary grassland (previously cultivated areas);
- Depressions (containing seasonal and temporary wetlands);
- Alien trees;
- Disturbed areas;
- Transformed areas.

**Grassland**

The site is characterised by short, sparse grassland that appears to be in moderate to poor condition in most places. It appears that some parts of the study area may have been cultivated at some point in history, but this is not clearly evident from the vegetation structure and composition on site. It seems that at least parts of the site were previously cultivated, but that sufficient time has passed for the old lands to recover to something resembling the original species composition. Alternatively, all parts of the site were previously disturbed and due to soil and/or hydrological properties of the landscape, only some areas are still evident on aerial imagery. For mapping purposes, only those areas that could be clearly seen to have been previously ploughed are classified as secondary grassland and other grassland areas as unaltered, but this distinction is not evident from species composition of the grasslands. The species composition is relatively diverse, although dominated by *Aristida congesta* in places, which indicates overgrazing or previous disturbance of the soil profile. This supports the contention that significant parts of the site have been previously ploughed. The topography within these areas is relatively flat. Common and dominant species include *Aristida congesta* subsp. *congesta*, *Themeda triandra*, *Trichoneura grandiglumis*, *Eragrostis chloromelas*, *Heteropogon contortus*, *Felicia muricata*, *Arctotis arctotoides*, *Anthospermum rigidum*, *Cynodon dactylon*, *Digitaria erianthe*, *Solanum supinum*, *Bulbine narcissifolia* and *Cucumis zeyheri*.

**Secondary grassland**

Large parts of the site, as well as surrounding areas, have been cultivated at some point in history (see plough lines in **Figure 25** below), but this is not always clearly evident from the vegetation structure and composition on site. It seems that at least parts of the site were previously cultivated, but that sufficient time has passed for the old lands to recover to something resembling the original species composition. For mapping purposes, only those areas that could be clearly seen to have been previously ploughed are classified as secondary grassland and other grassland areas as unaltered, but this distinction is not always evident from species composition of the grasslands. The species composition is relatively diverse, although dominated by *Aristida congesta* in places, which indicates overgrazing or previous disturbance of the soil profile. This supports the contention that significant parts of the site have been previously ploughed.


**Figure 25:** Plough lines evident on Google Earth imagery

**<u>Depressions</u>**

At the Wildebeestkuil site are patches on-site where the species composition indicates seasonally or temporarily wet soil conditions. For the main wetland system running diagonally through the site, it appears to have been excavated for borrow material or has eroded out. The lower parts of these areas have developed wetlands that vary in their seasonality, with some having permanent water at the time of the May survey, although completely dry at the time of the previous September survey. The species composition is indicative of seasonal to permanent wetlands, dominated by *Schoenoplectus corymbosus* and *Cyperus difformis*. Where standing water was found, there was also the floating hydrophyte, *Marsilea macrocarpa*. Less wet areas were dominated by the tall grasses, *Echinochloa holubii*, *Setaria pallida-fusca* and *Eragrostis biflora*, along with the small sedge, *Kyllinga erecta*, and the smaller grasses, *Eragrostis plana* and *Eragrostis planiculmis*. Typically, there is a band around the edge of the wetland vegetation dominated by the herb, *Gnaphalium filagopsis*. This species composition was typical of the shallow depressions on site and in nearby areas on other sites.

The value of these wetland habitats is debatable in the sense that, in the case of the main wetland system on site, they were obviously disturbed in the past, but the species composition that has developed in these disturbed areas has converged on the species composition in undisturbed sites. They therefore represent the natural species composition that would be expected in these areas.

#### *8.5.1.12 Habitat Sensitivity*

To determine ecological sensitivity in the study area, local and regional factors were taken into account. There are some habitats in the study area that have been described as sensitive in their own right, irrespective of regional assessments. This includes primarily the grasslands and depressions in which wetland vegetation occurs.

At a regional level, the CBA map for North West Province indicates various parts of the study area as being important for maintenance of ecological patterns. These fall within ESAs.

In terms of other species of concern, there are no specific locations where conservation of habitat would benefit a specific species based on the existing data available. All mammal and bird species of concern described previously could occur on any part of the site, although it is probable that depressions and drainage areas are of more importance than plains areas.

A summary of sensitivities that occur on-site and that may be vulnerable to damage from the proposed project are as follows:

- Depressions;
- Grasslands;
- ESA areas.

Based on this information, a map of habitat sensitivity on-site is provided in **Figure 26**. This shows main habitat sensitivity classes on-site, as follows:

- **LOW** for all transformed and degraded areas.
- **MEDIUM-LOW** for all secondary vegetation.
- **MEDIUM-HIGH** for all areas that appear to be natural. This is because of the fact that the site is within an Endangered vegetation type (Vaal-Vet Sandy Grassland). Permanent wetland areas are classified within this category.

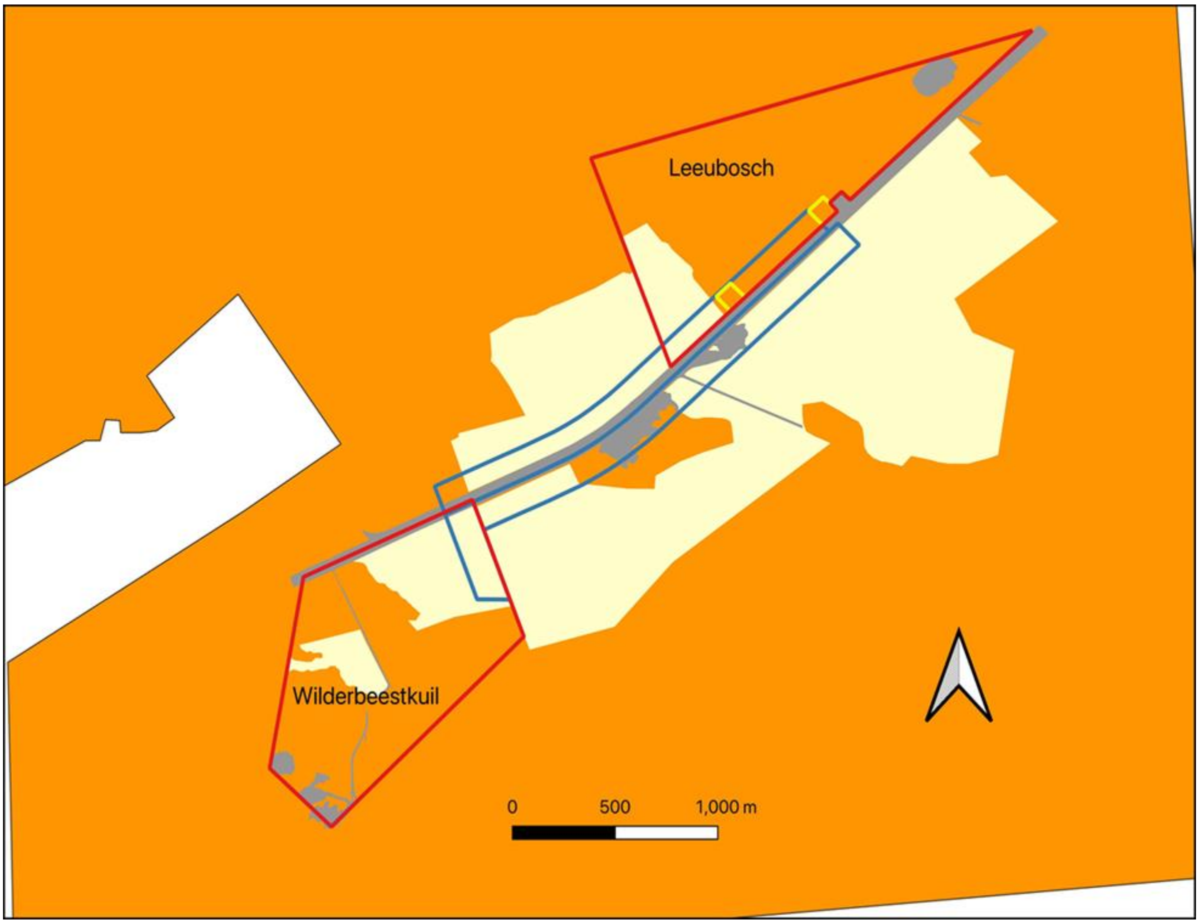

**Figure 26:** Habitat sensitivity of the study area, including all projects and infrastructure options

## 8.6 Avifauna

The Avifaunal Impact Assessment has been conducted by Chris van Rooyen and Albert Fronemann of Chris van Rooyen Consulting (**Appendix 6C**). The findings are detailed in the report dated September 2020 (**Appendix 6C**)**.** A one (1)-day site visit was conducted in November 2016 and again in August 2020. During the latter, data was collected by means of transect and incidental counts. The BirdLife South Africa (BLSA) Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa (Jenkins *et al.,* 2017) were consulted to determine the level of survey effort that is required. Please see section 3 of Avifaunal Impact Assessment Report (**Appendix 6C**) for the methodology used in the surveys.

**It should be noted that the Avifauna specialist has undertaken a detailed ground-truthing walk-through, in order to inform the final layout design which is being put forward for authorisation. The specialist confirmed that there are no fatal flaws associated with the proposed layout and that this layout should ultimately be authorised as part of the EA (should this be granted).**

### *8.6.1 Baseline Assessment*

#### *8.6.1.1 Important Bird Areas*

There are no Important Bird Areas (IBAs) within a 30km radius around the proposed Wildebeestkuil 2 Solar PV Plant and 132kV Power Line. It is therefore highly unlikely that the proposed development will have a negative impact on any IBAs.

#### *8.6.1.2 DFFE National Screening Tool*

The DFFE National Screening Tool classifies a section of the study area as highly sensitive from an avifaunal perspective (**Figure 27**), but when the classification is further interrogated, it seems to be applicable to bats and not birds. The site investigations revealed that the site is not highly sensitive from an avifaunal perspective.

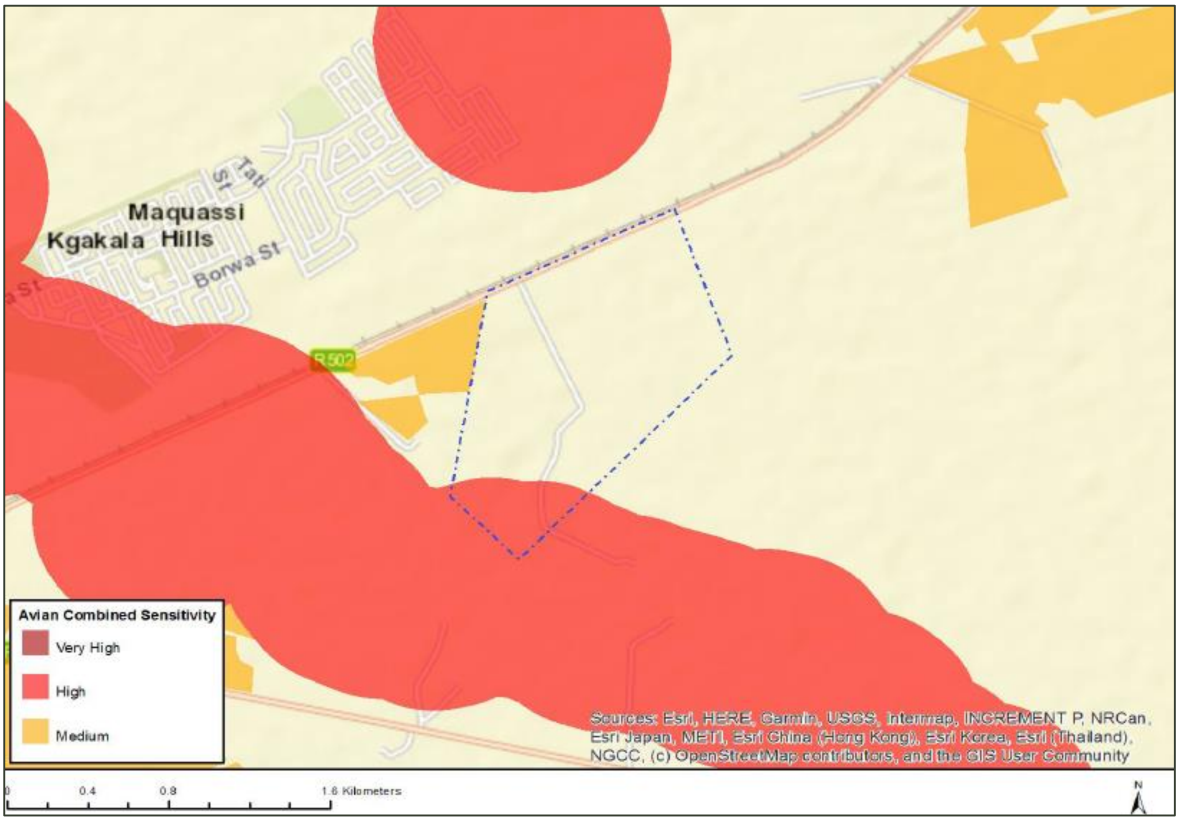


**Figure 27:** DFFE National Screening Tool Map of Relative Avian Theme Sensitivity – Wildebeestkuil 2 Solar PV Plant Application Site. **The High Sensitivity refers to bats, not birds**

| Sensitivity | Feature(s) |
|---|---|
| High | Within 500m of a river |

#### *8.6.1.3 National Protected Areas Expansion Strategy (NPEAS) focus areas*

The application site forms part of the Vaal Grasslands NPEAS focus area.

#### *8.6.1.4 Micro-habitats*

**Water troughs**
Surface water is of specific importance to avifauna in this fairly dry environment. The application site contains open water troughs that provide drinking water to cattle. Open water troughs are important sources of surface water and are used extensively by various priority species to drink and bath.

**High voltage lines**
High voltage lines are an important roosting substrate for raptors. The Leeudoringstad – Leeubos 132kV sub-transmission line runs along the southern border of the application site.

**Drainage lines**
The application site does not contain any drainage lines. One (1) medium-sized, ephemeral drainage line, namely the Klipspruit, runs approximately 4.4km east of the application site, and a smaller one (1), namely the Leeuspruit, runs less than 1km west of the site. Drainage lines are important corridors of waterbird movement, and the woodland along the banks are a refuge for woodland species.

**Dams**

The application site does not contain any dams. There is a cluster of wastewater treatment evaporation ponds which is associated with the two (2) towns, situated approximately 3.8km south-west of the site. Water purification plants are important refuges for waterbirds. There are also artificial waterbodies in Leeudoringstad itself, at the golf course, approximately 5km away.

**Exotic trees**

There are several stands of exotic trees scattered in the immediate surroundings of the application site, and in the south-western corner of the site. Other than that, the site itself contains very few trees. Exotic trees serve as perching and breeding substrate for several priority species, particularly raptors.

**Wetlands**

The site contains two (2) wetland areas which is located in natural depressions in the grassland, and consists basically of periodically flooded grassland. When these areas hold water (which is only likely after sustained rainfall events), it may temporarily attract a variety waterbirds. However, due to their small size and ephemeral nature, it is unlikely to be a major attractant to priority species, and they are heavily utilized by cattle for grazing.

See Appendix 2 of the Avifauna Impact Assessment Report (**Appendix 6C**) for photographic record of the habitat in the application site.

### *8.6.2 Avifauna in the application site*

**South African Bird Atlas Project 2**

The South African Bird Atlas Project 2 (SABAP2) data indicates that a total of 161 bird species could potentially occur within the application site and immediate surroundings – Appendix 1 of the Avifauna Impact Assessment Report (**Appendix 6C**) provides a comprehensive list of all the species. Of these, 50 species are classified as priority species (see definition of priority species in section 4) and five (5) of these are South African Red Data species.

**Table 14** below lists all the priority species and the possible impact on the respective species by the proposed solar energy infrastructure. The following abbreviations and acronyms are used:

- EN = Endangered
- VU = Vulnerable
- NT = Near threatened
- End = South African Endemic
- N-End = South African near endemic
- H = High
- M = Medium
- L = Low

**Table 14:** Priority species potentially occurring at the site and immediate surroundings

| Species | Taxonomic name | Global status | Regional status | SA endemic status | Raptor | Waterbird | SABAP2 Full protocol reporting rate | Probability of occurrence | Recorded during surveys | Habitat | | | | | | Impacts | | | | Power line collisions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Grassland | Exotic trees | Drainage lines | Pans | Dams | HV lines | PV collisions | Displacement disturbance | Displacement habitat loss | Entrapment in fences | |
| Buzzard, Steppe | *Buteo vulpinus* | | | | x | | 3.85 | M | | x | x | | | | x | | | x | | |
| Falcon, Amur | *Falco amurensis* | | | | x | | 3.85 | L | | x | x | | | | | x | | x | | |
| Falcon, Lanner | *Falco biarmicus* | LC | VU | | x | | 0.00 | L | | x | x | | | | x | x | | x | | |
| Goshawk, Gabar | *Melierax gabar* | | | | x | | 3.85 | L | | | | x | | | | | | | | |
| Kestrel, Greater | *Falco rupicoloides* | | | | x | | 11.54 | M | | x | x | | | | x | | | x | | |
| Kestrel, Lesser | *Falco naumanni* | | | | x | | 30.77 | H | | x | x | | | | x | x | | x | | |
| Kite, Black-shouldered | *Elanus caeruleus* | | | | x | | 38.46 | H | x | x | x | | | | x | | | x | | |
| Kite, Yellow-billed | *Milvus aegyptius* | | | | x | | 0.00 | L | | x | x | | | | | | | x | | |
| Secretarybird | *Sagittarius serpentarius* | | | | x | | 3.85 | M | x | x | | x | | | | | x | x | x | x |
| Snake-Eagle, Black-chested | *Circaetus pectoralis* | | | | x | | 0.00 | M | | x | | | x | x | x | | | x | | |
| Chat, Sickle-winged | *Cercomela sinuata* | | | N-end | | | 3.85 | L | | x | | | | | | x | x | x | | |
| Cisticola, Cloud | *Cisticola textrix* | | | N-end | | | 23.08 | H | | x | | | | | | x | x | x | | |
| Cliff-swallow, South African | *Hirundo spilodera* | | | End | | | 42.31 | H | x | x | | | | | | x | | x | | |
| Coot, Red-knobbed | *Fulica cristata* | | | | | x | 30.77 | L | | | | | x | x | | | | | | x |
| Cormorant, Reed | *Phalacrocorax africanus* | | | | | x | 15.38 | L | | | | x | | x | | | | | | x |
| Cormorant, White-breasted | *Phalacrocorax carbo* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Darter, African | *Anhinga rufa* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Duck, Maccoa | *Oxyura maccoa* | VU | NT | | | | 3.85 | L | | | | | | x | | | | | | x |
| Duck, White-faced | *Dendrocygna viduata* | | | | | x | 15.38 | L | | | | x | | x | | | | | | x |
| Duck, Yellow-billed | *Anas undulata* | | | | | | 19.23 | L | | | | | | x | | | | | | x |

| Species | Taxonomic name | Global status | Regional status | SA endemic status | Raptor | Waterbird | SABAP2 Full protocol reporting rate | Probability of occurrence | Recorded during surveys | Habitat: Grassland | Habitat: Exotic trees | Habitat: Drainage lines | Habitat: Pans | Habitat: Dams | Habitat: HV lines | Impacts: PV collisions | Impacts: Displacement disturbance | Impacts: Displacement habitat loss | Impacts: Entrapment in fences | Power line collisions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Eagle, Martial | *Polemaetus bellicosus* | EN | EN | | | x | 0.00 | L | | x | x | | | | x | | | x | | x |
| Eagle-owl, Spotted | *Bubo africanus* | | | | | x | 0.00 | M | | x | x | | | | | | | x | | |
| Egret, Cattle | *Bubulcus ibis* | | | | | x | 92.31 | H | x | x | x | | x | | | | | x | | x |
| Egret, Great | *Egretta alba* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Egret, Little | *Egretta garzetta* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Flamingo, Greater | *Phoenicopterus ruber* | LC | NT | | | x | 3.85 | L | | | | | x | x | | | | | | x |
| Flamingo, Lesser | *Phoenicopterus minor* | NT | NT | | | x | 3.85 | L | | | | | x | x | | | | | | x |
| Flycatcher, Fiscal | *Sigelus silens* | | | N-end | | | 30.77 | M | | | | x | | | | | | | | |
| Goose, Egyptian | *Alopochen aegyptiacus* | | | | | x | 30.77 | M | | | x | | x | x | x | | | | | x |
| Goose, Spur-winged | *Plectropterus gambensis* | | | | | x | 11.54 | M | | x | | | x | x | | | | | | x |
| Grebe, Little | *Tachybaptus ruficollis* | | | | | x | 26.92 | L | | | | | | x | | | | | | |
| Heron, Black-headed | *Ardea melanocephala* | | | | | x | 26.92 | H | | | x | x | x | x | x | | | x | | x |
| Heron, Grey | *Ardea cinerea* | | | | | x | 15.38 | L | | | x | x | x | x | | | | | | x |
| Ibis, Glossy | *Plegadis falcinellus* | | | | | x | 7.69 | L | | | x | | x | x | | | | x | | |
| Kingfisher, Malachite | *Alcedo cristata* | | | | | x | 3.85 | L | | | | x | | x | | | | | | |
| Kingfisher, Pied | *Ceryle rudis* | | | | | x | 7.69 | L | | | | x | | x | | | | | | |
| Lark, Eastern Long-billed | *Certhilauda semitorquata* | | | End | | | 3.85 | L | | x | | | | | | x | x | x | | |
| Lark, Melodious | *Mirafra cheniana* | | | N-end | | | 3.85 | L | | x | | | | | | x | x | x | | |
| Night-Heron, Black-crowned | *Nycticorax nycticorax* | | | | | x | 3.85 | L | | | | x | | x | | | | | | |
| Pochard, Southern | *Netta erythrophthalma* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |

| Species | Taxonomic name | Global status | Regional status | SA endemic status | Raptor | Waterbird | SABAP2 Full protocol reporting rate | Probability of occurrence | Recorded during surveys | Habitat | | | | | | Impacts | | | | Power line collisions |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Grassland | Exotic trees | Drainage lines | Pans | Dams | HV lines | PV collisions | Displacement disturbance | Displacement habitat loss | Entrapment in fences | |
| Sandpiper, Wood | *Tringa glareola* | | | | | x | 7.69 | M | | | | x | x | x | | | | | | |
| Shelduck, South African | *Tadorna cana* | | | | | x | 15.38 | M | | | | | | x | | | | | | x |
| Shoveler, Cape | *Anas smithii* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Spoonbill, African | *Platalea alba* | | | | | x | 3.85 | L | | | | | | x | | | | | | x |
| Stilt, Black-winged | *Himantopus himantopus* | | | | | x | 11.54 | M | | | | | | x | | | | | | |
| Stonechat, African | *Saxicola torquatus* | | | | | | 23.08 | H | | x | | | | | | x | x | x | | |
| Teal, Cape | *Anas capensis* | | | | | x | 15.38 | L | | | | | | x | | | | | | x |
| Teal, Red-billed | *Anas erythrorhyncha* | | | | | x | 15.38 | L | | | | | | x | | | | | | x |
| Tern, Whiskered | *Chlidonias hybrida* | | | | | x | 7.69 | L | | | | | x | x | | | | | | |
| Tern, White-winged | *Chlidonias leucopterus* | | | | | x | 3.85 | L | | | | | x | x | | | | | | |
| Thrush, Karoo | *Turdus smithi* | | | N-end | | | 15.38 | L | x | | | x | | | | | | | | |

## On-site surveys

On-site surveys were conducted on 8 August 2020 by means of transect counts.

The abundance of avifauna recorded during the transect counts are displayed in **Figure 28** and **Figure 29**.

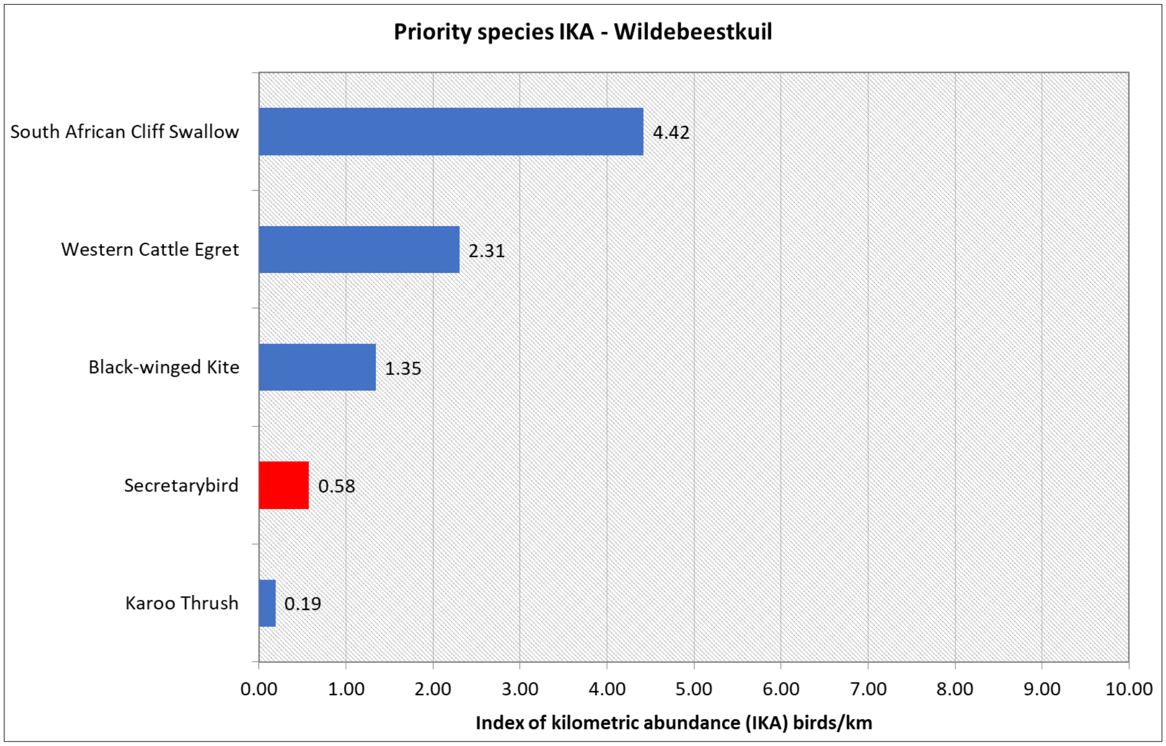


**Figure 28:** Index of kilometric abundance (IKA) for all priority species recorded by means of walk transects during the surveys in the study area, conducted in August 2020. Red Data species are indicated in red bars

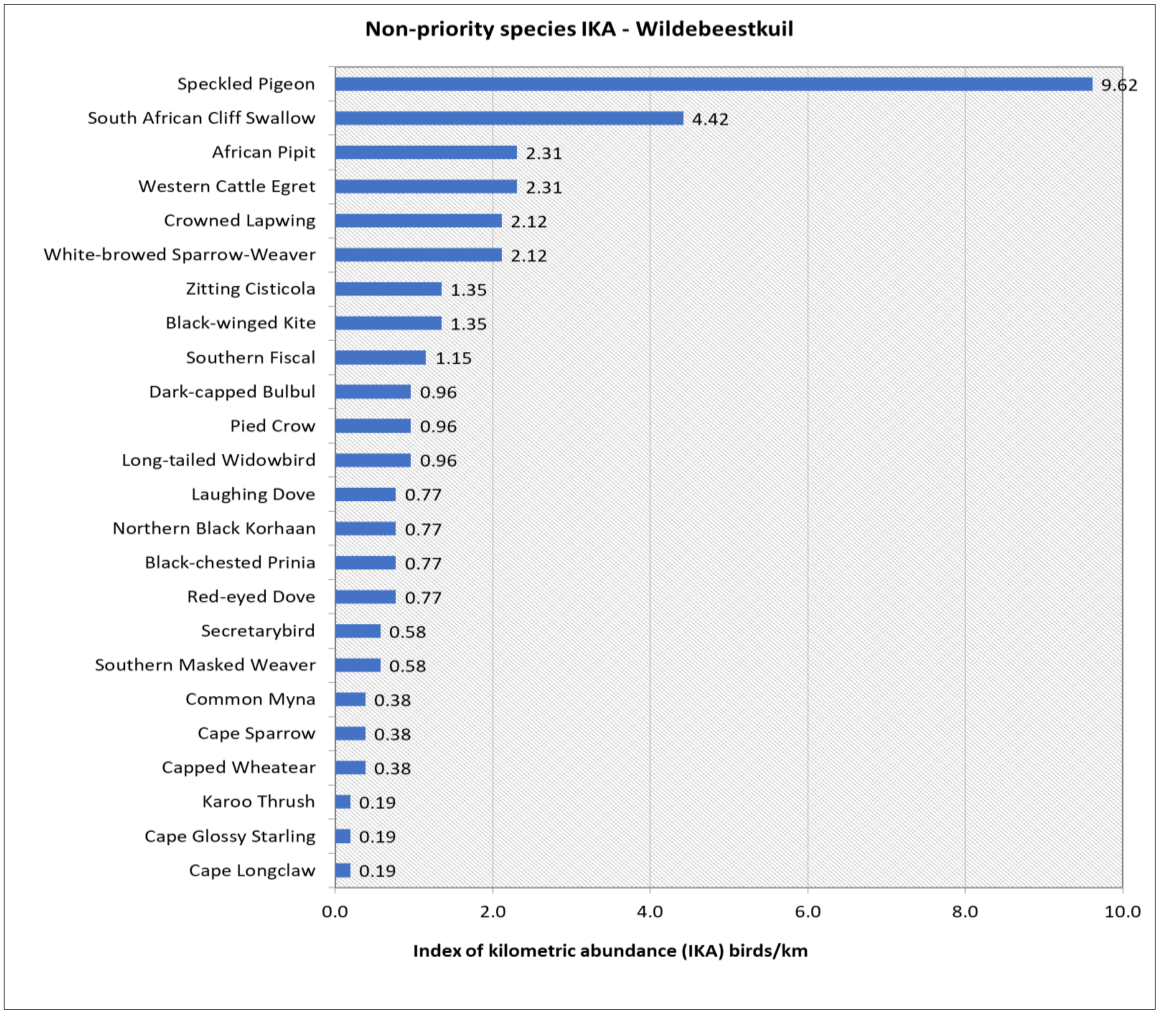


**Figure 29:** Index of kilometric abundance (IKA) for all non-priority species recorded by means of walk transects during the surveys, conducted in August 2020

## 8.7 Surface Water

The Surface Water Impact Assessment was originally conducted by Shaun Taylor while under the employment of SiVEST in 2017 and then updated by Stephen Burton, also while under the employment of SiVEST (see **Table 3**), in October 2020 (**Appendix 6B**). The Surface Water Impact Assessment has not been externally reviewed as the specialists are regarded as independent, have no vested interest in the project and receive fair and normal remuneration for the work. Based on recent correspondence with the DFFE, it was confirmed that this would be acceptable, provided all specialists sign a DoI. Signed DoIs from the specialists who undertook the Surface Water Impact Assessment are provided in **Appendix 3**. Proof of confirmation in this regard from the DFFE is provided in **Appendix 9D**.

The first step in the surface water resources assessment was to identify all surface water resources on the study site. This was undertaken using Geographic Information System (GIS) software. Utilising various resources (see section 3 of Surface Water Impact Assessment Report – **Appendix 6B**), identified surface water resources were mapped and highlighted for the in-field phase of the assessment. The supplementary use of satellite imagery allowed for other potentially overlooked surface water resources, not contained within the relevant databases, to be identified and ground-truthed in the field work phase. The fieldwork component was subsequently undertaken on the 13th September 2016 and the 19th of August 2020. The fieldwork ground-truthing, verification and delineation assessment was undertaken to scrutinise the results of the desktop assessment as well as to identify any potentially overlooked wetlands or other surface water resources in the field for the study site. The results of the Surface Water Impact Assessment are detailed in the report dated September 2020, which is provided in **Appendix 6B**.

**It should be noted that the Surface Water specialist has undertaken a detailed ground truthing walk-through in order to inform the final layout design which is being put forward for authorisation. The specialist confirmed that there are no fatal flaws associated with the proposed layout and that this layout should ultimately be authorised as part of the EA (should this be granted).**

### *8.7.1 Desktop Findings*

In terms of the North West and National Environmental Potential Atlas (ENPAT) (2002) national database, the study site is located within the Vaal Primary Catchment (**Figure 30**). More specifically, the study area is situated within the quaternary catchment C25A. The study site falls within the Middle Vaal Water Management Area (WMA). From the National Freshwater Ecosystem Priority Areas (NFEPA) (2011) database, no wetlands or watercourses could be identified directly on the study site. Additionally, no wetlands were found to be within 500m of the study site as well as the proposed power line corridors. However, the Leeudoringspruit was found to be within approximately 150m south from the southern corner of the study site boundary. The Leeudoringspruit is classified as having a present ecological status (PES): B (Largely natural), ecological importance (EI): Moderate and ecological sensitivity (ES): Moderate (DWA, 2014). At a general level however, the North West Province Biodiversity Conservation Plan (2008) database shows that the study site falls within a Critical Biodiversity Area – Category 1, making the local region ecologically significant from a conservation point of view.

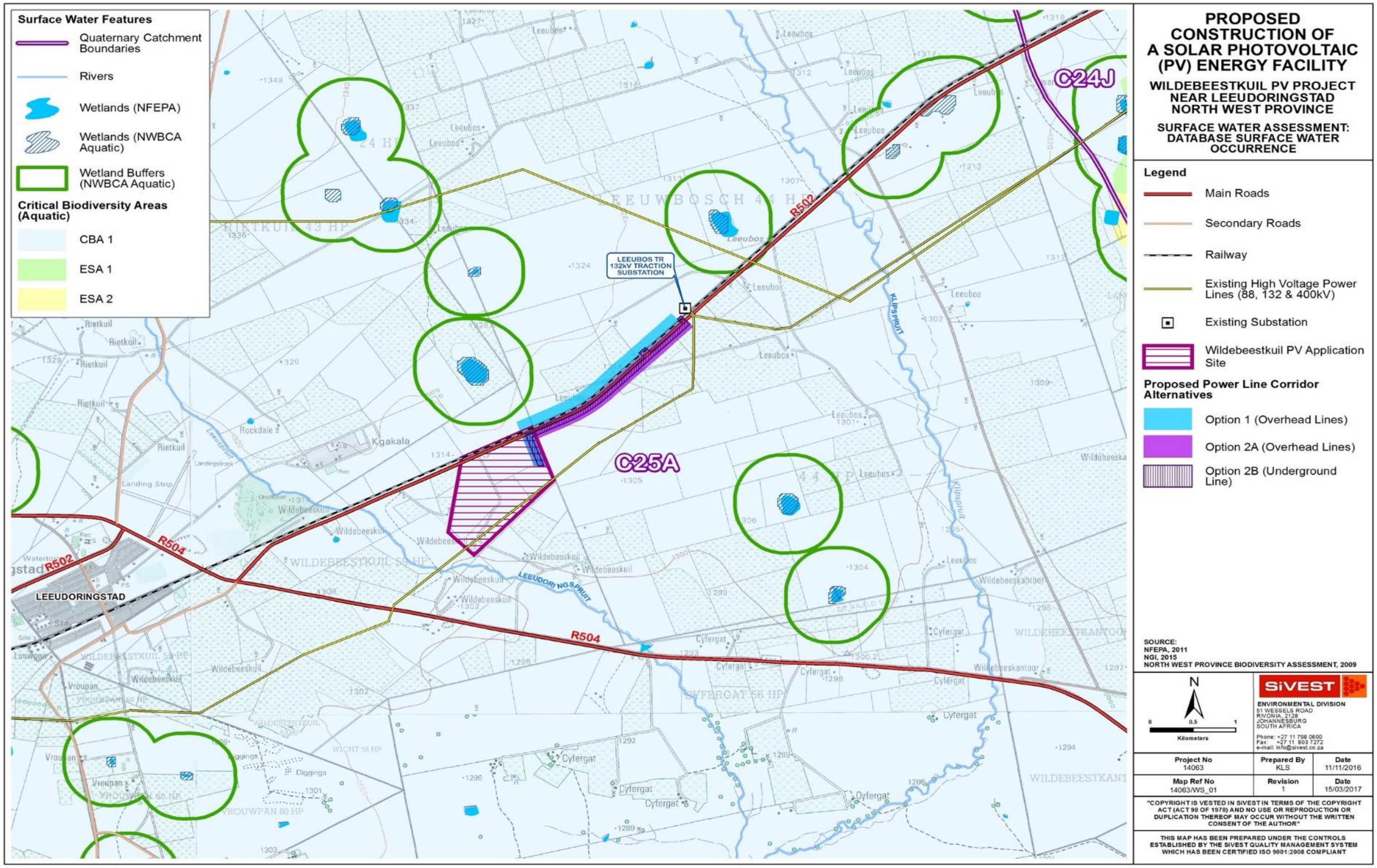


**Figure 30:** Database Surface Water Occurrence Map

### *8.7.2 In-field Findings and Delineations*

The in-field surface water resources delineation assessment took place on the 13th September 2016, as well the 19th August 2020. The fieldwork ground-truthing, verification and delineation assessment was undertaken to scrutinise the results of the desktop assessment as well as to identify any potentially overlooked wetlands or other surface water resources in the field for the study site. The delineation results are displayed in **Figure 31** and **Figure 32**.

Ultimately, it was found that there are two (2) artificial depression wetlands, one (1) drainage line within the study site, as well as one natural depression wetland within the proposed power line corridors. None of the field identified natural wetland, drainage line and artificial features were evident in the database information sets consulted at a desktop level. The only feature that could be correlated included the Leeudoringspruit which is not located on the study site. The biophysical characteristics of the various indicators for each artificial and natural depression wetlands, and the drainage line are provided in more detail in the sub-sections below.

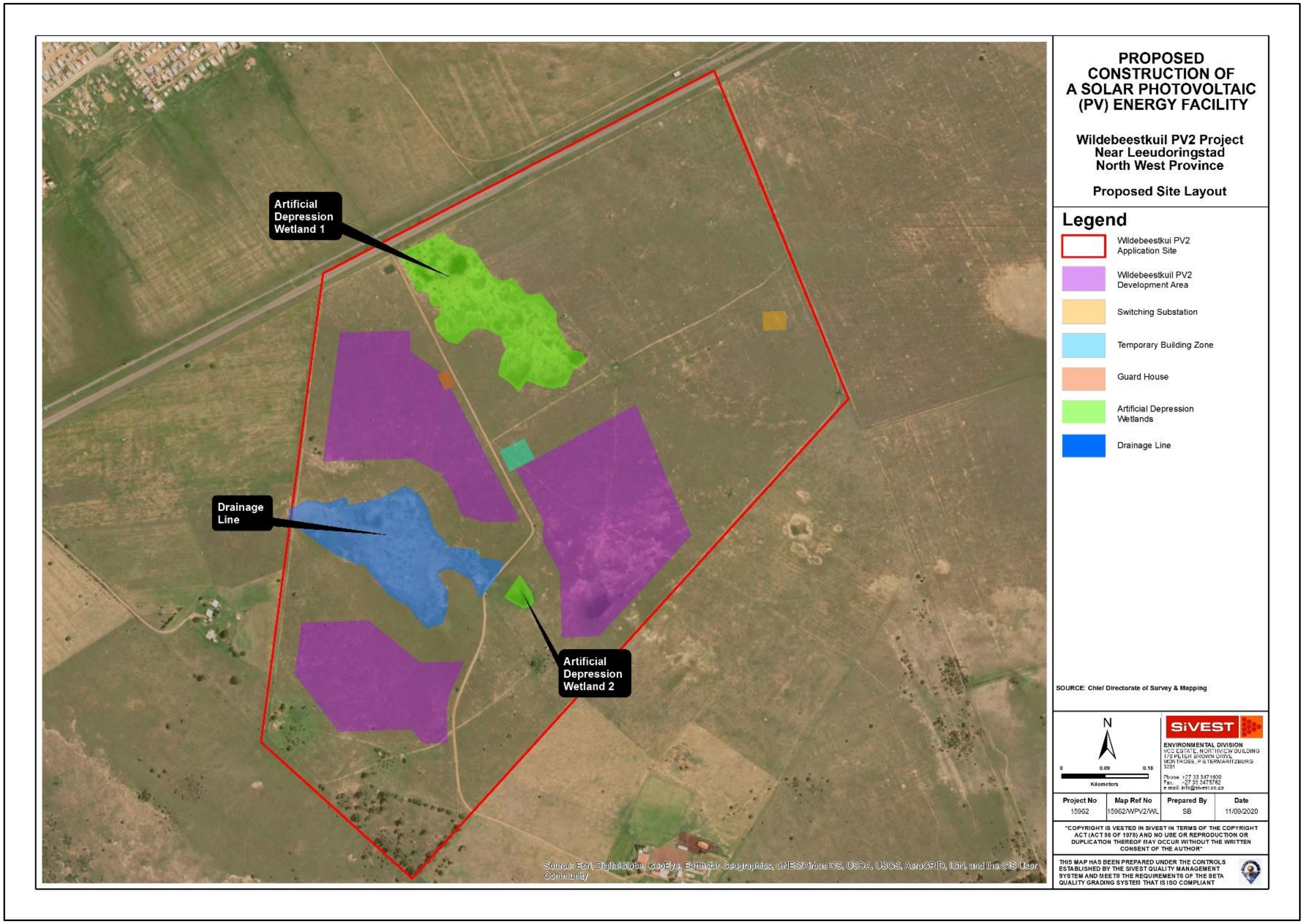


**Figure 31:** Surface Water Delineation Map for the Wildebeestkuil 2 Solar PV Plant Layout

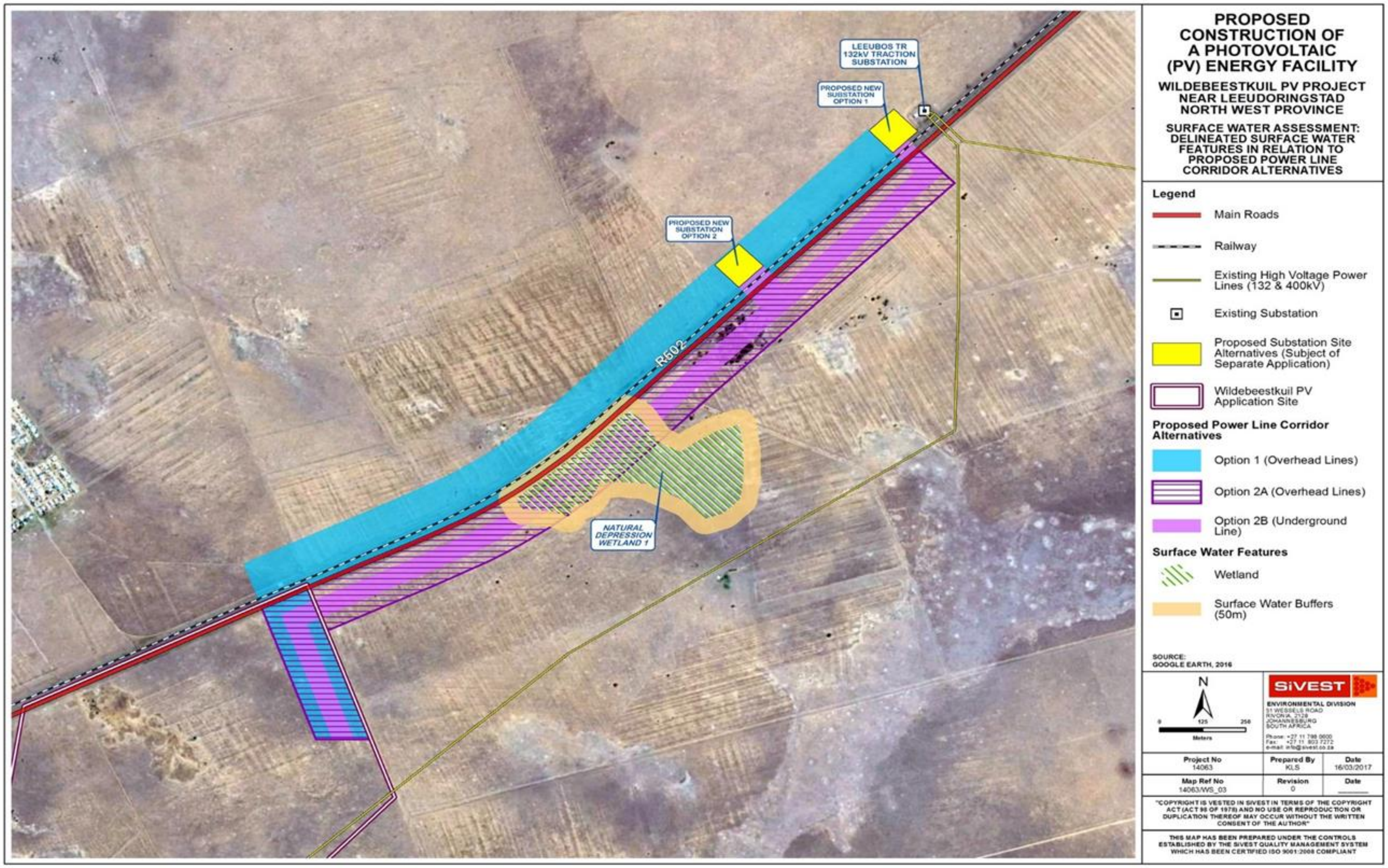


**Figure 32:** Surface Water Delineation Map for the Grid Connection Corridor Alternatives

#### 8.7.2.1 Natural Depression Wetland 1

**Terrain and Soil Characteristics**

Natural Depression Wetland 1 (approximately 5.7ha) is found within the power line corridor approximately 650m to the north east of the PV project site. The landscape characteristics are predominantly flat in this area. However, any shallowed out basins in the terrain provide a suitable template for endorheic (closed systems that are in-ward draining) depression wetlands to form. In this instance, a natural depression wetland has formed (**Figure 33**) in the localized depression in the landscape. However, excavation activities have taken place within the wetland, presumably in an attempt to provide additional surface water for cattle to drink.

**Figure 33:** Natural Depression Wetland **1**

In terms of soil characteristics, an Orthic A horizon overlaying a Soft Plinthic B horizon was observed. Excavations within the wetland make the wetland artificially deeper than would otherwise naturally be the case. A limited amount of surface water was therefore evident in the deeper excavated areas within the wetland. Nonetheless, the sub-soils were found to comprise a mixture of sandy/loamy/clay particles within the soil matrix. The soils were a dark brown colour with mottling signatures present in the form of orange, red and black mottles. Grey soil particles indicating reduction processes taking place in the wetland sub-soils were also evident. Accordingly, with the combination of the two soil horizon types, the Westleigh Soil Form could be attributed to the soils in Natural Depression Wetland 1. The soil characteristics in Natural Depression Wetland 1 indicate that soil saturation is likely to be temporary.

**Vegetation**

Vegetation observed in Natural Depression Wetland 1 varied from hydrophytic species within the open surface water pools in the excavated areas to graminoid species which dominated the majority of the wetland. Of the hydrophytic species observed, these included *Juncus* sp. (ow), *Marsilea* sp. (ow) and *Persicaria* sp. (ow - weed). Graminoid species in the wetter core areas of the wetland consisted of mainly *Eragrostis plana* (fw), whilst *Themeda triandra* and *Hypparhenia hirta* were also observed.

**Figure 34:** Hydrophytic Vegetation of Depression Wetland 3

Existing impacts include dirt and tar road fragmenting the wetland. Grazing impacts are also currently affecting the wetland as well as old excavation pits.

*8.7.2.2 Artificial Depression Wetland 1*

**Terrain and Wetland Soil Characteristics**

The terrain of the landscape is flat. Past excavation activities in the northern region of the study site, presumably for road and/or rail transportation, have resulted in a collection of hollowed out basins (**Figure 35**) within the greater excavation pit (approximately 5.5 hectares). The excavation pit situated in the flatter landscape which now acts as a sink for sediments in the surrounding catchment. Drainage does not flow in from or out of any particular hydrological system, but rather as diffuse flow from the surrounding catchment. The system can therefore be considered endorheic (a closed system that is in-ward draining).

**Figure 35:** Hollowed out Basin in the Old Excavation Pit

In terms of geomorphology, the influx of silt and clay due to inward depositional processes results in the accumulation of sediment. This accumulated sediment forms a layer (normally containing appreciable amounts of clay) that is relatively impermeable and is found near the surface in the subsoil of the old excavation pit. However, soil composition (for example, degree of sand, silt and clay) varies across the numerous localized smaller depressions within the excavation pit with a higher composition of clays in the lowest points of the excavated pockets within the excavation pit. Soil deposition near the surface was representative of an Orthic A horizon. In general, bedrock was found close to the surface (approximately 10-50cm). The sub-soils were therefore relatively thin in most areas. However, it was noticed that the soils presumably undergo regular but temporary wet and dry phases to the extent that hydric soils are able to form. The characteristics of a Soft Plinthic B horizon are evident in the sub-soils with brown soils comprising a loamy / clay fraction, expressing mottling signatures in the form of orange coloured accumulations (mottles) as well as grey reduced particles (**Figure 36**). Ultimately, the combination of the Orthic A and Soft Plinthic B soil horizons are attributable to the Westleigh Soil Form, a common wetland soil form which can be indicative of temporary saturation cycles.

**Figure 36:** Cracking Clays (left) and Soil Sample showing Orange Mottling (right) in the Soil Matrix

Overall, soil indicators akin to wetlands were observed within the excavation pit. The excavation pit was therefore classified as an artificial depression wetland.

**<u>Wetland Vegetation</u>**

A community of small herbaceous shrubs and small trees were found in the north western region of the artificial depression wetland. Notable species include *Acacia karroo*, *Searsia lancea* and Zizi*phus mucronata*. Aside from these vegetation species, hydrophytic vegetation was observed in the form of *Juncus* sp. (ow) at the lowest points within several of the depression pockets within the excavation pit. Otherwise, vegetation cover was sparse. The occurrence of the *Juncus* sp. species provides further evidence of wetland conditions suitable for hydrophytic vegetation species currently exhibited by the artificial depression wetland.

**Figure 37:** *Juncus* sp. observed in Artificial Depression Wetland 1

Aside from the excavation impacts, other existing impacts currently affecting the artificial wetland that were noted include grazing by cattle thereby creating a moderate level of disturbance.

##### *8.7.2.3 Artificial Depression Wetland 2*

**Terrain and Soil Characteristics**

Anthropogenic modification in the form of a berm was observed near the south central parts of the study site. Whilst the study site is predominantly flat, the berm presumably acts as a barrier in order to contain water draining through the property seemingly in a south easterly direction. Water therefore accumulates behind the berm. The feature is approximately 0.24ha in extent (**Figure 38**).

**Figure 38:** Artificial Depression Wetland 2

Sediments contained in the run-off settle behind the berm forming a layer that is relatively impermeable, similar to artificial depression wetland 1. As a result, the layer contains a loamy clay mixture which appears to retain saturation relatively well enough for hydric soils to develop near the surface. The A horizon could be attributed to an Orthic A horizon, whilst the B horizon was similar to the sub-soils observed in Artificial Depression Wetland 1 revealing a predominantly brown soil matrix intermixed with mottling signatures in the form of orange and red iron accumulations and grey reductions. Again, the Westleigh Soil Form could be attributed to the soils in the feature. Given the soil characteristics, the feature was classified as an Artificial Depression Wetland 2. The soils signatures for Artificial Depression Wetland 2 indicate temporary soil saturation.

#### *8.7.2.4 Drainage Line 1*

**<u>Topography Associated with a Watercourse</u>**

Despite the study site being flat, it seems that surface water run-off follows a south easterly trajectory in the mid regions of the PV study site. A distinct area where soil and vegetation characteristics change from that of the surrounding landscape, form a drainage pathway area (**Figure 39**). This particular area was defined as Drainage Line 1. Drainage Line 1 is approximately 5.6 hectares in extent.

**Figure 39:** Terrain Characteristics of Drainage Line 1

**Alluvial Soils and Deposited Materials**

Soils samples within Drainage Line 1 did not show any characteristics that are indicative of hydric soils. As such, the area was not classified as a wetland. However, a higher amount of clay particles was visibly evident by comparison to the adjacent terrestrial area. Given the context of the landscape, the higher degree of clay particles in the sub-soils may be indicative illuviation (downward movement of soil particles by percolating water – McVicar *et al*., 1991) taking place in the landscape following rainfall events.

**Vegetation**

The vegetation observed within Drainage Line 1 was a mixture of graminoid, small herbacoues and scrub vegetation species (**Figure 40**). The condition of the vegetation appeared considerably disturbed at the time of the assessment. Bare patches of soil were exposed at the surface, presumably in part a result of surface water movement through the area after rains. However, no specific hydrophytic vegetation species were noted during the fieldwork.

**Figure 40:** Encroachment of Herbaceous Vegetation Species in Drainage Line 1

It should be noted that buffer zones were determined for the identified natural and artificial depression wetlands and the drainage line. **A buffer zone of 50m was applied to the natural and artificial depression wetlands, and drainage line to provide sufficient buffer from the PV array field and associated power line (including towers).** Please refer to **section 9.2.3.1** of the DBAR for more details regarding surface water buffer zones.

## 8.8 Agricultural and Soil

The Agricultural and Soils Compliance statement[19] was conducted by Garry Paterson (**SACNASP registration:** 400463/04) of the Agricultural Research Council (ARC)-Soil, Climate and Water (ARC-ISCW) unit. The full Agricultural and Soils Compliance statement dated September 2020 is included in **Appendix 6A**. It should be noted that document adheres to the process and content requirements of the gazetted agricultural protocol.

The environmental baseline from an agricultural and soils perspective is presented below.

### *8.8.1 Soils*

Existing soil information was obtained from the map sheet 2726 Kroonstad (Bruce & Schoeman, 1974) from the national Land Type Survey, published at a 1:250 000 scale. A land type is defined as an area with a uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar *et al.,* (1977).

Based on the land type survey information, the area under investigation is covered by two (2) land types (as shown on **Figure 41**), namely:

- **Bd12** (non-red apedal soils, with plinthic subsoil); and
- **Fb6** (miscellaneous soils, usually shallow, sometimes calcareous)

[19] Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources for a site identified by the national web based environmental screening tool as being of 'medium' or 'low' sensitivity for agricultural resources, gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

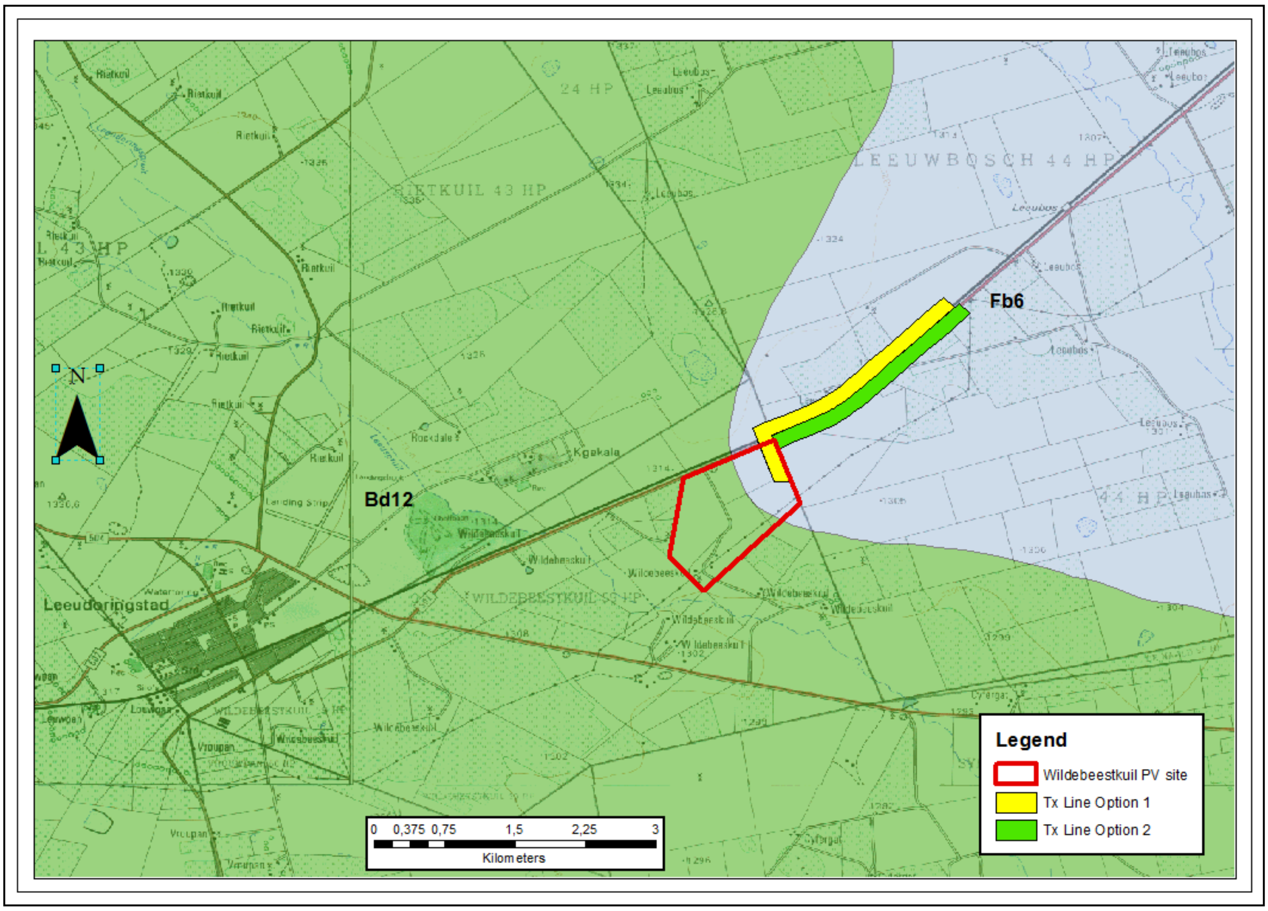


**Figure 41:** Land types

A summary of the dominant soil characteristics of the land types occurring is given in **Table 15** below. The colours used correspond to those used on **Figure 41**.

The distribution of soils with high, medium and low agricultural potential within the land types is also given, with the dominant class shown in **highlighted bold type** (**Table 15**).

The soils are predominantly shallow, with much exposed rock. The prevailing dominant agricultural potential of the area is thus low to very low, defined mainly by the restricted rooting depth (**Table 15**). Where subsurface restrictions, such as rock or hard plinthite, are present at shallow depth (generally less than 450mm from the surface), then the arable agricultural potential will be significantly restricted. More than 80% of the area has low potential arable soils and rock (**Table 15**).

These soils would be most suited to grazing of livestock, and the prevailing grazing potential of the area is moderate, at 10-12 hectares per Large Stock Unit (ha/LSU) (Schoeman & van der Walt, 2004).

*It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Also, other soils that were not identified due to the scale the land type survey may also occur.*

The Wildebeestkuil 2 Solar PV Plant & 132kV Power Line falls within different land type units, namely Fb6 and Bd12 respectively. While the details of the specific soils vary somewhat (**Table 15**), the overall occurrence of different agricultural potential classes does not vary significantly, as both mapping units are dominated by low potential soils, with little or no high potential soils in either vicinity. This is borne out by the lack of any cultivation or other agricultural activities on the site.

**Table 15:** Land types occurring (with soils in order of dominance)

| Land Type | Dominant soils | Depth (mm) | % of land type | Characteristics | Agric. Potential (%)[20] |
|---|---|---|---|---|---|
| **Bb12** | Clovelly 36, Glencoe 36<br>Glenrosa 13/1416/17, Mispah 10<br>Avalon 36 | 450-550<br>100-250<br>650-750 | 25.4%<br>15.9%<br>13.6% | Yellow-brown, weakly structured, sandy loam to sandy clay loam soils on hard rock or ferricrete.<br>Grey-brown, weakly structured, sandy loam to sandy lay loam topsoil on hard to weathering rock or ferricrete<br>Yellow-brown, weakly structured, sandy loam to sandy clay loam soils on hard rock or ferricrete. | High: 0.0<br>Mod: 25.7<br>**Low: 74.3** |
| **Fb6** | Glenrosa 16/17, Mispah 10/11<br>Rock<br>Arcadia 20 | 150-300<br>-<br>450-750 | 47.3%<br>30.0%<br>24.8% | Grey-brown, weakly structured, sandy loam to sandy lay loam topsoil on hard to weathering rock or ferricrete<br>Exposed surface rock outcrops<br>Dark brown to black, swelling clay soils, usually calcareous | High: 2.4<br>Mod: 13.2<br>**Low: 84.4** |

It should be noted that the Agricultural Potential referred to in column 6 in the table above refers to **soil potential only** and does not take prevailing climatic conditions into account.

#### *8.8.2 Sensitive Areas*

There are no especially sensitive areas regarding soils that can be identified at this stage.

## 8.9 Geotechnical

The Geotechnical Impact Assessment was conducted by Keval Singh of JG Afrika (Pty) Ltd. The methodology entailed a literature review and a review of topographic and geological maps. Consideration was given to the terrain, geological, hydrogeology and envisaged geotechnical constraints. The full Geotechnical Impact Assessment Report dated March 2021 is included in **Appendix 6F**.

The geotechnical characteristics present over the area in which the site is situated are presented below.

#### *8.9.1 Engineering Geology*

Brink (1979), recognised that the occurrence of the Ventersdorp Supergroup within South Africa falls within three (3) distinct climatic zones. The Wildebeestkuil 2 Solar PV Plant and 132kV Power Line study site is located within an area classed as a sub-humid dry zone, in which the soils are potentially expansive. In this climate zone where residual soils have developed, the profiles are not deeper than 12m depth (Brink, 1979).

The upper 2m of the residual profile is red or reddish brown in colour, which may contain abundant ferruginous concretions and may be densely cemented by ferricrete. Below this the profile can be a yellow coloured clayey silt can be anticipated which merges into an olive green coloured soil with depth. This typical colour sequence is indicative of well-drained soils in basic igneous rocks (Brink, 1979).

[20] Refers to **soil potential only** and does not take prevailing climatic conditions into account

Investigations in Klerksdorp have shown that heaving conditions can be expected in the residual lava profiles. Indicator tests conducted on the Ventersdorp lavas by Brink (1979), record mean plasticity index values in the range of 17 to 23, implying active soil properties.

Clay contents generally averaged 20-21% of the soil composition. More importantly, the clay contains smectite minerals such as montmorillonite, which is subject to shrink and swell upon moisture variations.

The presence of well-developed ferricrete hardpans of substantial thicknesses (1-2m) developed in the upper horizons is not uncommon in the Ventersdorp lavas. Hardpans reduces the effects of heaving, with structures founded on ferricrete recording minimal heave.

A Geology Map is provided as **Figure 14**, as well as in Appendix A of the Geotechnical Impact Assessment Report (**Appendix 6F**).

### *8.9.2 Hydrogeology*

According to the 1: 500 000 scaled Hydrogeological Series map of Kroonstad (2726), the aquifer type is classed as an intergranular, fractured aquifer type. According to the hydrogeological map the groundwater table can be anticipated at transition zones, weathered zones and joints.

A Hydrogeological Map is presented as **Figure 42** below, as well as in Appendix A of the Geotechnical Impact Assessment Report (**Appendix 6F**).

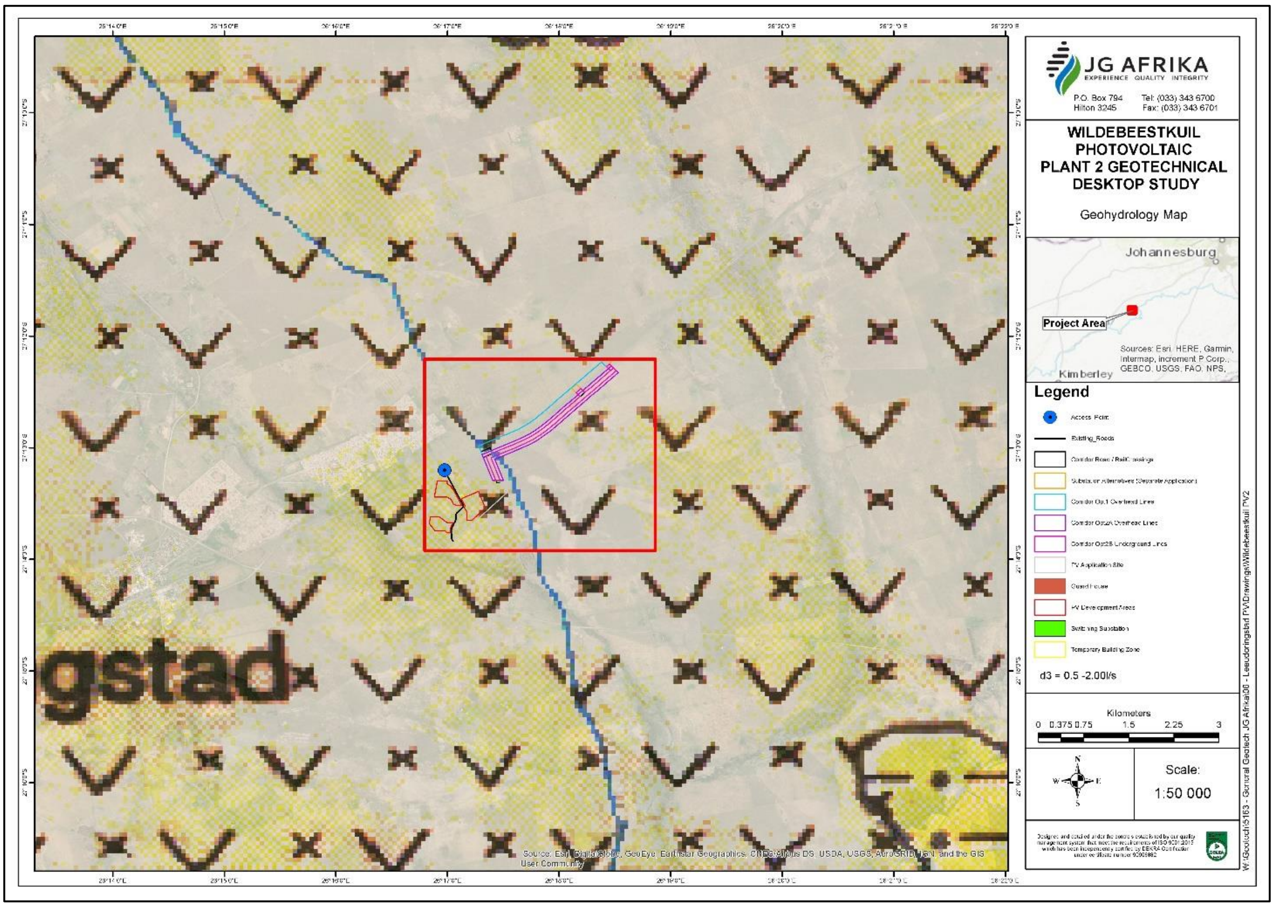

**Figure 42:** Geohydrological map of the application site.

### 8.9.3 Geotechnical Appraisal

Soil activity may be influence by the presence of expansive soil conditions if deep, residual andesitic lava horizons are present. The presence of ferricrete hardpans may influence the depth of excavation during exploratory trial pitting.

Depending on site-specific considerations such as the topography and weathering extent of the bedrock, the andesitic bedrock may not be suitable material for construction use. This will have to be assessed during the detailed investigation. Competent founding conditions can be anticipated in the residual soil profile and in weathered bedrock conditions, which will have to be assessed during the detailed investigation. Consideration can be given to the following foundation types:

- Ballasted Foundations (concrete raft) – these foundations are suitable in areas where shallow bedrock conditions are encountered or in poor, non-cohesive soils, where helical or screw-in piles are not suitable. The limitations are that; ballasted foundations require additional design considerations on steep slopes, they are not suited to areas susceptible to settlement and areas underlain by expansiveness soil conditions.
- Driven Piles - these piles are suited to clay, gravel and dense sand where shallow groundwater conditions can be anticipated. The advantages are that they can be accurately positioned, no curing is required and the cost of installation is relatively low (e.g. Duktus pile).

It is important to select the correct foundation type and optimize the design. As such, a detailed and comprehensive geotechnical investigation is required. This will be undertaken prior to construction and upon finalisation of the layout plan. The presence of uplift and downward forces in the form of wind loads must be taken into consideration during foundation design.

The presence of wetlands is a possible indication of shallow groundwater conditions, which will need to be evaluated on-site.

## 8.10 Visual

The Visual Assessment (VIA) was conducted by Kerry Schwartz of SiVEST. The VIA has not been externally reviewed as the specialist is regarded as independent, has no vested interest in the project and receives fair and normal remuneration for the work. Based on recent correspondence with the DFFE, it was confirmed that this would be acceptable, provided all specialists sign a DoI. A signed DoI from the specialist who undertook the VIA is provided in **Appendix 3**. Proof of confirmation in this regard from the DFFE is provided in **Appendix 9D**.

Baseline information about the physical characteristics of the study area was initially sourced from spatial databases. The characteristics identified via desktop analysis were later verified during site visits undertaken in October 2016 (early summer), as well as between the 12th and 13th of August 2020 (late winter) (see section 1.4 of VIA Report – **Appendix 6H**). The full VIA Report dated 07 September 2020 is included in **Appendix 6H**.

### 8.10.1 Topography

The largely flat terrain in the immediate vicinity of the application site results in generally wide-ranging vistas throughout the study area.

### 8.10.2 Vegetation

The predominant open grassland results in wide-open vistas across most of the study area and as such the existing vegetation cover will provide little visual screening. In some instances, however, tall trees (sometimes exotic) established around farmhouses would provide some degree of visual screening.

### 8.10.3 Land Use

Refer to **section 8.3** of DBAR for details regarding land use in study area.

The relatively low density of human habitation and presence of natural vegetation cover across large portions of the study area would give the viewer the general impression of a largely natural setting with some pastoral elements resulting from cultivation and livestock rearing activities. High levels of human transformation and visual degradation become evident in the vicinity of the town of Leeudoringstad and Kgakala Township. Urban development and associated infrastructure significantly alter the visual character within the urban areas and on their periphery. General landscape degradation in the vicinity of Kgakala Township has been exacerbated by significant amounts of litter and a dumping site on the periphery of the township, thus contributing to the overall disturbed and degraded visual character of the surrounding area.

It should also be noted that the presence of road, rail and electricity infrastructure result in a more urban or industrial landscape character. Hence, the visual impacts associated with the proposed developments are expected to be relatively insignificant in these areas as they have been relatively transformed and / or degraded.

The influence of the level of human transformation on the visual character of the area is described in more detail below.

### 8.10.4 Visual Character and Cultural Value

The above physical and land use-related characteristics of the study area contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other elements such as rail or electrical infrastructure. The visual character of an area largely determines the sense of place relevant to the area. This is the unique quality or character of a place, whether natural, rural or urban which results in a uniqueness, distinctiveness or strong identity.

As mentioned above, much of the study area is characterised by rural areas with natural unimproved vegetation. Agriculture in the form of cultivation and livestock rearing is the dominant land use, which has transformed the natural vegetation in some areas. However, a large portion of the study area has retained a natural appearance due to the presence of the low shrubs and grasslands and the introduction of a solar PV plant, power line and associated infrastructure into this environment could be considered to be a degrading factor.

The most prominent anthropogenic elements in these areas include the R502 and R504 regional roads, rail infrastructure, high voltage power lines, the Leeubos TR 132kV Traction Substation, and other linear elements such as telephone poles, communication poles and farm boundary fences. However, the town of Leeudoringstad and Kgakala Township and their environs appear more urban or disturbed, thus altering the overall visual character of the study area. In addition, litter in and around Kgakala Township and the presence of a dumping site on the outskirts of the township contribute to the overall disturbed nature of the area and will ultimately further degrade the visual character of the surrounding area.

The presence of the anthropogenic elements in the landscape is an important factor in this context, as the introduction of the proposed development would result in less visual contrast where other anthropogenic elements are already present. As such, the proposed development is not expected to result in significant visual impacts within these transformed areas.

The greater area surrounding the development site is an important component when assessing visual character. The area can be considered to be typical of a rural farming landscape that consists of largely flat areas of natural low shrubland and grassland interspersed with farmsteads, windmills, livestock holding pens and agricultural land. Livestock farming and other forms of agriculture are evident within the area. In addition, cultivation is considered to be an important land use within the study area. This can be attributed to the fact that the headquarters of 'Suidwes Landbou', one (1) of the largest agricultural companies in South Africa, is located in the town of Leeudoringstad.

The small farming town of Leeudoringstad was established in 1920 and named after the Lion-thorn tree that was once characteristic of the farm Rietkuil, upon which the village was laid out. With the passing of time hunters gradually reduced the numbers of game in the area and the natural vegetation, including the 'lion thorn' also gradually disappeared. The town made newspaper headlines on 17 July 1932 when a train carrying 320 to 330 tons of dynamite from the De Beers factory at Somerset West to the Witwatersrand exploded in the town centre, killing five people and numerous livestock, as well as damaging almost every building in the town. 'The Star' newspaper of July 18th, 1932 carried extensive articles regarding this incident. This above-mentioned incident is described in the Leeudoringstad Museum (http://www.stayza.com/leeudoringstad/). In addition, pieces of the explosion can be found in the Koos Russouw Collection (http://www.mullersgazette.co.za/Leeudoringstad.html).

Considering the historical significance of the area, the broader area could potentially be seen to have some significance as a 'cultural landscape' in the South African context. Although the cultural landscape concept is relatively new, it is becoming an increasingly important concept in terms of the preservation and management of rural and urban settings across the world (Breedlove, 2002). In 1992 the World Heritage Committee[21] adopted the following definition for cultural landscapes:

*'Cultural landscapes represent the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.'*

Cultural Landscapes can fall into three (3) categories (according to the Committee's Operational Guidelines):

- 'a landscape designed and created intentionally by man';
- an 'organically evolved landscape' which may be a 'relict (or fossil) landscape' or a 'continuing landscape'; and
- an 'associative cultural landscape' which may be valued because of the 'religious, artistic or cultural associations of the natural element'.

Based on the above, the study area can be regarded as a type 'ii' organically evolving cultural landscape. It can be considered both a relict landscape, due to the relatively rich history dating back to the 1930's, and a continuing landscape as the typical rural farming landscape represents how the environment has been shaped

[21] UNESCO, 2005. Operational Guidelines for the Implementation of the World Heritage Convention. UNESCO World Heritage Centre. Paris

by the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction. The presence of small farming towns, such as Leeudoringstad, engulfed by an otherwise rural environment, form an integral part of the wider landscape.

In light of this, it is important to assess whether the introduction of a solar PV plant with associated infrastructure and 132kV power line into the study area would be a degrading factor in the context of the rural farming character of the landscape. In this instance, however, visual impacts on the cultural landscape would be reduced by the fact that the visual character has been significantly transformed and degraded by urban and infrastructural development and also the fact there are relatively few tourism or nature-based leisure facilities in the study area.

### *8.10.5 Visual Sensitivity*

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e. topography, landform and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer, 2005). A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal.

In order to assess the visual sensitivity of the area, SiVEST has developed a matrix based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be 'key issues' (Oberholzer, 2005).

Based on the criteria in the matrix (**Table 16**), the visual sensitivity of the area is broken up into a number of categories, as described below:

- **High** - The introduction of a new development such as a solar PV facility and overhead power line would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors.
- **Moderate** – Receptors are present, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.
- **Low** - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

**Table 16:** Environmental factors used to define visual sensitivity of the study area

| **FACTORS** | **DESCRIPTION** | **RATING** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ***LOW*** | | | | | | | | | ***HIGH*** |
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Pristine / natural / scenic character of the environment | Study area is largely natural with areas of scenic value and some pastoral elements. | | | | | | | | | | |
| Presence of potentially sensitive visual receptors | Relatively few potentially sensitive receptors have been identified in the study area. | | | | | | | | | | |
| Aesthetic sense of place / visual character | Visual character is typical of Karoo Cultural landscape. | | | | | | | | | | |

| FACTORS | DESCRIPTION | RATING | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *LOW* | | | | | | | | | *HIGH* |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Irreplaceability / uniqueness / scarcity value | Although there are areas of scenic value within the study area, these are not rated as highly unique. | | | | | | | | | | |
| Cultural or symbolic meaning | Much of the area is typical of a Karoo Cultural landscape. | | | | | | | | | | |
| Protected / conservation areas in the study area | No protected or conservation areas were identified in the study area. | | | | | | | | | | |
| Sites of special interest present in the study area | No sites of special interest were identified in the study area. | | | | | | | | | | |
| Economic dependency on scenic quality | Few tourism/leisure-based facilities in the area | | | | | | | | | | |
| International / regional / local status of the environment | Study area is typical of Karoo landscapes | | | | | | | | | | |
| ****Scenic quality under threat / at risk of change | Introduction of Solar PV facilities and associated power lines will alter the visual character and sense of place. In addition, the development of other renewable energy facilities in the broader area as planned or under construction will introduce an increasingly industrial character, giving rise to significant cumulative impacts | | | | | | | | | | |

*****Any rating above '5' for this specific aspect will trigger the need to undertake an assessment of cumulative visual impacts.*

| Low | | | Moderate | | | | High | | |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

Based on the above factors, the total score for the study area is 29, which according to the scale above, would result in the area being rated as having a **LOW** visual sensitivity. This is mainly due to significant landscape transformation and degradation resulting from urban and infrastructural development (such as the town of Leeudoringstad, Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line) which would have reduced the scenic quality of the area.

It should be stressed, however, that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts, and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

No formal protected areas were identified in the study area and although a significant number of potentially sensitive receptors were identified in the study area, most of these appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors because they are located within a mostly rural setting and the proposed developments will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed developments are unknown.

### *8.10.6 Receptor Identification*

During the VIA, a significant number potentially sensitive visual receptor locations were identified within the study area by desktop means, most of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the residents' sentiments toward the proposed development are unknown.

None of these receptor locations were identified as being sensitive. This is mainly due to the relative scarcity of leisure-based or nature based tourism activities in the assessment area. In addition, the only significant concentrations of human habitation in the study area are the town of Leeudoringstad and Kgakala Township which are both characterised by urban land uses and a high degree of transformation. Although there is a relatively high concentration of receptors in this area, these receptors are not expected to be sensitive to the visual impact of the proposed development due to the existing visual degradation within these areas.

In many cases, roads, along which people travel, are considered to be sensitive receptors. The primary thoroughfares in the broader area the R502 and R504 Main Roads. The R502 regional road traverses the visual assessment zone in a north-east to south-west direction, connecting the town of Leeudoringstad in the west with the town of Orkney to the north-east. A section of this road abuts the Wildebeestkuil 2 Solar PV Plant application site. The R504 regional road traverses the south-western section of the visual assessment zone, linking the town of Leeudoringstad with the town of Bothaville to the south-east. The roads are single carriageway tar roads, primarily used as access routes by local residents.

These roads do not form part of any formal scenic tourist routes, and are not specifically valued or utilised for their scenic or tourism potential. As such, they are not considered to be visually sensitive.

Other thoroughfares in the study area include gravel access / secondary roads which are primarily used by local farmers to gain access to surrounding farms / properties. These roads are therefore not regarded as visually sensitive as they do not form part of any scenic tourist routes, and are not specifically valued or utilised for their scenic or tourism potential.

There are therefore no visually sensitive roads within the visual assessment zone.

The potentially sensitive visual receptor locations in relation to the zones of visual impact are indicated in **Figure 43** below.

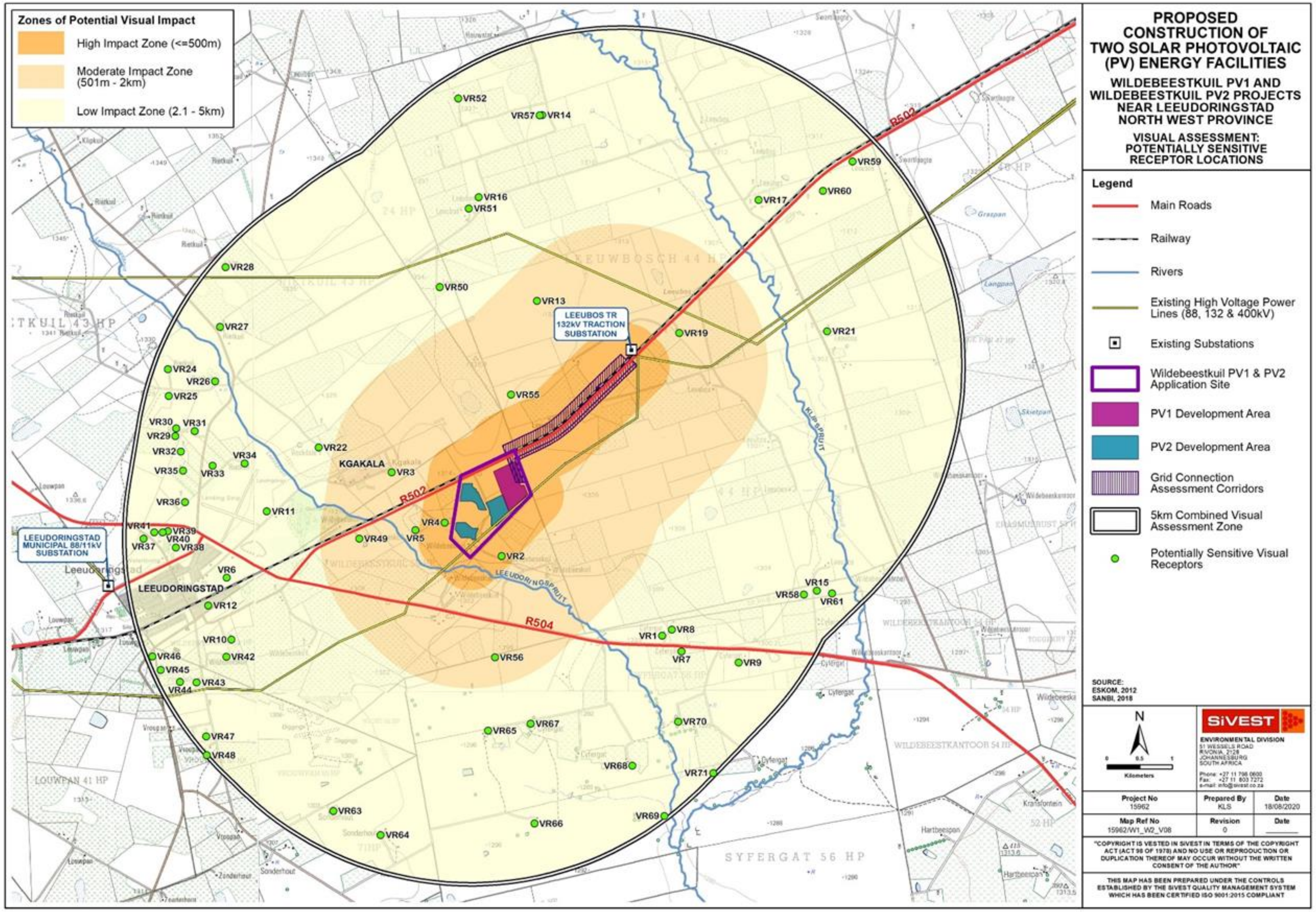


**Figure 43:** Visual Receptors in the study area

### 8.10.7 Site Sensitivity Verification

Prior to commencing with the specialist assessment in accordance with Appendix 6 of the NEMA EIA Regulations of 2014 (as amended), 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 National Web-Based Environmental Screening Tool (Screening Tool[22]).

Visual sensitivity of the broader area surrounding the proposed development site was found to be low largely due to the to the presence of degraded land and anthropogenic elements such as the town of Leeudoringstad, Kgakala Township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line) which would likely reduce the scenic quality of the area.

As a result of the relatively flat terrain and the lack of screening vegetation, PV arrays placed on the site are expected to be at least partially visible from most of the potentially sensitive receptors and as such, no areas on the site were significantly more sensitive than the remainder of the site.

In assessing the visual sensitivity of the proposed application site, consideration was given to the Landscape Theme of the National Environmental Screening Tool. Under this theme, the tool identifies areas of 'High' and '**Medium**' sensitivity in respect of solar PV development on the application site. The identification of areas of 'High' landscape sensitivity in this instance is related to the proximity of the site to Kgakala Township to the north-west and the Leeudoringspruit to the south of the application site. **Figure 44** below is an extract from the Screening Tool Report generated for the application site.

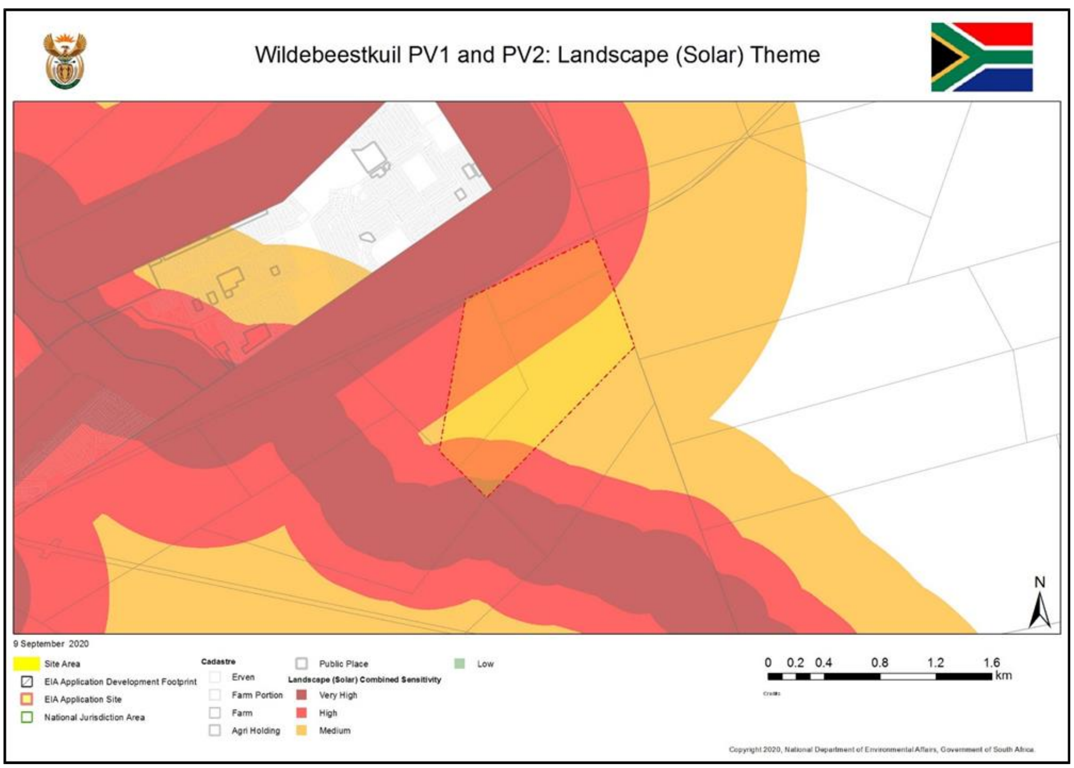


**Figure 44:** Relative Landscape Sensitivity for the application site

[22] https://screening.environment.gov.za/screeningtool/#/pages/application_category

This VIA has, however, found that although there is a relatively high concentration of receptors in the Kgakala Township, these receptors are not expected to be sensitive to the visual impact of the proposed development due to the existing visual degradation within these areas. In addition, the site investigation did not confirm any landscape sensitivity associated with the Leeudoringspruit. In fact, views towards the watercourse from the R502 main road show significant degradation largely due to litter (**Figure 45**).

The National Environmental Screening Tool does not identify any landscape sensitivities in respect of the proposed power line.

**Figure 45:** Views towards the Leeudoringspruit showing visual degradation due to litter

It should be noted that the Screening Tool is a very high level, desktop study and as such the results of the study must be viewed against the findings of the field investigation as well as factors affecting visual impact, such as:

- the presence of visual receptors;
- the distance of those receptors from the proposed developments; and
- the likely visibility of the developments from the receptor locations.

This issue is further examined in the Site Sensitivity Verification Report in Appendix D of the VIA Report (**Appendix 6H**).

### *8.10.8 Receptor Impact Rating*

In order to assess the impact of the proposed solar PV facility, 132kV power line and associated infrastructure on the identified potentially sensitive receptor locations, a matrix that takes into account a number of factors has been developed and is applied to each receptor location.

The matrix is based on a number of factors as listed below:

- Distance of a receptor location away from the proposed development (zones of visual impact);
- Presence of screening elements (topography, vegetation etc.); and
- Visual contrast of the development with the landscape pattern and form.

These factors are considered to be the most important factors when assessing the visual impact of a proposed development on a potentially sensitive receptor location in this context. It should be noted that this rating matrix is a relatively simplified way of assigning a likely representative visual impact, which allows a number of factors to be considered. Experiencing visual impacts is however a complex and qualitative phenomenon and is thus difficult to quantify accurately. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

The above-mentioned factors used when assessing the visual impact of the proposed development on receptor locations have been discussed in more detail in section 8.2 of the VIA Report (**Appendix 6H**).

The matrix returns a score which in turn determines the visual impact rating assigned to each receptor location (**Table 17**) below.

**Table 17:** Rating Scores

| Rating | Overall Score |
|---|---|
| High Visual Impact | 8-9 |
| Moderate Visual Impact | 5-7 |
| Low Visual Impact | 3-4 |
| Negligible Visual Impact | (overriding factor) |

An explanation of the matrix is provided in **Table 18** below.

**Table 18:** Visual assessment matrix used to rate the impact of the proposed development on potentially sensitive receptors

| **VISUAL FACTOR** | **VISUAL IMPACT RATING** | | | |
|---|---|---|---|---|
| | **HIGH** | **MODERATE** | **LOW** | **OVERRIDING FACTOR: NEGLIGIBLE** |
| **Distance of receptor away from proposed development** | <= 500m<br>**Score 3** | 500m < 2km<br>**Score 2** | 2km < 5km<br>**Score 1** | >5km |
| **Presence of screening factors** | No / almost no screening factors – development highly visible<br>**Score 3** | Screening factors partially obscure the development<br>**Score 2** | Screening factors obscure most of the development<br>**Score 1** | Screening factors completely block any views towards the development, i.e. the development is not within the viewshed |
| **Visual Contrast** | **High contrast** with the pattern and form of the natural landscape | **Moderate contrast** with the pattern and form of the natural landscape | **Corresponds** with the pattern and form of the natural | |

| VISUAL FACTOR | VISUAL IMPACT RATING | | | |
|---|---|---|---|---|
| | **HIGH** | **MODERATE** | **LOW** | **<u>OVERRIDING FACTOR</u>: NEGLIGIBLE** |
| | elements (vegetation and land form), typical land use and/or human elements (infrastructural form)<br><br>**Score 3** | elements (vegetation and land form), typical land use and/or human elements (infrastructural form)<br><br>**Score 2** | landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form)<br><br>**Score 1** | |

**Table 19** below presents a summary of the overall visual impact of the proposed development on each of the potentially sensitive visual receptor locations which were identified within 5km of the proposed application site and the combined 132kV power line assessment corridors.

**Table 19:** Summary Receptor Impact Rating

| Receptor Location | Distance from PV Application Site | Distance from combined Power Line Assessment Corridor | Screening | Contrast | IMPACT RATING (SOLAR PV PLANT) | IMPACT RATING (POWER LINE) |
|---|---|---|---|---|---|---|
| VR 1 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 2 - Farmstead | High (3) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (7)** | **MODERATE (6)** |
| VR 3 – Kgakala Township | Moderate (2) | Moderate (2) | Low (1) | Low (1) | **LOW (4)** | **LOW (4)** |
| VR 4 - Farmstead | High (3) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (7)** | **MODERATE (6)** |
| VR 5- Farmstead | Moderate (2) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (6)** | **MODERATE (6)** |
| VR 6 – Leeudoringstad Golf Course | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 7 - Farmstead | Low (1) | Low (1) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (5)** |
| VR 8 - Farmstead | Low (1) | Low (1) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (5)** |
| VR 9 - Farmstead | Low (1) | Low (1) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (5)** |
| VR10 - Farmstead | Low (1) | Low (1) | Moderate (2) | Low (1) | **LOW (4)** | **LOW (4)** |
| VR 11 – Leeudoringstad Residential Community | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 12 – Leeudoringstad Town | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 13 - Farmstead | Low (1) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (6)** |
| VR 14 - Farmstead | >5km | Low (1) | Moderate (2) | High (3) | **NEGLIGIBLE** | **MODERATE (6)** |
| VR 15 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 16 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 17 - Farmstead | >5km | Low (1) | Low (1) | Moderate (2) | **NEGLIGIBLE** | **LOW (4)** |
| VR 19 - Farmstead | Low (1) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (6)** |
| VR 21 - Farmstead | >5km | Low (1) | Low (1) | High (3) | **NEGLIGIBLE** | **LOW (4)** |
| VR 22 - Farmstead | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 24 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 25 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 26 - Farmstead | Low (1) | Low (1) | Low (1) | Moderate (2) | **LOW (4)** | **LOW (4)** |
| VR 27 - Farmstead | Low (1) | Low (1) | Low (1) | High (3) | **MODERATE (5)** | **MODERATE (5)** |
| VR 28 - Farmstead | Low (1) | >5km | Low (1) | High (3) | **MODERATE (5)** | **NEGLIGIBLE** |
| VR 29 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |

| Receptor Location | Distance from PV Application Site | Distance from combined Power Line Assessment Corridor | Screening | Contrast | IMPACT RATING (SOLAR PV PLANT) | IMPACT RATING (POWER LINE) |
|---|---|---|---|---|---|---|
| VR 30 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 31 - Farmstead | Low (1) | Low (1) | Low (1) | Moderate (2) | **LOW (4)** | **LOW (4)** |
| VR 32 - Farmstead | Low (1) | Low (1) | Low (1) | Moderate (2) | **LOW (4)** | **LOW (4)** |
| VR 33 - Farmstead | Low (1) | Low (1) | Low (1) | Moderate (2) | **LOW (4)** | **LOW (4)** |
| VR 34 - Farmstead | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 35 - Farmstead | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 36 - Farmstead | Low (1) | Low (1) | Low (1) | Low (1) | **LOW (3)** | **LOW (3)** |
| VR 37 - Smallholding | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 38 - Smallholding | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 39 - Smallholding | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 40 - Smallholding | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 41 - Smallholding | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 42 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 43- Farmstead | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 44 - Farmstead | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 45 - Farmstead | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 46 - Farmstead | Low (1) | >5km | Low (1) | Low (1) | **LOW (3)** | **NEGLIGIBLE** |
| VR 47 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 48 - Farmstead | Low (1) | >5km | Low (1) | Moderate (2) | **LOW (4)** | **NEGLIGIBLE** |
| VR 49 - Farmstead | Moderate (2) | Low (1) | Low (1) | Moderate (2) | **MODERATE (5)** | **LOW (4)** |
| VR 50 - Farmstead | Low (1) | Low (1) | Moderate (2) | Moderate (2) | **MODERATE (5)** | **MODERATE (5)** |
| VR 51 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 52 - Farmstead | >5km | Low (1) | Moderate (2) | High (3) | **NEGLIGIBLE** | **MODERATE (6)** |
| VR 55 - Farmstead | Moderate (2) | Moderate (2) | Moderate (2) | Moderate (2) | **MODERATE (6)** | **MODERATE (6)** |
| VR 56 - Farmstead | Moderate (2) | Low (1) | Low (1) | High (3) | **MODERATE (6)** | **LOW (4)** |
| VR 57 - Farmstead | >5KM | Low (1) | Moderate (2) | High (3) | **NEGLIGIBLE** | **MODERATE (6)** |
| VR 58 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 59 - Farmstead | >5KM | Low (1) | Low (1) | Moderate (2) | **NEGLIGIBLE** | **LOW (4)** |

| Receptor Location | Distance from PV Application Site | Distance from combined Power Line Assessment Corridor | Screening | Contrast | IMPACT RATING (SOLAR PV PLANT) | IMPACT RATING (POWER LINE) |
|---|---|---|---|---|---|---|
| VR 60 - Farmstead | >5KM | Low (1) | Low (1) | Moderate (2) | **NEGLIGIBLE** | **LOW (4)** |
| VR 61 - Farmstead | Low (1) | Low (1) | Low (1) | High (3) | **MODERATE (5)** | **MODERATE (5)** |
| VR 63 - Farmstead | Low (1) | >5km | Low (1) | High (3) | **MODERATE (4)** | **NEGLIGIBLE** |
| VR 64 - Farmstead | Low (1) | >5km | Low (1) | High (3) | **MODERATE (5)** | **NEGLIGIBLE** |
| VR 65 - Farmstead | Low (1) | Low (1) | Low (1) | High (3) | **MODERATE (5)** | **MODERATE (5)** |
| VR 66 - Farmstead | Low (1) | >5km | Low (1) | High (3) | **MODERATE (5)** | **NEGLIGIBLE** |
| VR 67 - Farmstead | Low (1) | Low (1) | Low (1) | High (3) | **MODERATE (5)** | **MODERATE (5)** |
| VR 68 -Farmstead | Low (1) | Low (1) | Low (1) | High (3) | **MODERATE (5)** | **MODERATE (5)** |
| VR 69 - Farmstead | Low (1) | >5km | Low (1) | High (3) | **MODERATE (5)** | **NEGLIGIBLE** |
| VR 70 - Farmstead | Low (1) | Low (1) | Moderate (2) | High (3) | **MODERATE (6)** | **MODERATE (6)** |
| VR 71 - Farmstead | Low (1) | >5km | Moderate (2) | High (3) | **MODERATE (6)** | **NEGLIGIBLE** |

Although the proposed development would theoretically be visible (to a degree) from most of the potentially sensitive visual receptor locations, none of these potentially sensitive receptor locations are expected to experience high levels of visual impact as a result of the proposed development. As indicated above, thirty-one (31) of the potentially sensitive visual receptors identified within the study area, will experience moderate levels of visual impact as a result of the proposed project and twenty-five (25) potentially sensitive receptors will experience moderate levels of impact as a result of the proposed 132kV power line. None of these receptors are tourism-related facilities, and as such they are not considered to be Sensitive Receptors. Thus the moderate impact rating assigned will not affect the overall impact ratings determined.

Twenty-seven (27) potentially sensitive visual receptors will be subjected to low levels of visual impact as a result of the proposed solar PV plant, while seventeen (17) will experience low levels of impact as a result of the 132kV power line.

### 8.11 Heritage (including Archaeology, Palaeontology and Cultural Landscapes)

The Heritage Impact Assessment (HIA) (including Archaeology, Palaeontology and Cultural Landscapes) was conducted by Wouter Fourie of PGS Heritage (Pty) Ltd. The Heritage (including Archaeology and Cultural Landscapes) and Palaeontological Impact Assessment were undertaken as standalone assessments, however, the findings of the Palaeontological Impact Assessment (PIA) were used in order to inform the HIA. The full HIA and HIA Reports dated 05 May 2021 are included in **Appendix 6D** respectively.

**It should be noted that the Heritage specialist has undertaken a detailed ground truthing walk-through in order to inform the layout which is being put forward for authorisation. No fatal flaws associated with the proposed layout were identified and therefore it was confirmed that this layout should ultimately be authorised as part of the EA (should this be granted).**

The HIA process consisted of three (3) steps, namely:

- **Step I – Literature Review:** A background research of the general history of the study area;
- **Step II – Physical Survey:** A physical survey was conducted of the application area, by a qualified archaeologist. In September 2016 and April 2021; and
- **Step III** – The final step involved the recording and documentation of relevant heritage resources, the assessment of resources in terms of the HIA criteria and report writing, as well as mapping and constructive recommendations.

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore, an Internet literature search was conducted, and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

The environmental baseline from heritage, archaeological and cultural landscape perspectives are presented below.

### *8.11.1 Historical background*

| DATE | DESCRIPTION |
|---|---|
| 2.5 million to 250,000 years ago | The Earlier Stone Age is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan, which is associated with crude flakes, and hammer stones and dates to approximately 2 million years ago. The second technological phase in the Earlier Stone Age of Southern Africa is known as the Acheulean and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe. The Acheulean phase dates back to approximately 1.5 million years ago. Prof. Revil Mason identified early Stone Age material along the banks of the Vaal River during an archaeological survey of the footprint of the Oppermansdrift Dam (Bloemhof Dam) in 1966. One (1) of the sites (Munro's Site) identified during the survey was subsequently excavated (Mason, 1969). |
| 250,000 to 40,000 years ago | The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. It is associated with flakes, points and blades manufactured by means of the prepared core technique. |
| 40,000 years ago to the historic past | The Later Stone Age is the third phase in South Africa's Stone Age history. It is associated with an abundance of very small stone artefacts (microliths). The Munro Site found by Revil Mason during his survey of the Oppermansdrift Dam (see above) also included a Later Stone Age component. The Later Stone Age is also associated with rock engravings and rock paintings. Rock engravings are known from the direct and wider vicinity of the study area (Bergh, 1998). Dr. Benjamin Smith of the Rock Art Research Institute at the University of Witwatersrand indicates that two San rock engraving sites are located on the farm Kareeboom 228 HO (Smith, 2011). This farm is located approximately 30 km West of the present study area. |
| 1500 – 1700 | This period is associated with a Late Iron group referred to as the Olifantspoort facies of the Urewe Tradition. The Olifantspoort facies originated from the Icon facies (AD1300 – 1500) and led to the Thabeng facies (AD1700 – 1840) (Huffman, 2007). The Olifantspoort facies (with the Letsibogo facies in Botswana and the Madikwe facies in the area between Makapansgat and Botswana) represents the second phase in the development of Moloko and were represented by an absence of any stonewalling. Olifantspoort pottery is characterised by "*multiple bands of fine stamping or narrow incision separated by colour*" (Huffman, 2007:193). |
| 1700 – 1820 | This period is associated with the Late Iron Age group known as the Thabeng facies of the Urewe Tradition. As indicated above this facies followed on the Olifantspoort facies as the third facies in the development of Moloko in this area. The Thabeng pottery is characterised by "*incised triangles, coloured chevrons and arcades*" (Huffman, 2007:197) whereas the settlements are stonewalled. Their layout conformed to Type Z settlements which can be described as "*...a loose circle of individual bilabial households surrounding the core...*" (Huffman, 2007:41). |
| 1795 | During this time Legassick (2010) indicates that the study area fell within the Rolong sphere of influence.<br><br>Before this time the Rolong were mainly settled south of the Vaal River. Under their leader Tau (c. 1700 – 1760) they were a strong group with a vast sphere of influence and in control of strong trade networks. However, after his death the Rolong moved northward to settle along the headwaters of the Molopo River. The period after Tau's death saw fissures develop which (after the death of Tau's son Ratlou and in turn the death of his son Seitshiro) led to the division of the once united Rolong into at least five groups, |

| DATE | DESCRIPTION |
|---|---|
| | namely the Rolong-Mariba, Rolong-Ratlou, Rolong-Tshidi, Rolong-Seleka and Rolong-Rapulana. In roughly 1790 the Rolong-Seleka, followed by the Rolong-Rapulana, left the Molopo River to settle at Thabeng near Klerksdorp (Legassick, 2010). |
| Early 1820s | During the early 1820s Burchell records the Tlhaping at Dithakong, the missionary Broadbent records the Rolong on top of the Platberg (at Thabeng) and the Kubung were associated with several localities in the Free State such as OMB1. These three groups form a South-western Sotho-Tswana cluster which can be associated with Thabeng pottery and Type Z walling (Huffman, 2007). |
| 1823 | As a result of increasing numbers of raiding groups crossing over the Vaal River from the south as part of the social dynamics of the Difaqane, the Rolong-Seleka abandoned their settlement at Thabeng and moved along the northern bank of the Vaal River in a western direction. |
| February 1823 | The Methodist Reverends Samuel Broadbent and Thomas Hodgson (with their respective families) established a mission station on the farm Leeuwfontein a short distance east of Wolmaransstad (Oberholster, 1972) and 20 km NW of the present study. The two missionaries had met Chief Sefunelo of the Rolong-Seleka on his movement away from Thabeng, and asked him to settle in this vicinity (Legassick, 2010). It is worth noting that Breutz (1955) indicates that the Rolong-Seleka was already settled here when the missionaries arrived.<br><br>It is significant to note that the Broadbent mission station was the first one to be established north of the Vaal River (Oberholster, 1972).<br><br>During 1824 Hodgson was instructed to return to Cape Town with the Reverend Archbell sent up to replace him. However, before Archbell could reach the mission station Broadbent left due to ill health. Although Hodgson rebuilt the mission station in 1826 he later abandoned it and moved to Boetsap (Oberholster, 1972). |
| January 1824 | The Taung under their leader Moletsane attacked the Rolong-Seleka of Sefonela at their settlement in the vicinity of the Broadbent mission station. This attack was believed to have been in response to an earlier attack of the Rolong-Seleka on them. The Rolong-Seleka were forced to abandon their settlement, and eventually joined to the Rolong-Ratlou and Rolong-Tshidi at Phitsane on the Molopo River (Legassick, 2010). The mission station was also destroyed during the attack. |
| c. 1827 | During this time the Taung under Moletsane crossed over the Vaal River from the south and settled along the Makwassie Stream. From here they undertook various attacks on the peripheral settlements and outposts of the Khumalo-Ndebele of Mzilikazi, who were established along the Magaliesberg Mountains further to the east (Bergh, 1998). |
| c. July 1829 | The Khumalo-Ndebele attacked the Taung along the Makwassie Stream in response to an attack, which a combined Taung, Griqua and Koranna force had made the previous year on the Ndebele. The Taung were defeated and fled to the Modder River to the south (Bergh, 1998). |
| 1839 | In 1839 the town and district of Potchefstroom were established (Bergh, 1998). This followed on the arrival of the Voortrekkers in the wider landscape during 1836.<br><br>The establishment of a Voortrekker town at Potchefstroom led to the increasing expansion of white farms toward the west. As a result, the 1840s saw the establishment of the first |

| DATE | DESCRIPTION |
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| | white farms along the Makwassie Stream. Some of the earliest farms on the eastern bank of the Makwassie Stream included Vlakfontein, Rietfontein, Zendelingsfontein and Goedvooruitzicht (Bergh, 1998). These farms are all located north of Wolmaransstad. |
| 1841 - 1850 | During this time the establishment of farms by Voortrekkers expanded from Potchefstroom and reached the Makwassie Stream (Bergh, 1998). |
| April - June 1871 | An arbitration commission held hearings in Bloemhof during this period. The commission was asked to provide an arbitrated solution to the exact position of the western boundary of the *Zuid-Afrikaansche Republiek*. It came as a result of increasing levels of disagreement and discontent between the Z.A.R. on the one hand, and the Rolong, Tlhaping and the Koranna (amongst others) on the other. The commission comprised the British magistrate at Klipdrif, John Campbell and the Z.A.R. magistrate of Wakkerstroom, A.A. O' Reilly. When the two individuals failed to reach an agreement, the Lieutenant-Governor of Natal, R.W. Keate, was asked to provide the final recommendations of the commission.<br><br>In the vicinity of the study area the Keate Award (as Keate's findings are referred to) defined the western boundary of the Z.A.R. along the Makwassie Stream (Bergh, 1998). This means that the study area now fell outside of the Z.A.R. |
| 1881 | After the end of the Anglo-Transvaal War (also referred to the First Boer War), which terminated the two-year British annexation of the Z.A.R., the Pretoria Convention of 1881 redefined the western boundary of the Z.A.R. The recommendations of the convention were largely based on the investigations undertaken by Lieutenant-Colonel C.J. Moysey who had been appointed by the British government during the previous year to investigate the Keate Award of 1871 through map surveys and field assessments. According to the recommendations of the Pretoria Convention the western boundary of the Z.A.R. was moved from the Makwassie Spruit to roughly the Harts River. In 1884 the western boundary of the Z.A.R. was again moved further west as a result of the recommendations of the London Convention (Bergh, 1998). |
| 19 August 1884 | The government of the *Zuid-Afrikaansche Republiek* (Z.A.R.) provided permission for a town to be established in the Makwassie ward. This permission came as a result of the investigations undertaken by J.M.A. Wolmarans and Commandant Piet Cronjé of Potchefstroom. Although stands for the town were already being laid out in 1888, a dispute arose as to exactly where the new town should be established. The three disputed localities for the new town were Witpoort in the east, portions of the farms Rooderand and Vlakfontein in the centre and Leeufontein in the west. When President Paul Kruger heard of the dispute he paid a visit to the area and personally viewed each of the three possibilities. Before he returned to Pretoria he decided that the town would be laid out on the western bank of the Makwassie Stream on portions of the farms Rooderand and Vlakfontein. On 16 February 1891 the town of Wolmaransstad was officially proclaimed by the government of the Z.A.R (Van Zijl, 1966). |
| 1899 – 1902 | A number of significant events can be associated with the general vicinity of the study area during the South African War.<br><br>The town of Wolmaransstad was occupied by Republican forces at the beginning of 1901 and shortly thereafter a military court known as the *Militaire Hof voor de Westelijke Districten der ZAR* was established by the Boer authorities. The reason for the establishment of an almost permanent court in the town was due to the fact that Wolmaransstad was not connected to the railway system and as a result British forces only occupied the town for short periods of time. Although the court proceedings took |

| DATE | DESCRIPTION |
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| | place under difficult circumstances due to the effect of war and numerous attacks on the town, a large number of cases were tried. Of specific interest is that the court had jurisdiction in terms of Boer forces and men in both the Z.A.R. and Free State Republic. Boer general and later prime minister of South Africa, General Jan Smuts, referred to this court as the start of a united South Africa because of its jurisdiction over international boundaries between the Boer republics. However, the British viewed the court in a completely different light and after the war numerous attempts were made to have at least some members of the court charged with war crimes (Blake, 2010).<br><br>During the war the nearby town of Wolmaransstad was attacked and occupied by the British on a number of occasions. One of these attacks took place on 5 March 1901 when a British column under Lord Methuen attacked the town. The column then turned south intending to assist the British garrison at Hoopstad. However, a skirmish developed with the local Boer commando between Wolmaransstad and the Vaal River. The British eventually managed to reach Commando Drift but found the river in flood and had to follow the bank of the river for almost 10 days before eventually reaching Fourteen Streams (Van Zijl, 1966).<br><br>Two more attacks on Wolmaransstad took place on 17 December 1901 and 28 December 1901. On 10 February 1902 Lieutenant-Colonel Von Donop occupied the town again after receiving instructions to do so from Lord Methuen. He remained in town for roughly a month (Van Zijl, 1966). |
| c. 1910 | The town of Makwassie (also known as Maquassi) was established during this time. The establishment of the town was as a result of the work undertaken by local shopkeeper Charles Cherrie. The first health committee of the town had Cherry as chairman and R. Reid, J. Lamont, H. Bloch as well as P. Quin as members. The secretary was Jack Wride (Van Zijl, 1966). |
| 1911 | The discovery and proclamation of an extensive diamond field at Mooifontein (north-west of Bloemhof) in 1911 attracted roughly 5,000 people to these diggings with other 1,200 fortune seekers setting their sights on the Bloemhof townlands. By the end of the year the two fields had yielded more than 37,000 carats, a yield that was maintained for the following two years as well (Van Onselen, 1996). |
| 1914 - 1915 | Even before the outbreak of the First World War in 1914, the Union of South Africa's responsibility to Britain in such a war was the subject of a heated debate for quite some time. With the outbreak of hostilities, the South African Government of General Louis Botha notified Britain of their willingness to assist in the war effort.<br><br>Many of the Afrikaans people found it intolerable that South Africa should assist their erstwhile enemy in her international conflicts and more so against a country with which they still had very strong ties. Subsequently many of them rose up in armed rebellion under the leadership of former Boer Generals such as Christiaan de Wet and J.C.G. Kemp. Another such a rebellion leader was Boer War Leader General Christiaan Frederik Beyers who at the time was the commander of the Union Defence Force. After resigning his post, he became one of the leaders of the rebellion.<br><br>He instructed the members of his commando that they should never be the first to shoot at government troops. As a result, he spent most of his time as rebel leader on the move to stay ahead of the government troops. Eventually his commando only comprised 25 men and they were chased without recourse from Kroonstad to the Vaal River. On the morning of 8 December 1914 government troops attacked the commando where they were camped in close vicinity to the Vaal River on the Free State farm Greyling's. In an |

| DATE | DESCRIPTION |
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| | attempt to allow their leader to escape, 23 members of the commando resisted while Beyers and Jan Pieterse tried to cross over the Vaal River on horseback. The river was however in flood and both men drowned (Van Zijl, 1966).<br><br>As the South African government did not want to allow the family of General Beyers to bury him in Makwassie, he was buried in the Van Zijl family cemetery on the farm Oersonskraal 207 HO directly east of present-day Makwassie. Pieterse was buried on the Free State side of the river (Möller, n.d.).<br><br>Van Onselen (1996) indicates that on 1 November 1914 a skirmish took place between rebels under the command of P.J.K. van Vuuren and government troops on the farm Zoutpan 212 HO. Another skirmish took place shortly thereafter at the railway siding by the name of Kingswood. |
| October 1918 | The Influenza Pandemic reached the general vicinity of the study area during this time. In his book *The Seed of Mine* Dr. Charles van Onselen (1996) relates how the crowded and unsanitary diamond diggings dotted across the wider landscape, resulted in large numbers of fatalities. At the diggings on the farms Kameelkuil 88 HO and London 112 hundreds of people died. One eyewitness account reveals how dozens of corpses were buried in mass graves near these diggings. As people starting leaving the diggings out of fear of getting infected, they brought the disease to their homesteads, villages and farms. Many of these returning workers also died along the roads on their way home and were often buried where they died. The farms themselves were also not immune to the disease and many people died as a result of it on the farms as well (Van Onselen, 1996). |
| 1920 | The Town Leeudoringstad was established. |
| 1922 | The diamond diggings in the wider vicinity were expanded in 1922 with the proclamation of Kareepoort 210 HO (with a number of other farms in the district which appears to have included Oersonskraal, Boskuil and Kareepan) as alluvial diggings. Thousands of white and black unemployed flocked to these diggings. On the farm Kareepoort a number of informal 'locations' comprising clusters of makeshift shanties and cabins sprung up. These included Fly Camp, Velskoen, Vuilkantien and Rooistad (Van Onselen, 1996). |
| 1925 | The northern portion of the farm Oersonskraal 250 HO was proclaimed an alluvial diggings (URU, 767, 2348). |
| 1932 | 17 July 1932 when a train carrying 320 to 330 tons of dynamite from the De Beers factory at Somerset West to the Witwatersrand exploded and flattened the town of Leeudoringstad. |
| 1940 | The ruins of the mission station, which had been established, by Broadbent and Hodgson was proclaimed a Historical Monument (Bergh, 1998). |

#### *8.11.2 Site Sensitivity - Notice 648 of the Government Gazette 45421*

Although minimum standard for archaeological and palaeontological assessments[23] were published by SAHRA and Heritage Western Cape[24 and 25], Government Notice 648 requires sensitivity verification for a site selected on the national web based environmental screening tool for which no specific assessment protocol related to any theme has been identified.

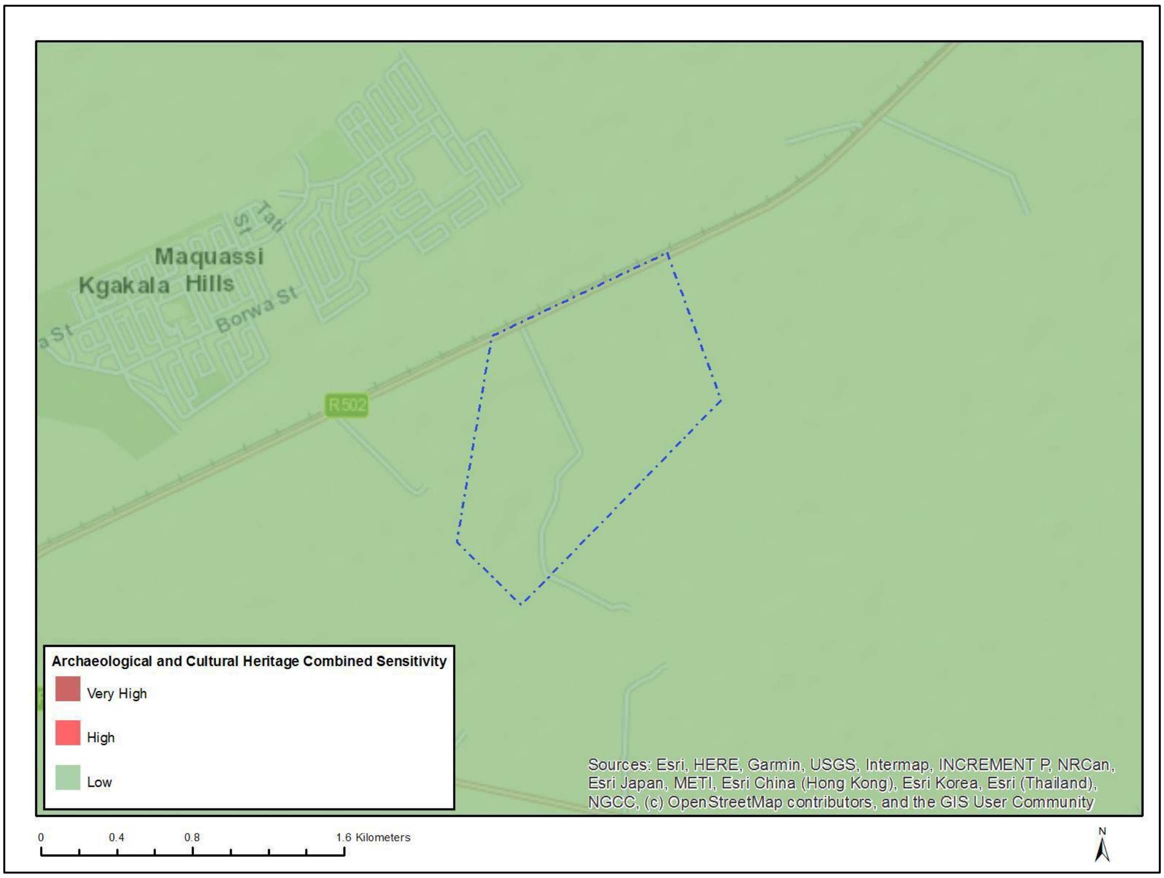
An assessment of the Environmental Screening tool provides sensitivity ratings for archaeological and cultural heritage as low (**Figure 46**) and for palaeontological resources medium (**Figure 47**). These ratings are however incorrect for the palaeontological resources and is assessed as having a low sensitivity as assessed by Butler (2021). The archaeological and cultural heritage rating varies between high for the burial ground identified and low for various structures having a low heritage significance rating.

Confirming again, as with other HIA conducted, that the screening tools for palaeontology, archaeology and cultural heritage resources only applies more accurately to regional assessments. The absence of a detailed regional and national heritage database, as explained in section 6.2 of the HIA Report (**Appendix 6D**), shows the accuracy of the Environmental Screening tool as lacking for site specific assessments.

[23] South African Heritage Resources Agency. 2007. *Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports.* May 2007

[24] Heritage Western Cape. 2016. *Guide for Minimum Standards for Archaeology and Palaeontology Reports Submitted to Heritage Western Cape.* June 2016

[25] Heritage Western Cape. 2016. *Guidelines for Heritage Impact Assessments required in terms of Section 38 of the National Heritage Resources Act (Act 25 of 1999)*



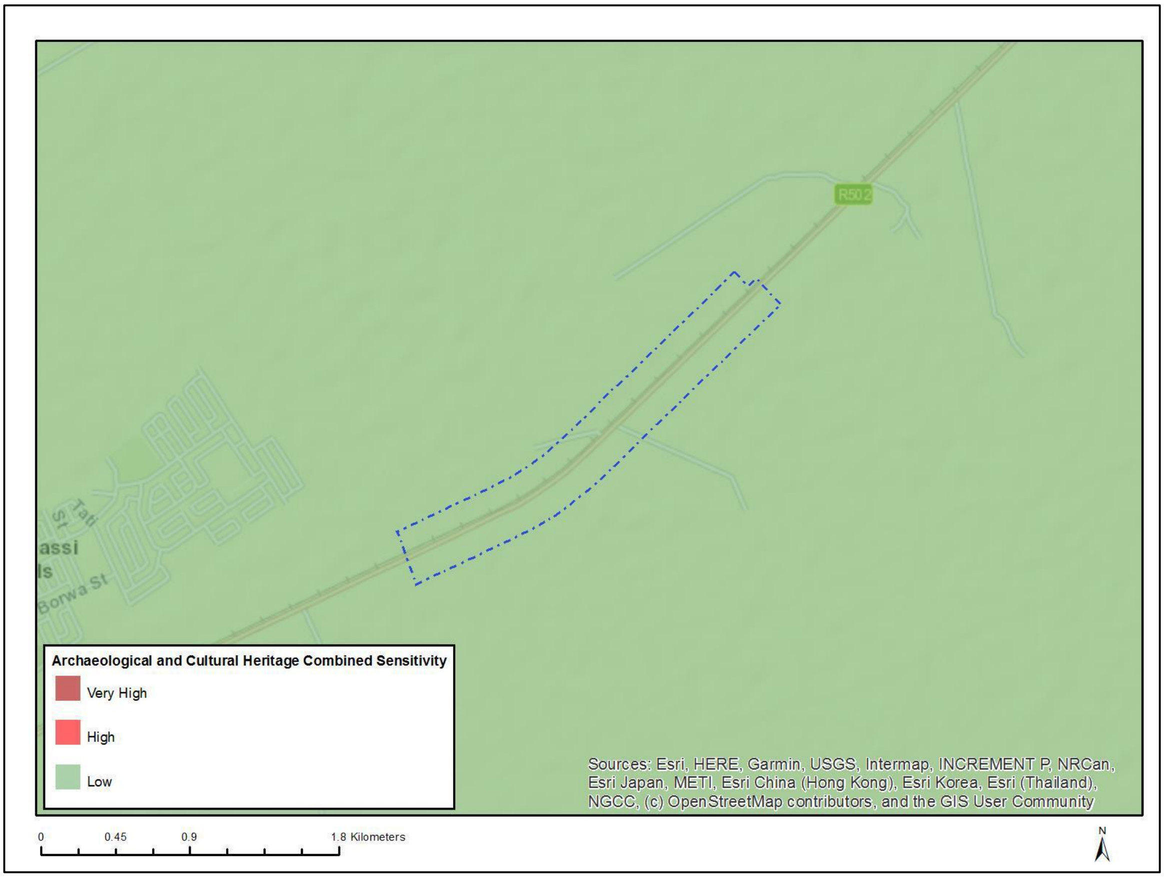
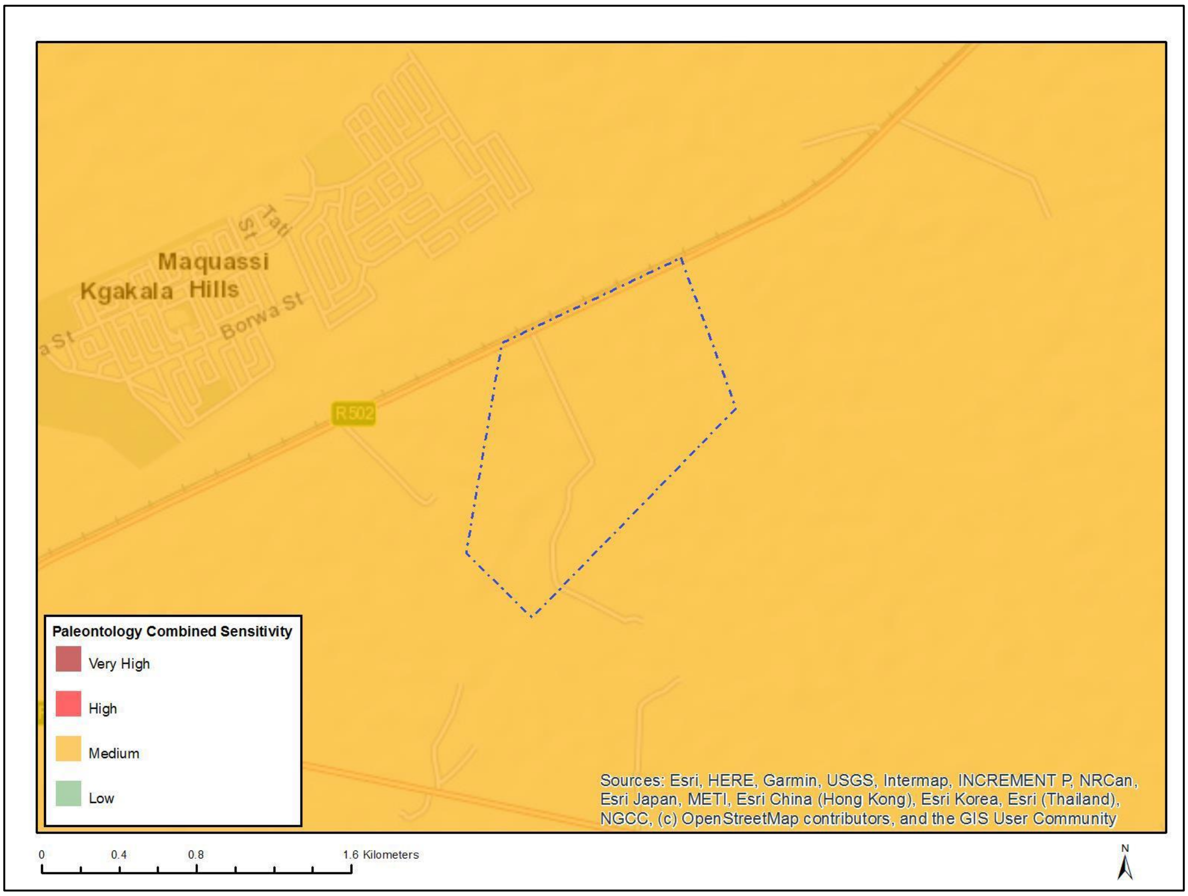




**Figure 46:** Environmental screening tool - archaeological and cultural heritage sensitivity



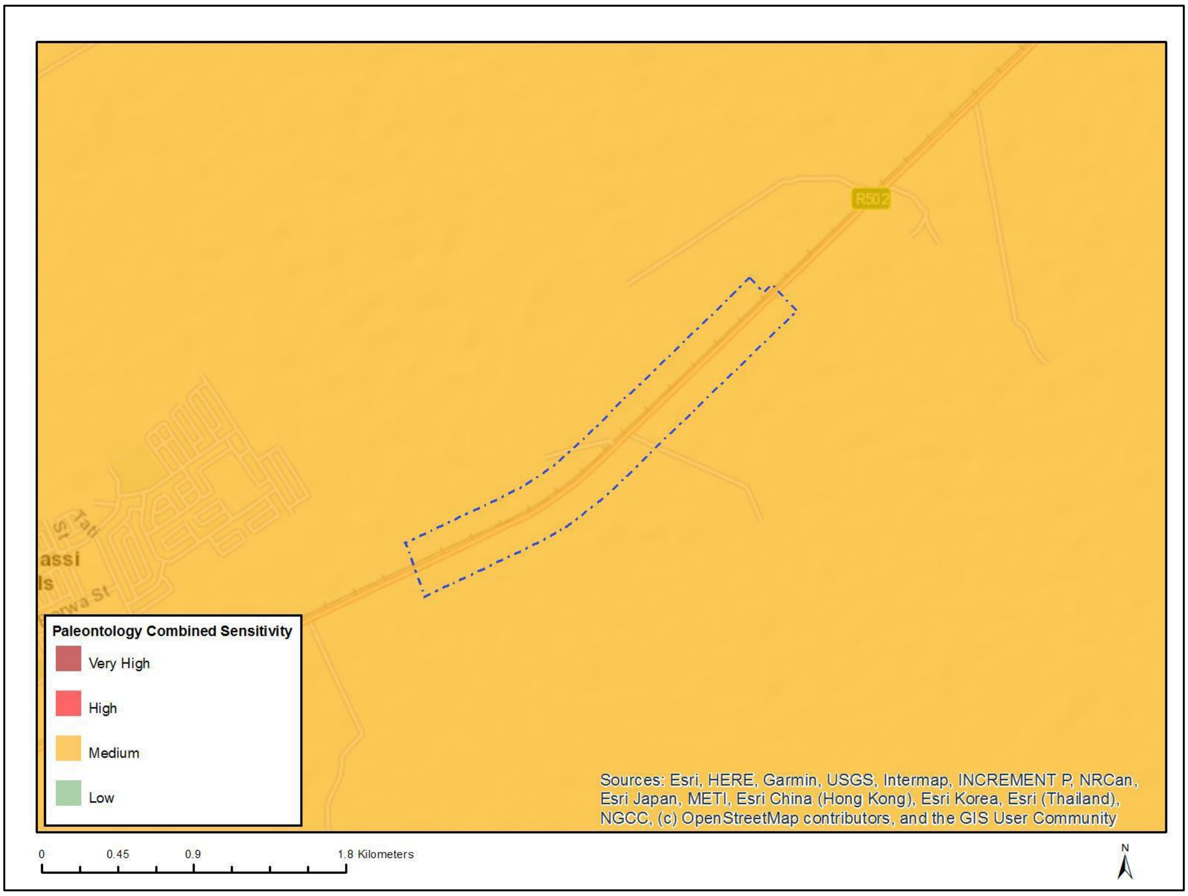




**Figure 47:** Environmental screening tool - palaeontology sensitivity

*8.11.3 Specialist Findings*

A selective survey of the study area was conducted on 13 September 2016 and 23 April 2021. Due to the nature of cultural remains, with most artefacts occurring below surface, an archaeologist from PGS conducted a vehicle and foot-survey that covered the study area. The fieldwork was logged with a GPS to provide a tracklog of the area covered (**Figure 48**).

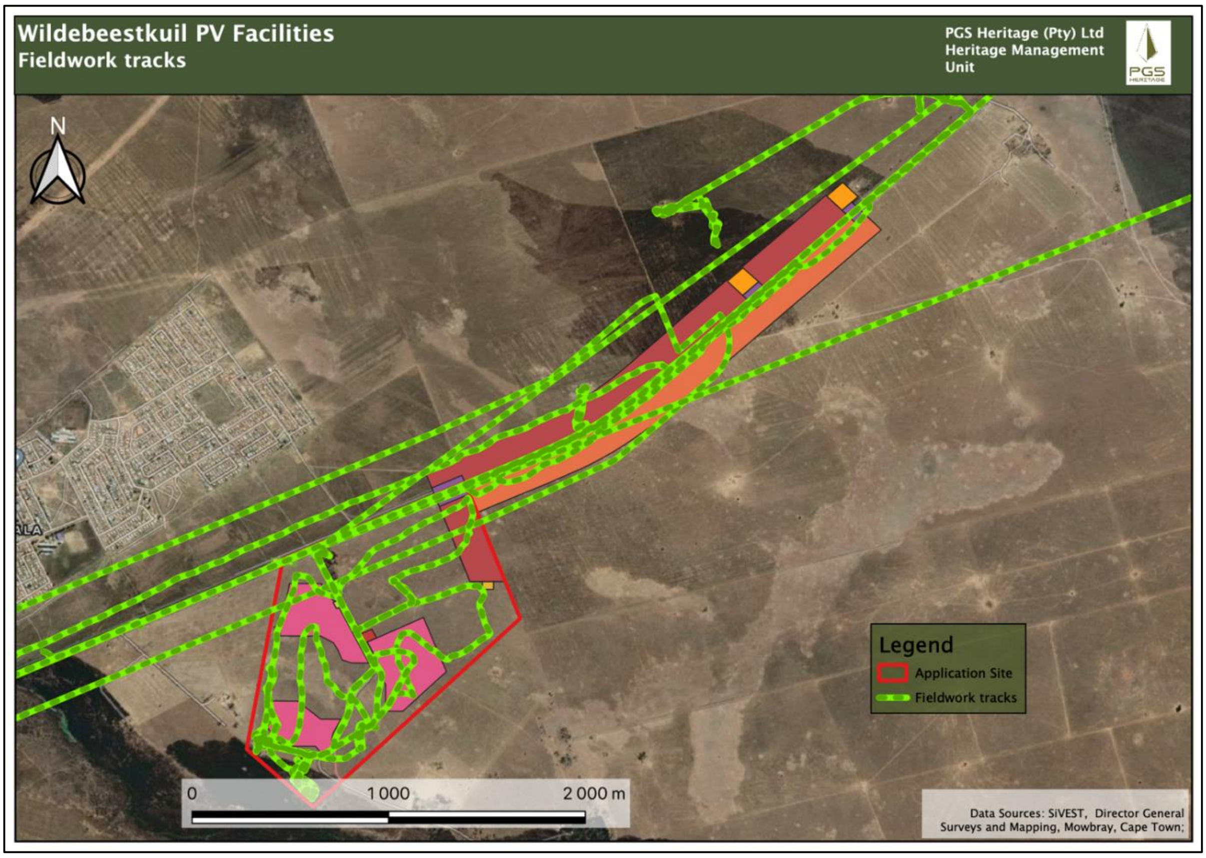



**Figure 48:** Track logs showing analysis of study area

The proposed site is generally flat. The northern section of the study area is severely degraded due to sand quarrying activities. Vegetation on the site is predominantly grassland currently utilized for grazing, as shown in **Figure 49** and **Figure 50** below.

**Figure 49:** View of north east section of site

**Figure 50:** View of south-western section of the site

The fieldwork identified seven (7) heritage resources and one (1) wind pump and cement dam. None of the identified resources fall within the footprint areas of the proposed solar PV plant. The fieldwork related to the proposed power line corridor alternatives identified no heritage resources.

Heritage resources identified within the footprint areas of the proposed solar PV plant and proposed power line corridor alternatives are shown in **Figure 51** and **Figure 52** below.

**Table 20** below provides a description of the heritage resources identified in the study area.

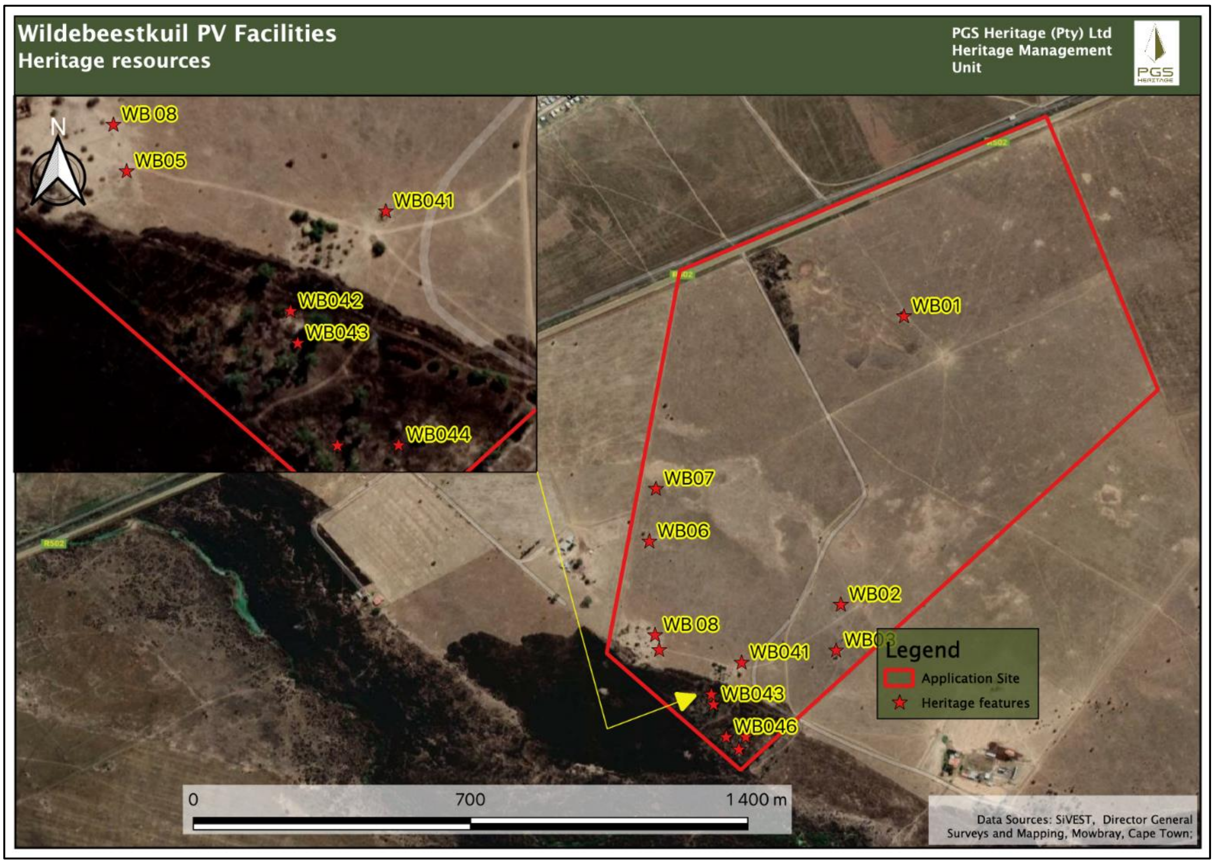



**Figure 51**: Heritage features identified within application site for Wildebeestkuil 2 Solar PV Plant

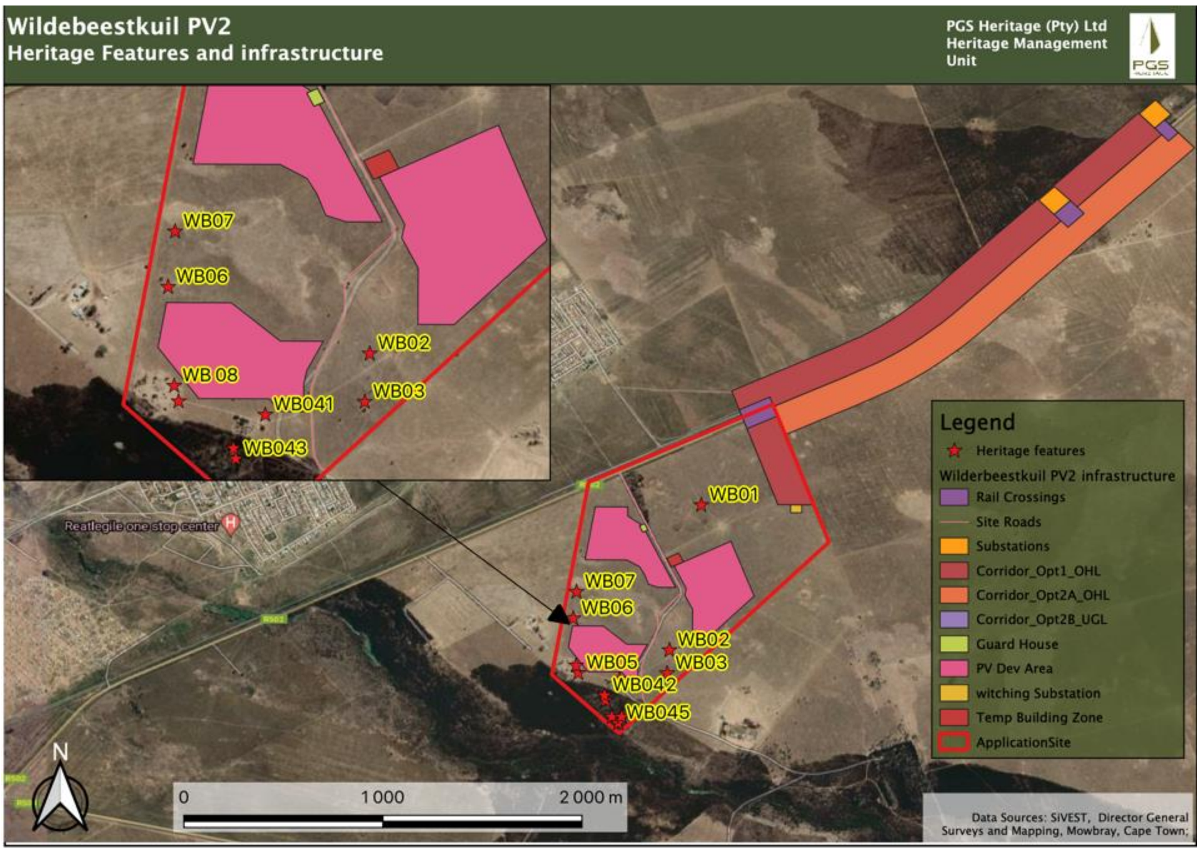



**Figure 52:** Heritage resources in relation to the Wildebeestkuil 2 Solar PV Plant & 132kV Power Line infrastructure

**Table 20:** Heritage resources identified in study area

| Site Number | Lat | Lon | Type Find | Description | Significance | Heritage Rating |
|---|---|---|---|---|---|---|
| WB01 | S27.22157° | E26.28659° | Recent historic structure | The wind pump and cement dam is situated in the north eastern section of the study area<br><br>The resource is graded as of low local heritage significance.<br><br>Nor further mitigation required. | Low | NCW |
| <br>**Landscape and wind pump at WB01** | | | | | | |
| WB02<br>WB03<br>WB06<br>WB07 | S27.22811°<br>S27.22915°<br>S27.22668°<br>S27.22548° | E26.28516°<br>E26.28505°<br>E26.28082°<br>E26.28096° | Heritage Resource | The four (4) structures identified are all the remains of single room dwellings. The square single stone packed foundations which remain, identified both structures. The structures were most probably labourer cottages.<br><br>The structures in themselves are of low heritage significance, but the possibility of infant burials close to or in the remaining foundations as per | Medium | IIIC |

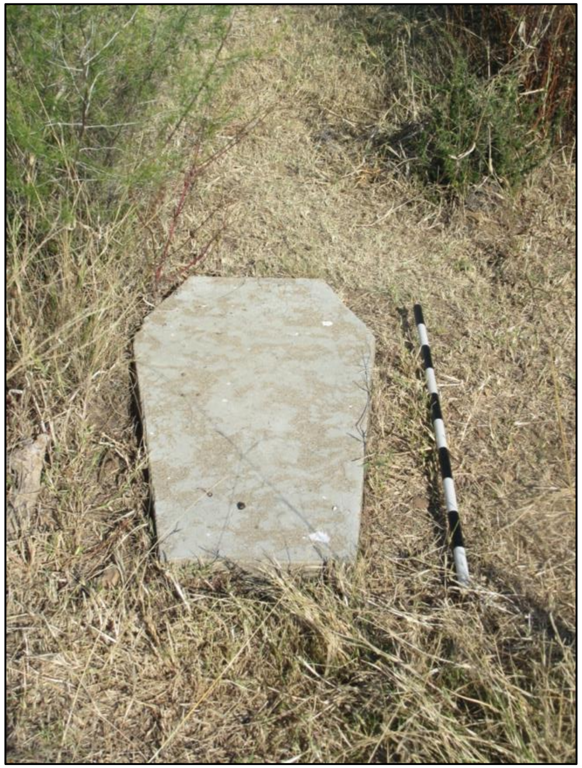
| Site Number | Lat | Lon | Type Find | Description | Significance | Heritage Rating |
|---|---|---|---|---|---|---|
| | | | | African custom cannot be excluded. The resources are graded as having medium local heritage significance.<br><br>It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated.<br><br>It is further recommended that an archaeologist monitor the earth moving activities during construction. | | |
| <br>**View of WB02** | | | <br>**View of WB03** | <br>**View of WB06** | <br>**View of WB07** | |
| WB04.1<br>WB04.2<br>WB04.3<br>WB04.4<br>WB04.5<br>WB04.6 | S27.22943°<br>S27.23015°<br>S27.23038°<br>S27.23111°<br>S27.23140°<br>S27.23112° | E26.28291°<br>E26.28222°<br>E26.28227°<br>E26.28300°<br>E26.28284°<br>E26.28256° | Heritage Resource | The concentration of structures is distributed of an area of 200x200 meters in the southern section of the study area. The structures are the remains of a farmstead that consisted of; a small stone kraal (WB04.1), a wind pump, dam and kraal (WB04.2), a mains dwelling with two rooms constructed with stone (WB04.3), a second dwelling that was constructed with cement bricks and two (2) ash middens (WB04.5 and 6). All these structures are totally ruined with only a few minimal foundations stones surviving.<br><br>The farmstead is graded as of low local heritage significance and graded 4C. | Low | IIIC |

| Site Number | Lat | Lon | Type Find | Description | Significance | Heritage Rating |
|---|---|---|---|---|---|---|
|  **View of WB04.1** | | |  **View of WB04.2** |  **View of WB04.3** |  **View of WB04.4** | |
| WB05 | S27.22914° | E26.28104° | Heritage Resource | The heritage resource consists of a farmstead situated on the western boundary of the property. The main dwelling is a multi-roomed ruined structure. The walls of the dwelling are still at roof height. The original core of the house was built with backed mud bricks with mud floors. Later additions were done with fired clay brick and the floors were cement. The veranda and main entrance of the house faces north. All window and doorframes are removed.<br><br>The rest of the farmstead consist of a brick constructed grain silo, watering furrow and what seem to have been a stone built structure. Possibly an original dwelling of the farmstead.<br><br>The site is older than 60 years and protected under section 34 of the NHRA. It is recommended that the site and structures be documented by means of a layout drawing and photographic documentation after which a destruction permit must be applied for from the North West Provincial Heritage Authority prior to destruction. | Medium | IIIC |

<table>
<tr><th>Site Number</th><th>Lat</th><th>Lon</th><th>Type Find</th><th>Description</th><th>Significance</th><th>Heritage Rating</th></tr>
<tr><td colspan="4"><br>**View of farmstead at WB05**</td><td colspan="3"><br>**Veranda of main house at WB05**<br><br>**Mud brick internal walls of main house**</td></tr>
<tr><td colspan="4"><br>**Cement brick additions WB05**</td><td colspan="3"><br>**Watering furrows**<br><br>**Silo with overgrown structure in foreground**</td></tr>
<tr><td>WB08</td><td>-27.228803</td><td>26.280944</td><td>Heritage Resource</td><td>The heritage resource consists of a burial ground. There are four (4) children's graves all with cement dressings located here.</td><td>High</td><td>IIIA</td></tr>
</table>

| Site Number | Lat | Lon | Type Find | Description | Significance | Heritage Rating |
|---|---|---|---|---|---|---|
| | | | | The resource is protected under section 36 of the NHRA and it is recommended that the burial ground is protected and managed in situ with a 3o meter buffer as per SAHRA policies. | | |


**View of burial ground at WB08**


**One (1) of the cement grave dressings at WB08**


**One (1) of the cement grave dressings at WB08**

## 8.12 Palaeontology

The Desktop PIA was conducted by Elize Butler of Banzai Environmental (Pty) Ltd. The HIA (including Archaeology and Cultural Landscapes) and PIA were undertaken as standalone assessments, however, the findings of the PIA were used in order to inform the HIA. The full PIA Report dated 05 May 2021 is included in **Appendix 6D**. The PIA consisted of a desktop assessment. The objective of the PIA was to determine the impact of the development on potential palaeontological material at the site.

The development footprint is underlain by the Allanridge Formation (Ventersdorp Supergroup) (**Figure 53**). The Ventersdorp Supergroup characterise a major occurrence of igneous extrusion that is associated with fracturing of the Kaapvaal Craton approximately 2.7 Ga (billion years) ago. At the top of the Ventersdorp succession are the greyish-green amydaloidal and porphyritic lavas, mainly basaltic andesites, of the Allanridge Formation. The Late Archaean Allanridge succession is almost entirely composed of resistant-weathering, dark green lavas and associated pyroclastic rocks (Van der Westhuizen and De Bruiyn, 2006).

The ancient basement rocks, including the **Allanridge Formation, are not known to be fossiliferous.**

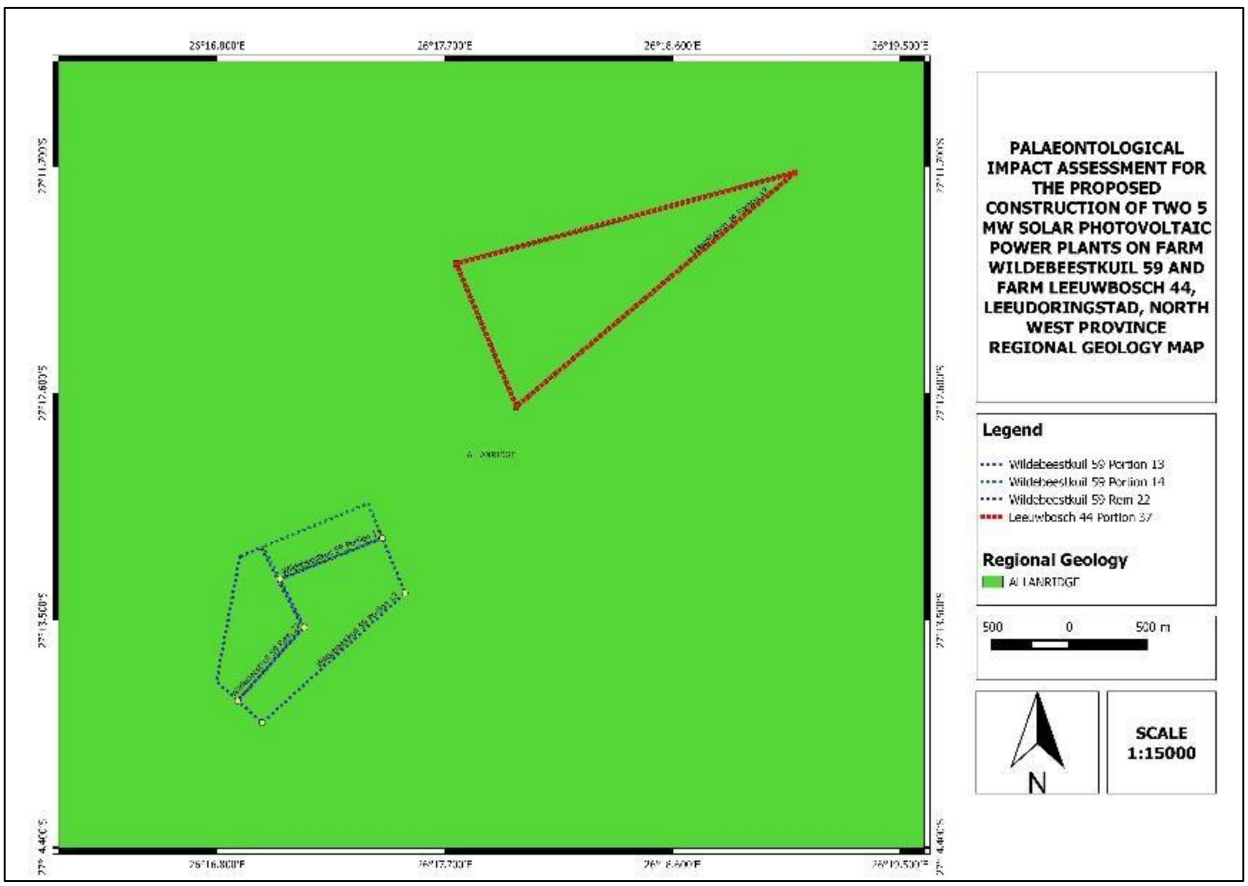



**Figure 53:** The surface geology of the proposed two (2) 9.9MW Solar Photovoltaic power plants on farm Wildebeestkuil 59 and farm Leeuwbosch 44, Leeudoringstad, Maquassi Hills Local Municipality, North West Province (Wildebeestkuil in black, power line corridor in red)

## 8.13 Social

The Desktop Socio-Economic Impact Assessment was conducted by Tsebo Majoro of Urban Econ Development Economists. The full Desktop Social Impact Assessment Report is included in **Appendix 6E**. The Socio-Economic Impact Assessment was undertaken via desktop means. The findings are detailed in the initial report compiled in July 2020 which was subsequently amended in September 2020 (**Appendix 6E**).

The environmental baseline from a social perspective is presented below.

### *8.13.1 Baseline information*

This chapter examines key socio-economic characteristics of the study area, as per delineation provided. This is essential as it provides both qualitative and quantitative data related to the communities and economies under observation, creating a baseline against which the impacts can be assessed.

### *8.13.2 Study Area's Composition and Locational Factors*

The closest town is Leeudoringstad, which is approximately 4km east from the application site which forms part of the solar PV plant (namely Portion 13, Portion 14 and Remainder of Portion 22 of the Farm Wildebeestkuil No. 59). The closest residential area is a township called Kgakala.

It may be classified as the local community for this project. According to the ward councillor, the main socio-economic issues in Kgakala are unemployment and crime. Furthermore, service delivery is a major municipal limitation. The proposed project is supported by both the local authority and ward councillor.

The project site may be accessed from the R502, parallel to which the Leeubos Railway line is located. The surrounding land uses consist of commercial farming, mining and residential. The closest tourist destination is the Wolwespruit Nature Reserve, 21km south-west from the project area. Lastly the project site is in close proximity to the boundary separating the Free State Province from the North West Province.

### *8.13.3 Demographic Profile*

The population of any geographical area is the basis of the development process, as it affects all areas of human activity. Demography serves as an indicator of trends, which assists in understanding population dynamics. This numerical profile is essential in gaining an accurate perspective of those who are likely to be affected by any prospective development or project.

The population of Maquassi Hills Local Municipality is estimated to be 96 042 in 2020 and constitutes 11.6% of the Dr Kenneth Kaunda District Municipality and only 2.4% of the North West Province's population (Urban-Econ calculations based on Quantec 2020). Evidently, the Maquassi Hills LM, from a provincial and district context, houses a relatively small population. The average growth rate over the past ten years has been 2.3%, which is slightly above the national and provincial growth rates by 1.4% and 1.6%, respectively (Urban-Econ calculations based on Quantec 2020). A recorded 26 941 households resided in the Maquassi Hills LM in 2020 and thus comprise of 2% of all households in the Province. This indicates a significantly small residential footprint from a provincial level. The average household size in the LM is 3.9; whereas the average provincial household size is 3.4 (Quantec, 2020). Thus, the household size in Maquassi LM is higher than that of the province.

Approximately 59 065 residents of the Maquassi LM's population are between the ages of 15 and 64 and therefore comprise of the working age population (Quantec, 2020). This makes up 61.5% of the LM's population. In terms of gender distribution, there is a 1% difference between males and females with males dominating.

#### *8.13.4 Economy*

The structure of the economy and the composition of its employment provide valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector is also important for the economic impact results' interpretation, as it allows the assessment of the extent to which the proposed activity would change the economy, its structure, and trends of specific sectors.

The economy of Maquassi Hills LM was valued at R3 515,9 million in current prices. The tertiary sector accounts for 65% of the LM's Gross Domestic Product (GDP), followed by the primary sector and secondary sector with 21% and 14% contributions, respectively (Quantec, 2020). The general government sector particularly contributes close to a fifth (19.06%) of the local economy's production. The second largest contributing sector is the wholesale and retail trade with a contribution of R549 million in current prices.

Based on constant 2005 prices, the Maquassi Hills LM grew at a relatively small rate of 0.51% CAGR over the ten-year period spanning 2010-2020. The growth was driven by the increasing performance of the trade sector at which grew by 7.2% over the same period. Other sectors that contributed to the growth over the same ten-year period included the agriculture sector at 7.1% and the community, social and personal services with 6.6% (Quantec, 2020). However, the growth of the above-mentioned sectors was offset by the decline observed in the other industries, resulting in a notably lower performance of the economy over the years.

#### *8.13.5 Labour Force and Employment Structure*

Employment is the primary means by which working age individuals may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being.

A significant proportion (61.5%) of the population of the Maquassi Hills LM is of working age (Quantec, 2020). However, only close to one-third of this population is employed. The Maquassi Hills LM employment figure represents only 2% of the provincial employment figure due to the fact that it holds only 2.4% of the province's population (Quantec, 202). Thus, from a local level, the 66.1% unemployment rate is massive; however, from a provincial scale it is relatively minor.

Information suggests that 16 113 people are absorbed in the formal sector and 4 588 work in the informal sector. The formal sector thus, has over three times the number of employees than the informal sector. In the formal sector, semi-skilled workers dominate with 7 235, followed by unskilled workers with 6 268 and lastly, there are 2 610 skilled workers (Stats SA, 2020). The skill levels are, therefore, low in the Local Municipality.

The economic sectors with the highest proportion of employees on the local scale are Agriculture with a quarter of all employed individuals. This is followed by the Community, Social and Personal Services sector with 3 722 employees and the Wholesale and Trade sector with 3 334 employees.

### *8.13.6 Income*

Income is a commonly used proxy for measuring poverty. A poverty line is a minimum threshold that is required by a household to meet its basic needs. Income analysis is imperative as it serves as an indicator of the standard of living of the population of the study area concerned.

According to the 2011 National Census, the weighted average household income in the Maquassi Hills LM was R4 836 in basic prices. About 2 973 or 14.5% of the LM's households had no regular income in 2011 (Stats SA, 2020). In total 77.2% of LM's households are surviving on an income less than R3 200 per month in current prices (Stats SA, 2020). One (1) fifth (20.6%) of the population are in the middle-income category. In this light, the LM can be considered as dominantly relatively poor. This status can be attributed to the education levels of the LM.

Just over a fifth of the population aged over 20 in the LM have no schooling, 18.5% have acquired a matric qualification, and 4.8% have acquired a higher education qualification. On the provincial level, 11.6% of the population aged over 20 do not have schooling, whilst a quarter have acquired a matric and 7.5% have acquired a higher education qualification (Quantec, 2020). From this, it can be deduced that the education levels are low and less than a quarter of the population over 20 have successfully completed formal schooling.

### *8.13.7 Access to Electricity*

The introduction of new solar PV and power line developments in the Maquassi Hills LM region will have an impact on the local household's access to electricity, if the municipality purchases electricity directly from the SPV. An analysis of the types of electricity usage in the Maquassi Hills LM will indicate the number of households that may utilise additionally generated electricity.

An estimated 26 557 households had access to the electricity grid in 2020, while 2 141 households had no access to electricity. In accordance with the North West Provincial Development Plan (2013) target of 95% of households with access to the electricity grid, the Maquassi Hills LM falls short by approximately 2,6%.

In order to reach the goals of the North West Provincial Development Plan, additional energy generators are required to increase electricity supply, which would therefore improve the affordability in the long run, due to a decrease in rea prices.

### *8.13.8 Profile of the Zone of Influence*

Various activities have been identified within the zone of influence (a 3km radius from the proposed project area). Most of the land is underutilised, however scattered commercial farming takes place. There are eight (8) built structures identified to be located in the zone of influence, which are mainly farmhouses. In addition, a portion of the Kgakala Township is located within the zone of influence.

In total, 20 farm portions are identified to be located within the zone of influence. In order to collect information on the current land uses and socio-economic profile of each of these farms portions, both visual observation and interviews were employed. The table below (**Table 21**) summarises the information collected. It is important to note that no concerns were raised during the interviews with the potentially affected parties.

**Table 21:** Affected Farms Information

| Farm Portions | Area (Ha) | Impact nature | Land use | Presence of residence |
|---|---|---|---|---|
| **Portion 13 Farm Wildebeestkuil 59** | 120 | 9,9MW Solar PV Plant Footprint | Commercial Farming. Livestock Farming. | 4 farm structures and residences |
| **Portion 14 of the Farm Wildebeestkuil No. 59;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Remainder of Portion 5 of the Farm Wildebeestkuil No. 59;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Remainder of Portion 7 of the Farm Leeuwbosch No. 44;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Remainder of Portion 29 of the Farm Leeuwbosch No. 44;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Remainder of Portion 22 of the Farm Wildebeestkuil No. 59;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Portion 35 of the Farm Leeuwbosch No. 44;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Portion 36 of the Farm Leeuwbosch No. 44;** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Portion 37 of the Farm Leeuwbosch No. 44; and** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Portion 38 of the Farm Leeuwbosch No. 44.** | | Potential Power Line Corridor | Commercial Farming. Livestock Farming. | N/A |
| **Farm portions located further away from the project site** | | | | |
| **Portion 47 Farm Leeuwbosch 44** | 642 | Visual but further away from site | Commercial Farming | None |
| **Remainder of Portion 5 Farm Leeuwbosch 44** | 333 | Visual but away from site | Commercial Farming | None |
| **Portion 21 Leeuwbosch 44** | 924 | Visual but away from site | Commercial Farming | None |
| **Portion 36 Farm Leeuwbosch 44** | 200 | Visual but away from site | Commercial Farming | None |
| **Remainder of Portion 29 Farm Leeuwbosch 44** | 618 | Visual and opposite site | Commercial Farming | None |
| **Portion 13 Farm Leeuwbosch 44** | 644 | Visual but further away from site | Commercial Farming | None |
| **Portion 14 Farm 59** | 172 | Visual but away from site | Commercial Farming | None |
| **Portion 13 Farm Leeuwbosch 44** | 219 | Visual but further away from site | Commercial Farming | None |
| **Portion 26 Farm Leeuwbosch 44** | 128 | Visual but away from site | Commercial Farming | None |
| **Portion 27 Farm Leeuwbosch 44** | 128 | Visual but further away from site | Commercial Farming | None |
| **Kgakala** | 200 | Visual but away from site | Medium density Residential area | 2369 households |

Source: Based on interviews, Google Earth map observations and spatial data from Chief Surveyor-General website (csg.dla.gov.za)

# 9 ENVIRONMENTAL IMPACT ASSESSMENT

## 9.1 Methodology for Assessing Impacts

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment while allowing for comparison between different impacts based on the same criteria. Determining the significance of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact.

### *9.1.1 Determination of Significance of Impacts*

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 22** below.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

### *9.1.2 Impact Rating System*

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning or pre-construction;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts has also been rated as reported in **section 9.4**.

#### *9.1.2.1 Rating System Used to Classify Impacts*

SiVEST developed a uniform rating system to enable comparison between impacts. The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue, the following criteria (including an allocated point system) is used:

**Table 22:** Rating of Impacts Criteria

| **ENVIRONMENTAL PARAMETER** |
|---|
| A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water). |

| | | |
|---|---|---|
| **ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE** | | |
| Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water feature). | | |
| **EXTENT (E)** | | |
| This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined. | | |
| 1 | Site | The impact will only affect the site |
| 2 | Local / district | Will affect the local area or district |
| 3 | Province / region | Will affect the entire province or region |
| 4 | International and National | Will affect the entire country |
| **PROBABILITY (P)** | | |
| This describes the chance of occurrence of an impact | | |
| 1 | Unlikely | The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence). |
| 2 | Possible | The impact may occur (Between a 25% to 50% chance of occurrence). |
| 3 | Probable | The impact will likely occur (Between a 50% to 75% chance of occurrence). |
| 4 | Definite | Impact will certainly occur (Greater than a 75% chance of occurrence). |
| **REVERSIBILITY (R)** | | |
| This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity. | | |
| 1 | Completely reversible | The impact is reversible with implementation of minor mitigation measures |
| 2 | Partly reversible | The impact is partly reversible but more intense mitigation measures are required. |
| 3 | Barely reversible | The impact is unlikely to be reversed even with intense mitigation measures. |
| 4 | Irreversible | The impact is irreversible, and no mitigation measures exist. |
| **IRREPLACEABLE LOSS OF RESOURCES (L)** | | |
| This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity. | | |
| 1 | No loss of resource. | The impact will not result in the loss of any resources. |
| 2 | Marginal loss of resource | The impact will result in marginal loss of resources. |
| 3 | Significant loss of resources | The impact will result in significant loss of resources. |
| 4 | Complete loss of resources | The impact is result in a complete loss of all resources. |
| **DURATION (D)** | | |
| This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity. | | |
| 1 | Short term | The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years). |

| | | |
|---|---|---|
| 2 | Medium term | The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years). |
| 3 | Long term | The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years). |
| 4 | Permanent | The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite). |
| **INTENSITY / MAGNITUDE (I / M)** | | |
| Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily). | | |
| 1 | Low | Impact affects the quality, use and integrity of the system / component in a way that is barely perceptible. |
| 2 | Medium | Impact alters the quality, use and integrity of the system/component but system / component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity). |
| 3 | High | Impact affects the continued viability of the system / component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation. |
| 4 | Very high | Impact affects the continued viability of the system / component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible, rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation. |
| **SIGNIFICANCE (S)** | | |
| Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:<br><br>**Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude / intensity.**<br><br>The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude / intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating. | | |
| **Points** | **Impact Significance Rating** | **Description** |
| 5 to 23 | Negative Low impact | The anticipated impact will have negligible negative effects and will require little to no mitigation. |
| 5 to 23 | Positive Low impact | The anticipated impact will have minor positive effects. |
| 24 to 42 | Negative Medium impact | The anticipated impact will have moderate negative effects and will require moderate mitigation measures. |
| 24 to 42 | Positive Medium impact | The anticipated impact will have moderate positive effects. |

| | | |
|---|---|---|
| 43 to 61 | Negative High impact | The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact. |
| 43 to 61 | Positive High impact | The anticipated impact will have significant positive effects. |
| 62 to 80 | Negative Very high impact | The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws". |
| 62 to 80 | Positive Very high impact | The anticipated impact will have highly significant positive effects. |

SiVEST's Impact Rating Methodology which was used to assess the potential impacts is set-out in detail in **Appendix 9C**.

## 9.2 Environmental Impact Assessment

Specialist studies have been conducted in terms of the stipulations contained within Appendix 6 of the EIA Regulations, 2014 (as amended). In addition, the relevant specialist Protocols as published in Government Notice No. 648 of 10 May 2019 were also followed, where required (https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols).

The following specialist assessments were conducted as part of the BA process in order to identify and assess the issues associated with the proposed development:

- Agricultural and Soils Compliance Statement[26];
- Surface Water Impact Assessment[27];
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Heritage Impact Assessment (including Palaeontology, Archaeology & Cultural Landscape);
- Palaeontological Impact Assessment;
- Desktop Social Impact Assessment;
- Desktop Geotechnical Impact Assessment;
- Terrestrial Ecology Impact Assessment[28]; and
- Visual Impact Assessment.

These above-mentioned specialist assessments have been undertaken to identify and assess issues. These assessments were also undertaken to inform the impact assessment of the proposed development. It should be noted that the specialists assessed the entire application site and power line corridor alternatives as part of their respective assessments, and also focused on specific impacts of the proposed PV development area and solar PV plant and power line infrastructure in detail.

The identified impacts are elaborated on in the sub-sections below.

[26] Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources for a site identified by the national web based environmental screening tool as being of 'medium' or 'low' sensitivity for agricultural resources, gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

[27] Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

[28] Protocol for the assessment and reporting of environmental impacts on terrestrial biodiversity gazetted on 20 March 2020 (Sections 24(5)(A) and (H) and 44 of NEMA, 1998)

### *9.2.1 Terrestrial Ecology Impacts*

The Terrestrial Ecology Impact Assessment was conducted by Dr David Hoare (David Hoare Consulting) and is included as **Appendix 6G**.

Potential issues relevant to impacts on the ecology of the study area include the following:

- Impacts on biodiversity: this includes any impacts on populations of individual species of concern (flora and fauna), including protected species, and on overall species richness. This includes impacts on genetic variability, population dynamics, overall species existence or health and on habitats important for species of concern.
- Impacts on sensitive habitats: this includes impacts on any sensitive or protected habitats, including indigenous grassland and wetland vegetation that leads to direct or indirect loss of such habitat.
- Impacts on ecosystem function: this includes impacts on any processes or factors that maintain ecosystem health and character, including the following:
  - disruption to nutrient-flow dynamics;
  - impedance of movement of material or water;
  - habitat fragmentation;
  - changes to abiotic environmental conditions;
  - changes to disturbance regimes, e.g., increased or decreased incidence of fire;
  - changes to successional processes;
  - effects on pollinators;
  - increased invasion by alien plants.

Changes to factors such as these may lead to a reduction in the resilience of plant communities and ecosystems or loss or change in ecosystem function.

- Secondary and cumulative impacts on ecology: this includes an assessment of the impacts of the proposed projects taken in combination with the impacts of other known projects for the area or secondary impacts that may arise from changes in the social, economic or ecological environment.
- Impacts on the economic use of vegetation: this includes any impacts that affect the productivity or function of ecosystems in such a way as to reduce the economic value to users, e.g., reduction in grazing capacity, loss of harvestable products. It is a general consideration of the impact of a project on the supply of so-called ecosystem goods and services.

**Solar PV Infrastructure**

There are various impacts that have been assessed as having medium significance prior to mitigation, but for which the significance is low after mitigation. This means that, with one exception, all impacts are assessed as having low significance after mitigation. The exception is the impact on indigenous natural vegetation, with a significance of high before and medium after mitigation, where construction will lead to a loss of vegetation. The impact will definitely occur, will be permanent and is irreversible, and no mitigation can change these factors.

**Grid Infrastructure**

All assessed impacts have a low significance after the application of mitigation measures.

The impacts listed above have either a medium or low significance after the application of mitigation measures. The results of the assessment of significance of terrestrial ecology impacts for the solar PV plant and power line are provided in **Table 24** on **page 188**.

#### 9.2.1.1 Potential sensitive receptors in the general study area

| | | | |
|---|---|---|---|
| *Atelerix frontalis* | South African Hedgehog | Near Threatened, protected | High |
| *Hyaena brunnea* | Brown hyaena | Near Threatened, protected | Medium |
| *Vulpes chama* | Cape Fox | Protected | Medium |
| *Mellivora capensis* | Honey Badger | Protected | Medium |

A summary of the potential ecological issues for the study area is as follows (issues assessed by other specialists, e.g., on birds and on wetland and hydrological function, are not included here):

- Presence of natural vegetation on site, much of which has high conservation value due to being within a listed Endangered ecosystem and with some parts within ESAs.
- Presence of shallow depressions and drainage valleys and associated vegetation on site, assessed as being sensitive to impacts associated with development as well as being important habitat for various plant and animal species.
- Presence in nearby areas of Camelthorn trees, protected under the National Forests Act (Act 84 of 1998).
- Potential presence of one (1) protected frog species, namely the Giant Bullfrog, not listed, but protected according to the National Environmental Management: Biodiversity Act (Act 10 of 2004).
- Presence of four (4) mammal species of concern, the South African Hedgehog (Near Threatened), the Brown Hyaena (Near Threatened), the Cape Fox, and the Honey Badger, all protected according to the National Environmental Management: Biodiversity Act (Act 10 of 2004).
- Potential invasion of natural habitats by alien invasive plants, thus causing additional impacts on biodiversity features. There are a large number of alien invasive species present in neighbouring areas, all of which have the potential to invade more widely, given the right circumstances.

#### 9.2.1.2 Design phase / pre-construction impacts

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

#### 9.2.1.3 Construction phase impacts

**Direct impacts**
Direct impacts include the following:

- Loss and/or fragmentation of indigenous natural vegetation due to clearing.
- Loss of individuals of protected trees;
- Loss of faunal habitat and refugia;
- Direct mortality of sedentary fauna due to machinery, construction and increased traffic; and
- Displacement and/or disturbance of fauna due to increased activity and noise levels.

#### 9.2.1.4 Operational phase impacts

**Direct impacts**
On-going direct impacts will include the following:

- Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure.

**Indirect impacts**
These will include the following:

- Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and
- Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

##### *9.2.1.5 Decommissioning phase impacts*

**Direct impacts**
These will include the following:

- Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites;
- Direct mortality of fauna due to machinery, construction and increased traffic; and
- Displacement and/or disturbance of fauna due to increased activity and noise levels.

**Indirect impacts**
These will occur due to renewed disturbance due to decommissioning activities, as follows:

- Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors; and
- Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape.

##### *9.2.1.6 'No–go' alternative*

The no development alternative option assumes the site remains in its current state, i.e., there is no construction of a solar PV facility, power line or associated infrastructure in the proposed project area and the *status quo* would prevail. This alternative would result in no environmental impacts from the proposed project on the sites or surrounding local area. The 'no-go' option is a feasible option; however, this would prevent the proposed project from contributing to the environmental, social and economic benefits associated with the development of the renewables sector.

It should be noted that the significance of 'no-go' alternative(s) was not rated as part of the Terrestrial Ecology Impact Assessment.

As mentioned, the identified impacts have either a medium or low significance after the application of mitigation measures. Please refer to **Table 24** on **page 188** for the results of the assessment of significance of terrestrial ecology impacts for the solar PV plant and power line.

##### *9.2.1.7 Possible Mitigation Measures*

This section provides a description of mitigation measures that could be applied to minimize identified impacts for this project. These include the following:

- **Use existing road infrastructure -** There are existing gravel roads in the study area, as well as access roads along existing power lines. Where possible, these roads should be used for access to the proposed project areas.
- **Adjust infrastructure positions to avoid sensitive habitats -** Where one (1) infrastructure option is preferable over another, but there are still sensitive habitats affected, the infrastructure should be moved to avoid the sensitivity, wherever possible. During the extended planning phase for this project, this has already been undertaken.
- **Minimise vegetation clearing and disturbance -** For all construction activities, the amount of vegetation cleared should be as small as possible to minimize the amount of habitat that is lost as well as to minimize the amount of rehabilitation of disturbed areas that will be required. Areas outside the direct construction camp footprint must be fenced off or marked in some other appropriate manner and no activities must be permitted there. Vehicles and personnel must be prohibited from being in natural areas outside the footprint of the proposed construction. Access for unauthorised personnel must also be limited.
- **Rehabilitation Programme -** A Biodiversity Rehabilitation Programme should be established before operation. The programme must address the rehabilitation of the existing habitats as well as rehabilitation after closure. This Rehabilitation Programme must be approved by the relevant government departments.
- **Botanical walk-through survey -** This is a requirement only to ensure legal compliance and should take place once the final layout has been determined. A Biodiversity pre-construction walk-through survey has already been undertaken and no listed and/or protected species were found within the footprint of the proposed infrastructure.
- **Alien plant management plan -** It is recommended that a monitoring programme be implemented to enforce continual eradication of alien and invasive species. An Alien Invasive Programme is an essential component to the successful conservation of habitats and species. Alien species, especially invasive species are a major threat to the ecological functioning of natural systems and to the productive use of land. In terms of the amendments of the regulations under Sections 70-77 of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004), landowners are legally responsible for the control of alien species on their properties. This programme should include monitoring procedures.
- **Undertake regular monitoring -** Monitoring should be undertaken to evaluate the success of mitigation measures.

As mentioned, the results of the assessment of significance of terrestrial ecology impacts for the solar PV plant and power line (including mitigation measures) are provided in **Table 24** on **page 188**.

#### *9.2.2 Avifaunal Impacts*

The Avifaunal Impact Assessment has been conducted by Chris van Rooyen and Albert Fronemann of Chris van Rooyen Consulting and is included in **Appendix 6B**.

A literature review reveals a scarcity of published, scientifically examined information regarding large-scale PV plants and birds. The reason for this is mainly that large-scale PV plants is a relatively recent phenomenon. The main source of information for these types of impacts are from compliance reports and a few government-sponsored studies relating to recently constructed solar plants in the south-west United States. In South Africa, one (1) published scientific study has been completed on the impacts of PV plants in a South African context (Visser, 2016).

In summary, the main impacts of PV plants on avifauna which have emerged so far include the following:

- Displacement due to disturbance associated with the construction of the solar PV plant and associated infrastructure;
- Displacement due to habitat transformation associated with the construction of the solar PV plant and associated infrastructure;
- Collisions with the solar panels;
- Entrapment in perimeter fences; and
- Collisions with the associated power lines resulting in mortality.

All of the impacts listed above have been rated as having either a negative medium or negative low impact, before and after the implementation of the recommended mitigation measures. The above-mentioned avifauna related impacts are discussed in more detail below. The significance of the avifaunal related impacts associated with the proposed PV plant and overhead power line are detailed in **Table 24** on **page 188**.

Increasingly, human-induced climate change is recognized as a fundamental driver of biological processes and patterns. Historic climate change is known to have caused shifts in the geographic ranges of many plants and animals, and future climate change is expected to result in even greater redistributions of species (National Audubon Society, 2015). In 2006 WWF Australia produced a report on the envisaged impact of climate change on birds worldwide (Wormworth, J. & Mallon, K., 2006). The report found that:

- Climate change now affects bird species' behaviour, ranges and population dynamics;
- Some bird species are already experiencing strong negative impacts from climate change;
- In future, subject to greenhouse gas emissions levels and climatic response, climate change will put large numbers bird species at risk of extinction, with estimates of extinction rates varying from 2 to 72%, depending on the region, climate scenario and potential for birds to shift to new habitat.

Using statistical models based on the North American Breeding Bird Survey and Audubon Christmas Bird Count datasets, the National Audubon Society assessed geographic range shifts through the end of the century for 588 North American bird species during both the summer and winter seasons under a range of future climate change scenarios (National Audubon Society, 2015). Their analysis showed the following:

- 314 of 588 species modelled (53%) lose more than half of their current geographic range in all three modelled scenarios.
- For 126 species, loss occurs without accompanying range expansion.
- For 188 species, loss is coupled with the potential to colonize new areas.

Climate sensitivity is an important piece of information to incorporate into conservation planning and adaptive management strategies. The persistence of many birds will depend on their ability to colonize climatically suitable areas outside of current ranges and management actions that target climate change adaptation.

South Africa is among the world's top 10 developing countries required to significantly reduce their carbon emissions (Seymore *et al.,* 2014), and the introduction of low-carbon technologies into the country's compliment of power generation will greatly assist with achieving this important objective (Walwyn & Brent, 2015). Given that South Africa receives among the highest levels of solar radiation on earth (Fluri 2009;

Munzhedi *et al.,* 2009), it is clear that solar power generation should feature prominently in future efforts to convert to a more sustainable energy mix in order to combat climate change, also from an avifaunal impact perspective. However, while the expansion of solar power generation is undoubtedly a positive development for avifauna in the longer term in that it will help reduce the effect of climate change and thus habitat transformation, it must also be acknowledged that renewable energy facilities, including solar PV facilities, in themselves have some potential for negative impacts on avifauna.

A literature review reveals a scarcity of published, scientifically examined information regarding large-scale PV plants and birds. The reason for this is mainly that large-scale PV plants are a relatively recent phenomenon. The main source of information for these types of impacts are from compliance reports and a few government-sponsored studies relating to recently constructed solar plants in the south-west United States. In South Africa, only one published scientific study has been completed on the impacts of PV plants in a South African context (Visser *et al.,* 2019).

##### *9.2.2.1 Design phase / pre-construction impacts*

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

##### *9.2.2.2 Construction phase impacts*

Construction phase avifauna impacts include the following:

- Displacement due to disturbance associated with the construction of the solar PV plant and associated infrastructure; and
- Displacement due to habitat transformation associated with the construction of the solar PV plant and associated infrastructure.

These impacts are discussed in more detail below.

**Displacement due to habitat transformation associated with the construction of the solar PV plant**

Ground-disturbing activities affect a variety of processes in arid areas, including soil density, water infiltration rate, vulnerability to erosion, secondary plant succession, invasion by exotic plant species, and stability of cryptobiotic soil crusts. These processes have the ability – individually and together – to alter habitat quality, often to the detriment of wildlife, including avifauna. Any disturbance and alteration to the desert landscape, including the construction and decommissioning of utility-scale solar energy facilities, has the potential to increase soil erosion. Erosion can physically and physiologically affect plant species and can thus adversely influence primary production and food availability for wildlife (Lovich & Ennen, 2011).

Solar energy facilities require substantial site preparation (including the removal of vegetation) that alters topography and, thus, drainage patterns to divert the surface flow associated with rainfall away from facility infrastructure. Channelling runoff away from plant communities can have dramatic negative effects on water availability and habitat quality in arid areas. Areas deprived of runoff from sheet flow support less biomass of perennial and annual plants relative to adjacent areas with uninterrupted water-flow patterns (Lovich & Ennen, 2011).

The activities listed below are typically associated with the construction and operation of solar facilities and could have direct impacts on avifauna through the transformation of habitat (County of Merced, 2014):

- Preparation of solar panel areas for installation, including vegetation clearing, grading, cut and fill;
- Excavation/trenching for water pipelines, cables, fibre-optic lines, and the septic system;
- Construction of piers and building foundations;
- Construction of new dirt or gravel roads and improvement of existing roads;
- Temporary stockpiling and side-casting of soil, construction materials, or other construction wastes;
- Soil compaction, dust, and water runoff from construction sites;
- Degradation of water quality in drainages and other water bodies resulting from project runoff;
- Maintenance of fire breaks and roads; and
- Weed removal, brush clearing, and similar land management activities related to the ongoing operation of the project.

These activities could have an impact on birds breeding, foraging and roosting in or in close proximity through transformation of habitat, which could result in temporary or permanent displacement.

In a study comparing the avifaunal habitat use in PV arrays with adjoining managed grassland at airports in the USA, DeVault *et al.,* (2014) found that species diversity in PV arrays was reduced compared to the grasslands (37 vs 46), supporting the view that solar development is generally detrimental to wildlife on a local scale.

In order to identify functional and structural changes in bird communities in and around the development footprint, Visser *et al.,* (2019) gathered bird transect data at the 180 hectares, 96MW Jasper PV solar facility in the Northern Cape, representing the solar development, boundary, and untransformed landscape. The study found both bird density and diversity per unit area was higher in the boundary and untransformed landscape, however, the extent therefore was not considered to be statistically significant. This indicates that the PV facility matrix is permeable to most species. However, key environmental features, including available habitat and vegetation quality are most likely the overriding factors influencing species' occurrence and their relative density within the development footprint. Her most significant finding was that the distribution of birds in the landscape changed, from a shrubland to open country and grassland bird community, in response to changes in the distribution and abundance of habitat resources such as food, water and nesting sites. These changes in resource availability patterns were detrimental to some bird species and beneficial to others. Shrubland specialists appeared to be negatively affected by the presence of the PV facility. In contrast, open country/grassland and generalist species, were favoured by its development (Visser *et al.*, 2019).

As far as displacement, either completely or partially (reduced densities) due to habitat loss is concerned, it is highly likely that the same pattern of reduced avifaunal densities and possible changes in densities and composition favouring grassland species will manifest itself at the proposed PV facility. In addition, raptors are also likely to be impacted by the habitat transformation, as it will result in reduced prey availability and accessibility. Species that could be negatively affected by displacement due to habitat loss are listed below:

- Chat, Sickle-winged
- Cisticola, Cloud
- Cliff-swallow, South African
- Falcon, Lanner
- Falcon, Amur

- Kestrel, Lesser
- Lark, Eastern Long-billed
- Lark, Melodious
- Stonechat, African
- Eagle, Martial
- Eagle-owl, Spotted
- Egret, Cattle
- Heron, Black-headed
- Ibis, Glossy
- Buzzard, Steppe
- Kestrel, Greater
- Kite, Black-shouldered
- Kite, Yellow-billed
- Secretarybird
- Snake-Eagle, Black-chested

**Displacement due to disturbance associated with the construction of the solar PV plant**

As far as disturbance is concerned, it is likely that all the avifauna, including all the priority species, will be temporarily displaced in the footprint area, either completely or more likely partially (reduced densities) during the construction phase, due to the disturbance associated with the construction activities e.g. increased vehicle traffic, and short-term construction-related noise (from equipment) and visual disturbance. The priority species which would be most severely affected would be ground nesting birds or those that utilise low shrubs for nesting:

- Chat, Sickle-winged
- Cisticola, Cloud
- Lark, Eastern Long-billed
- Lark, Melodious
- Stonechat, African

#### *9.2.2.3 Operational phase impacts*

Operational phase avifauna impacts include the following:

- Collisions with the solar panels;
- Entrapment in perimeter fences; and
- Collisions with the associated power lines resulting in mortality.

These impacts are discussed in more detail below.

**Impact trauma (collisions)**

This impact refers to collision-related fatality i.e. fatality resulting from the direct contact of the bird with a project structure(s). This type of fatality has been occasionally documented at solar projects of all technology types (McCrary *et al.,* 1986; Hernandez *et al.,* 2014; Kagan *et al.,* 2014). In some instances, the bird is not killed outright by the collision impact, but succumbs to predation later, as it cannot avoid predators due to its injured state.

Sheet glass used in commercial and residential buildings has been well established as a hazard for birds. When the sky is reflected in the sheet glass, birds fail to see the building as an obstacle and attempt to fly through the glass, mistaking it for empty space (Loss *et al.,* 2014). Although very few cases have been reported it is possible that the reflective surfaces of solar panels could constitute a similar risk to avifauna.

An extremely rare but potentially related problem is the so-called “lake effect” i.e. it seems possible that reflections from solar facilities' infrastructure, particularly large sheets of dark blue photovoltaic panels, may attract birds in flight across the open desert, who mistake the broad reflective surfaces for water (Kagan *et al.,* 2014)[29]. The unusually high percentage of waterbird mortalities at the Desert Sunlight PV facility (44%) may support the “lake effect” hypothesis (West, 2014). Although in the case of Desert Sunlight, the proximity of evaporation ponds may act as an additional risk increasing factor, in that birds are both attracted to the water feature and habituated to the presence of an accessible aquatic environment in the area. This may translate into the misinterpretation of diffusely reflected sky or horizontal polarised light source as a body of water. However, due to limited data it would be premature to make any general conclusions about the influence of the lake effect or other factors that contribute to fatality of water-dependent birds. The activity and abundance of water-dependent species near solar facilities may depend on other site-specific or regional factors, such as the surrounding landscape (Walston *et al.*, 2015). However, until such time that enough scientific evidence has been collected to discount the “lake effect” hypothesis, it must be considered as a potential source of impacts.

Weekly mortality searches at 20% coverage were conducted at the 250MW, 1300ha California Valley Solar Ranch PV site (Harvey & Associates, 2014a and 2014b). According to the information that could be sourced from the internet (two quarterly reports), 152 avian mortalities were reported for the period 16 November 2013 – 15 February 2014, and 54 for the period 16 February 2014 – 15 May 2014, of which approximately 90% were based on feather spots which precluded a finding on the cause of death. These figures give an estimated unadjusted 1 030 mortalities per year, which is obviously an underestimate as it does not include adjustments for carcasses removed by scavengers and missed by searchers. The authors stated clearly that these quarterly reports do not include the results of searcher efficiency trials, carcass removal trials, or data analyses, nor does it include detailed discussions.

In a report by the National Fish and Wildlife Forensic Laboratory (Kagan *et al.,* 2014), the cause of avian mortalities was estimated based on opportunistic avian carcass collections at several solar facilities, including the 550MW, 1 600ha Desert Sunlight PV plant. Impact trauma emerged as the highest identifiable cause of avian mortality, but most mortality could not be traced to an identifiable cause.

Walston *et al.,* (2015) conducted a comprehensive review of avian fatality data from large scale solar facilities (all technology types) in the USA. Collision as cause of death (19 birds) ranked second at Desert Sunlight PV plant and California Valley Solar Ranch (CVSR) PV plant, after unknown causes. Cause of death could not be determined for over 50% of the fatality observations and many carcasses included in these analyses consisted only of feather spots (feathers concentrated together in a small area) or partial carcasses, thus making determination of cause of death difficult. It is anticipated that some unknown fatalities were caused by predation or some other factor unrelated to the solar project. However, they found that the lack of systematic data collection and standardization was a major impediment in establishing the actual extent and causes of fatalities across all projects.

[29] This could either result in birds colliding directly with the solar panels or getting stranded and unable to take off again because many aquatic bird species find it very difficult and sometimes impossible to take off from dry land e.g. grebes and cormorants. This exposes them to predation, even if they do not get injured through direct collisions with the panels

The only scientific investigation of potential avifaunal impacts that has been performed at a South African PV facility was completed in 2016 at the 96MW Jasper PV solar facility (28°17′53″S, 23°21′56″E) which is located on the Humansrus Farm, approximately 4 km south-east of Groenwater and 30km east of Postmasburg in the Northern Cape Province (Visser *et al.,* 2019). The Jasper PV facility contains 325 360 solar panels over a footprint of 180 hectares with the capacity to deliver 180 000 MWh of renewable electricity annually. The solar panels face north at a fixed 20° angle, reaching a height of approximately 1.86 m relative to ground level with a distance of 3.11 m between successive rows of panels. Mortality surveys were conducted from the 14th of September 2015 until the 6th of December 2015, with a total of seven mortalities recorded among the solar panels which gives an average rate of 0.003 birds per hectare surveyed per month. All fatalities were inferred from feather spots. Extrapolated bird mortality within the solar field at the Jasper PV facility was 435 birds/yr (95% CI 133 - 805). The broad confidence intervals result from the small number of birds detected. The mortality estimate is likely conservative because detection probabilities were based on intact birds, and probably decrease for older carcasses and feather spots. The study concluded inter alia that the short study period, and lack of comparable results from other sources made it difficult to provide a meaningful assessment of avian mortality at PV facilities. It further stated that despite these limitations, the few bird fatalities that were recorded might suggest that there is no significant collision-related mortality at the study site. The conclusion was that to fully understand the risk of solar energy development on birds, further collation and analysis of data from solar energy facilities across spatial and temporal scales, based on scientifically rigorous research designs, is required (Visser *et al.,* 2019).

The results of the available literature lack compelling evidence of collisions as a cause of large-scale mortality among birds at PV facilities. However, it is clear from this limited literature survey that the lack of systematic and standardised data collection is a major problem in the assessment of the causes and extent of avian mortality at all types of solar facilities, regardless of the technology employed. Until statistically tested results emerge from existing compliance programmes and more dedicated scientific research, conclusions will inevitably be largely speculative and based on professional opinion.

Based on the lack of evidence to the contrary, it is not foreseen that collisions with the solar panels at the PV facility will be a significant impact. The priority species which would most likely be potentially affected by this impact are mostly small birds which forage between the solar panels, and possibly raptors which prey on them, or forage for insects between the PV panels, e.g. Lesser Kestrels (i.e. if they are not completely displaced due to the habitat transformation). Due to the absence of large permanent waterbodies at or close to the application site, it is unlikely that waterbirds will be attracted to the solar arrays due to the 'lake effect'.

Species which could potentially be impacted due to collisions with the solar panels are:

- Chat, Sickle-winged
- Cisticola, Cloud
- Cliff-swallow, South African
- Falcon, Lanner
- Falcon, Amur
- Kestrel, Lesser
- Lark, Eastern Long-billed
- Lark, Melodious
- Stonechat, African

**Entrapment in perimeter fences**

Visser *et al.,* (2019) recorded a fence-line fatality (Orange River Francolin *Scleroptila gutturalis*) resulting from the bird being trapped between the inner and outer perimeter fence of the facility. This was further supported by observations of large-bodied birds unable to escape from between the two fences (e.g. Red-crested Korhaan *Lophotis ruficrista*) (Visser *et al.,* 2019). Considering that one would expect the birds to be able to take off in the lengthwise direction (parallel to the fences), it seems possible that the birds panicked when they were approached by observers and thus flew into the fence.

It is not foreseen that entrapment of priority species in perimeter fences will be a significant impact. The priority species which could potentially be affected by this impact are most likely medium to large terrestrial species, which in this instance is most likely limited to Secretarybird.

**Collisions with the 132kV grid connection**

Collisions are probably the biggest single threat posed by power lines to birds in southern Africa (van Rooyen, 2004; Shaw, 2013). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines (van Rooyen, 2004; Anderson, 2001; Shaw, 2013).

In a PhD study, Shaw (2013) provides a concise summary of the phenomenon of avian collisions with power lines:

*'The collision risk posed by power lines is complex and problems are often localised. While any bird flying near a power line is at risk of collision, this risk varies greatly between different groups of birds, and depends on the interplay of a wide range of factors (APLIC 1994). Bevanger (1994) described these factors in four main groups – biological, topographical, meteorological and technical. Birds at highest risk are those that are both susceptible to collisions and frequently exposed to power lines, with waterbirds, gamebirds, rails, cranes and bustards usually the most numerous reported victims (Bevanger, 1998; Rubolini et al., 2005; Jenkins et al., 2010).*

*The proliferation of man-made structures in the landscape is relatively recent, and birds are not evolved to avoid them. Body size and morphology are key predictive factors of collision risk, with large-bodied birds with high wing loadings (the ratio of body weight to wing area) most at risk (Bevanger, 1998; Janss, 2000). These birds must fly fast to remain airborne, and do not have sufficient manoeuvrability to avoid unexpected obstacles. Vision is another key biological factor, with many collision-prone birds principally using lateral vision to navigate in flight, when it is the low-resolution and often restricted, forward vision that is useful to detect obstacles (Martin & Shaw, 2010; Martin, 2011; Martin et al., 2012). Behaviour is important, with birds flying in flocks, at low levels and in crepuscular or nocturnal conditions at higher risk of collision (Bevanger, 1994). Experience affects risk, with migratory and nomadic species that spend much of their time in unfamiliar locations also expected to collide more often (Anderson, 1978; Anderson, 2002). Juvenile birds have often been reported as being more collision-prone than adults (e.g. Brown et al., 1987; Henderson et al., 1996).*

*Topography and weather conditions affect how birds use the landscape. Power lines in sensitive bird areas (e.g. those that separate feeding and roosting areas, or cross flyways) can be very dangerous (APLIC, 1994; Bevanger, 1994). Lines crossing the prevailing wind conditions can pose a problem for large birds that use the wind to aid take-off and landing (Bevanger, 1994). Inclement weather can disorient birds and* *reduce their flight altitude, and strong winds can result in birds colliding with power lines that they can see but do not have enough flight control to avoid (Brown et al., 1987; APLIC, 1994).*

*The technical aspects of power line design and siting also play a big part in collision risk. Grouping similar power lines on a common servitude or locating them along other features such as tree lines, are both approaches thought to reduce risk (Bevanger, 1994). In general, low lines with short span lengths (i.e. the distance between two adjacent pylons) and flat conductor configurations are thought to be the least dangerous (Bevanger, 1994; Jenkins et al., 2010). On many higher voltage lines, there is a thin earth (or ground) wire above the conductors, protecting the system from lightning strikes. Earth wires are widely accepted to cause the majority of collisions on power lines with this configuration because they are difficult to see, and birds flaring to avoid hitting the conductors often put themselves directly in the path of these wires (Brown et al., 1987; Faanes, 1987; Bevanger, 1994).'*

As mentioned by Shaw (2013) in the extract above, several factors are thought to influence avian collisions, including the manoeuvrability of the bird, topography, weather conditions and power line configuration. An important additional factor that previously has received little attention is the visual capacity of birds; i.e. whether they are able to see obstacles such as power lines, and whether they are looking ahead to see obstacles with enough time to avoid a collision. In addition to helping explain the susceptibility of some species to collision, this factor is essential to planning effective mitigation measures. Recent research provides the first evidence that birds can render themselves blind in the direction of travel during flight through voluntary head movements (Martin & Shaw, 2010). Visual fields were determined in three bird species representative of families known to be subject to high levels of mortality associated with power lines i.e. Kori Bustards, Blue Cranes and White Storks. In all species the frontal visual fields showed narrow and vertically long binocular fields typical of birds that take food items directly in the bill under visual guidance. However, these species differed markedly in the vertical extent of their binocular fields and in the extent of the blind areas which project above and below the binocular fields in the forward-facing hemisphere. The importance of these blind areas is that when in flight, head movements in the vertical plane (pitching the head to look downwards) will render the bird blind in the direction of travel. Such movements may frequently occur when birds are scanning below them (for foraging or roost sites, or for conspecifics). In bustards and cranes pitch movements of only 25° and 35° respectively are sufficient to render the birds blind in the direction of travel; in storks head movements of 55° are necessary. That flying birds can render themselves blind in the direction of travel has not been previously recognised and has important implications for the effective mitigation of collisions with human artefacts including wind turbines and power lines. These findings have applicability to species outside of these families especially raptors (Accipitridae) which are known to have small binocular fields and large blind areas similar to those of bustards and cranes and are also known to be vulnerable to power line collisions.

Thus visual field topographies which have evolved primarily to meet visual challenges associated with foraging may render certain bird species particularly vulnerable to collisions with human artefacts, such as power lines and wind turbines that extend into the otherwise open airspace above their preferred habitats. For these species placing devices upon power lines to render them more visible may have limited success since no matter what the device the birds may not see them. It may be that in certain situations it may be necessary to distract birds away from the obstacles, or encourage them to land nearby (for example by the use of decoy models of conspecifics, or the provision of sites attractive for roosting) since increased marking of the obstacle cannot be guaranteed to render it visible if the visual field configuration prevents it being detected. Perhaps most importantly, the results indicate that collision mitigation may need to vary substantially for different collision prone species, taking account of species specific behaviours, habitat and foraging preferences, since an effective all-purpose marking device is probably not realistic if some birds do not see the obstacle at all (Martin & Shaw, 2010).

Despite evidence that line marking might be ineffective for some species due to differences in visual fields and behaviour, or have only a small reduction in mortality in certain situations for certain species, particularly bustards (Martin & Shaw, 2010; Barrientos *et al.,* 2012; Shaw, 2013), it is generally accepted that marking a line with PVC spiral type Bird Flight Diverters (BFDs) can reduce the collision mortality rates (Sporer *et al.,* 2013; Barrientos *et al.,* 2012; Alonso & Alonso, 1999; Koops & De Jong, 1982). Regardless of statistical significance, a slight mortality reduction may be very biologically relevant in areas, species or populations of high conservation concern (e.g. Ludwig's Bustard) (Barrientos *et al.,* 2012). Beaulaurier (1981) summarised the results of 17 studies that involved the marking of earth wires and found an average reduction in mortality of 45%. A study reviewed the results of 15 wire marking experiments in which transmission or distribution wires were marked to examine the effectiveness of flight diverters in reducing bird mortality. The presence of flight diverters was associated with a decrease in bird collisions. At unmarked lines, there were 0.21 deaths/1000 birds (n = 339,830) that flew among lines or over lines. At marked lines, the mortality rate was 78% lower (n = 1,060,746) (Barrientos et al. 2011). Koops and De Jong (1982) found that the spacing of the BFDs was critical in reducing the mortality rates - mortality rates are reduced up to 86% with a spacing of 5 metres, whereas using the same devices at 10 metre intervals only reduces the mortality by 57%. Line markers should be as large as possible, and highly contrasting with the background. Colour is probably less important, as during the day the background will be brighter than the obstacle with the reverse true at lower light levels (e.g. at twilight, or during overcast conditions). Black and white interspersed patterns are likely to maximise the probability of detection (Martin *et al.,* 2010).

Using a controlled experiment spanning a period of nearly eight years (2008 to 2016), the Endangered Wildlife Trust (EWT) and Eskom tested the effectiveness of two types of line markers in reducing power line collision mortalities of large birds on three 400kV transmission lines near Hydra substation in the Karoo. Marking was highly effective for Blue Cranes, with a 92% reduction in mortality, and large birds in general with a 56% reduction in mortality, but not for bustards, including the endangered Ludwig's Bustard. The two different marking devices were approximately equally effective, namely spirals and bird flappers, they found no evidence supporting the preferential use of one type of marker over the other (Shaw *et al.,* 2017).

A potential impact of the proposed 132kV power lines is collisions with the earth wire. Quantifying this impact in terms of the likely number of birds that will be impacted, is very difficult because such a huge number of variables play a role in determining the risk, for example weather, rainfall, wind, age, flocking behaviour, power line height, light conditions, topography, population density and so forth. However, from incidental record keeping by the Endangered Wildlife Trust, it is possible to give a measure of what species are susceptible to power line collisions (**Figure 54**). This only gives a measure of the general susceptibility of the species to power line collisions, and not an absolute measurement for any specific line.

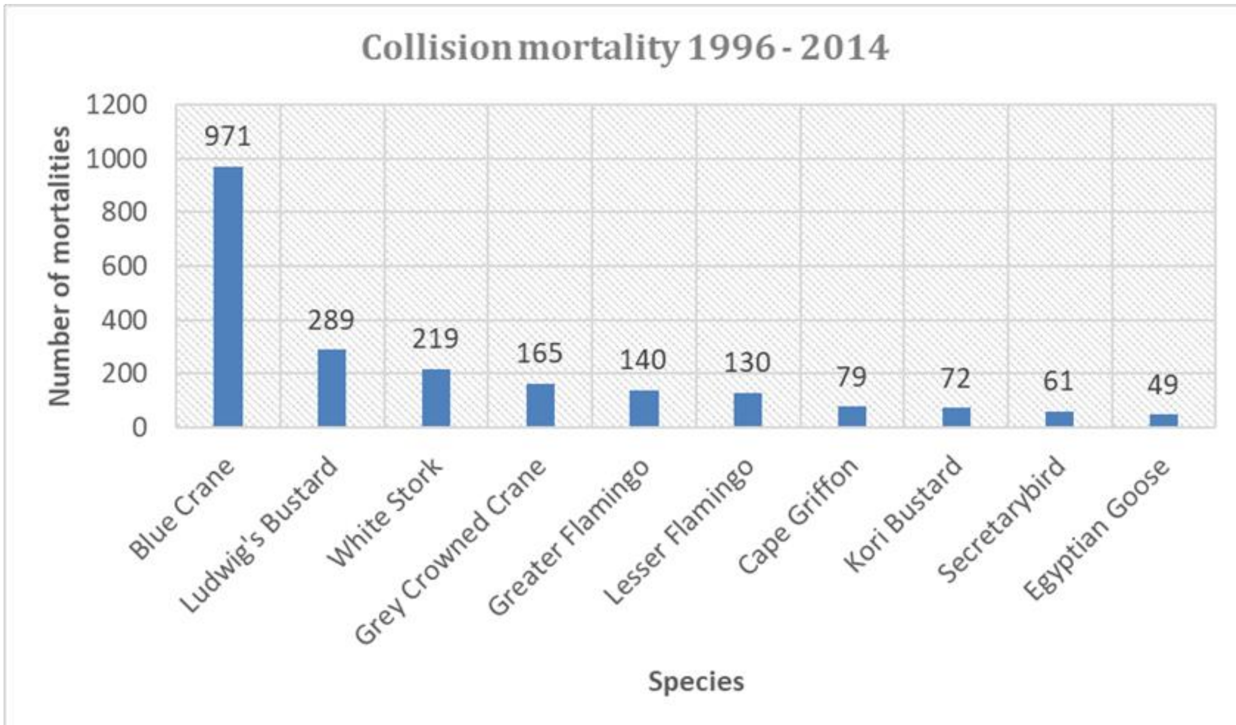



**Figure 54:** The top ten (10) collision prone bird species in South Africa, in terms of reported incidents contained in the Eskom / EWT Strategic Partnership central incident register 1996 - 2014 (EWT unpublished data, 2014)

The most likely priority species candidates for collision mortality on the proposed 132kV power line are large terrestrial species and waterbirds. However, the proposed power line corridor is situated next to the busy R502 road virtually all the way. The presence of the road will in itself be a mitigating factor in that the vicinity of the road will most likely be avoided by most power line sensitive species, or they will naturally cross the road at a higher altitude. The power line corridor does not cross any drainage lines, thereby further reducing the risk of collision. Species potentially at risk of collisions with the 132kV grid connection are the following:

- Secretarybird
- Coot, Red-knobbed
- Cormorant, Reed
- Cormorant, White-breasted
- Darter, African
- Duck, Maccoa
- Duck, White-faced
- Duck, Yellow-billed
- Eagle, Martial
- Egret, Cattle
- Egret, Great
- Egret, Little
- Flamingo, Greater
- Flamingo, Lesser
- Goose, Egyptian

- Goose, Spur-winged
- Heron, Black-headed
- Heron, Grey
- Pochard, Southern
- Shelduck, South African
- Shoveler, Cape
- Spoonbill, African
- Teal, Cape
- Teal, Red-billed

##### *9.2.2.4 Decommissioning phase impacts*

Should the proposed development need to be decommissioned, the same impacts as identified for the construction phase of the proposed development can be anticipated. Similar potential impacts are therefore expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts.

##### *9.2.2.5 'No–go' alternative*

The 'no-go' option assumes that the site remains in its current state, i.e. there is no construction of a solar PV plant, 132kV power line and associated infrastructure in the proposed project area and the *status quo* would proceed. The 'no-go' alternative will thus result in the current *status quo* being maintained at the proposed development site as far as the avifauna is concerned. The development site itself consist mostly of natural grassland. The 'no-go option' would maintain the natural grassland which would be beneficial to the avifauna currently occurring there.

It should be noted that the significance of 'no-go' alternative(s) has not been rated as part of the Avifauna Impact Assessment.

As mentioned, the identified impacts have been rated as having either a negative medium or negative low impact, before and after the implementation of the recommended mitigation measures. The significance of the avifaunal related impacts associated with the proposed PV plant and overhead power line are detailed in **Table 24** on **page 188**.

### *9.2.3 Surface Water Impacts*

The Surface Water Impact Assessment was originally conducted by Shaun Taylor while under the employment of SiVEST in 2017 and then updated by Stephen Burton, also while under the employment of SiVEST (see **Table 3**), and is included in **Appendix 6B**.

In summary, the main surface water related impacts include the following:

- Impacts associated with the Temporary Building Zones during the pre-construction phase;
- Vehicle and Machinery Degradation Impacts during the construction phase;
- Human Degradation of Flora and Fauna associated with the Surface Water Resources during the construction phase;
- Degradation and Removal of Soils and Vegetation associated with the Surface Water Resources during the construction phase;
- Increased Run-off, Erosion and Sedimentation Impacts during the construction phase;

- Vehicle Damage to the Surface Water Resources during the operation phase; and
- Storm water Run-off Impacts to Surface Water Resources during the operation phase.

All of the impacts listed above can be reduced to either a negative medium or negative low impact, after the implementation of the recommended mitigation measures. The above-mentioned surface water related impacts are discussed in more detail below. The significance of the surface water related impacts associated with the proposed PV plant and power line are discussed in more detail below and are detailed in **Table 24** on **page 188**.

#### *9.2.3.1 Surface Water Buffer Zones*

For the surface water resources, the primary threat related to the PV development and the associated power line during the construction phase, are increased run-off and additional sediment inputs as well as increased turbidity. These impacts commonly take place mainly during vegetation clearing for the PV array and excavation of pits for the foundations of the individual PV panels as well as electricity towers. These areas are left vulnerable to surface run-off, consequent erosion and sedimentation. Given the relatively flat terrain, these impacts are highly likely given the wetland types and proximity of the proposed PV field. However, these potential impacts can be easily mitigated with relatively simple management measures in place. Therefore, the buffer zones can be of limited size in order to address potential impacts adequately.

For the operation phase, run-off from the PV field and adjacent services roads (including service roads for the power line) can contribute to increased run-off and sediment inputs, as well as turbidity in the wetlands. Again, the terrain and climate factors will have a bearing on potential impacts. However, with the implementation of mitigation measures, potential impacts can be avoided.

Based on the above, buffer zones were determined for the identified natural and artificial depression wetlands and the drainage line. **As such, a buffer zone of 50m was applied to the natural and artificial depression wetlands, and drainage line to provide sufficient buffer from the PV array field and associated power line (including towers).** The above assigned buffer zones were guided by the rationale behind the establishment of suitable buffer zones for surface water resources according to the GDARD Requirements for Biodiversity Assessments (2014), which are equally deemed applicable in the North West Province, as well as using professional judgement based on the biophysical characteristics and findings in the field.

#### *9.2.3.2 Design phase / pre-construction phase impacts*

Surface water related impacts during the design / pre-construction phase include the following:

- Impacts associated with the Temporary Building Zones during the pre-construction phase.

**<u>Impacts associated with the Temporary Building Zones</u>**

A temporary building zone will be required for the proposed development. The location of the construction lay-down area alternative are within 55m of Artificial Depression Wetland 1. Placing the lay-down area in either alternative location is to result in indirect negative impacts respectively. Indirectly, potential downstream contamination and pollution impacts from stored oils, fuels, and other hazardous substances or materials being transported via run-off are a possibility. Where site clearing for the lay-down area may be required near surface water resources, clearance/removal of vegetation at the surface can leave the downstream surface water resources vulnerable to increased run-off and consequent erosion and sedimentation impacts.

#### *9.2.3.3 Construction phase impacts*

Surface water related impacts during the construction phase include the following:

- Vehicle and Machinery Degradation Impacts during the construction phase;
- Human Degradation of Flora and Fauna associated with the Surface Water Resources during the construction phase;
- Degradation and Removal of Soils and Vegetation associated with the Surface Water Resources during the construction phase; and
- Increased Run-off, Erosion and Sedimentation Impacts during the construction phase.

**Vehicle and Machinery Degradation Impacts**

Construction vehicles (heavy and light) will require access to the proposed PV array construction areas as well as tower locations for the proposed power lines or the underground power cable trench. Potential negative impacts can include the need to travel through the delineated surface water resources, thereby resulting in increased and additional physical degradation respectively. Physical degradation in the form of compaction / excavation of soils, potential erosion, consequent sedimentation and general disturbance from vehicle movement is likely. Additionally, drainage into the surface water resources directly or from run-off containing oils, fluids and/or fuels either leaking or spilling from vehicles and machinery is a possibility. Moreover, drainage into the surface water as a result of run-off containing oils, fluids and/or fuels leaked during re-fuelling or servicing in or near the surface water resources is also probability. Should any leakage or spillage occur in and/or near the surface water resources, potential soil / water contamination/intoxication of amphibians, avi-fauna or other organisms frequenting the surface water resources can result. Fuels and oils also pose a fire risk not only to the surface water resources, but also neighbouring grazing lands or nearby settlement areas.

**Human Degradation of Flora and Fauna associated with the Surface Water Resources**

The possibility of human degradation to surface water resources is likely to occur during the construction phase, since construction activities will take place in relative close proximity and directly within (in terms of access roads) to the surface water resources. Human degradation can take the form of physical / direct degradation such as lighting fires (purposefully or accidentally) in or near to the surface water resources. Usage of the surface water resources for sanitation purposes may take place when inundated, resulting in pollution of the surface water resources. The surface water resources may also be utilised as a source of water for domestic use, building and general cleaning purposes.

Fauna associated with surface water resources are often hunted, trapped, killed or eaten. This impact must be prevented. Finally, flora associated with wetlands may need to be cleared or removed for building storage purposes which can result in a loss of resources.

**Degradation and Removal of Soils and Vegetation associated with the Surface Water Resources**

The proposed development may need to take place either directly within the identified and delineated surface water resources as well as within the associated buffer zones. Where removal and/or infill of wetland soils will take place, functionality may be affected in terms of hydrogeomorphic functionality. Moreover, the excavation of any foundations will result in a relatively permanent structure, meaning that the area occupied by the foundation will ultimately result in a degree of permanent habitat and soil loss for the affected surface water resources.

**Increased Run-off, Erosion and Sedimentation Impacts**

Vegetation clearing will need to take place for the construction process. Excessive or complete vegetation clearance in the highly sensitive and nearby surrounding areas is likely to result in exposing the soil and leaving the ground susceptible to wind and water erosion, particularly during and after rainfall events. Due to the climate of the study area and sudden sporadic rainfall, general soil erosion, as a consequence of the proposed development, is a distinct possibility. A further impact due to erosion and storm water run-off impacts is increased sedimentation to the surface water resources. Deposited sediments can smother vegetation and change flow paths and dynamics making affected areas susceptible to alien plant invasion leading to further degradation.

#### *9.2.3.4 Operational phase impacts*

Surface water related impacts during the operational phase include the following:

- Vehicle Damage to the Surface Water Resources during the operation phase; and
- Storm water Run-off Impacts to Surface Water Resources during the operation phase.

**Vehicle Damage to the Surface Water Resources**

Access roads to the proposed PV field as well as the proposed power line during the operation and maintenance phase can physically affect the identified surface water resources. Therefore, it is important that roads are not planned and constructed within any of the surface water resources and/or associated buffer zones. However, where it is not possible to avoid this, the surface water resources will be susceptible to compaction and erosion impacts for the lifecycle of the proposed development leading to long term impacts. Regular vehicle movement in the affected surface water resources can compact the soil affecting the hydrology of the system. Similarly, regular movement from vehicles can flatten the ground surface making it a preferential flow path for storm water, thereby becoming susceptible to accelerated run-off which may result in progressive erosion. Compaction from vehicles can also create incisions which may induce donga erosion over time.

**Storm water Run-off Impacts to Surface Water Resources**

The impact of storm water run-off is primarily related to the types of structures and surfaces that will need to be established for the proposed development. Hard impermeable surfaces and foundations are to be laid for PV arrays, buildings and associated infrastructure. Additionally, where regular movement from vehicles flatten the ground surface making it a preferential flow path for storm water, sediment transportation from hardened gravel surfaces via run-off along internal access and power line service roads can result in increased run-off and sedimentation. In general, flat and hard surfaces aid with the acceleration and generation of run-off which can impact on nearby surface water resources through the onset of erosion due to increased run-off, as well as through the generation of increased sedimentation.

#### *9.2.3.5 Decommissioning phase impacts*

Should the proposed developments need to be decommissioned, the same impacts as identified for the construction phase of the proposed developments can be anticipated. Similar potential impacts are therefore expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts.

#### *9.2.3.6 'No-go' alternative*

The 'no-go' alternative is the option of not fulfilling the proposed solar PV and power line project. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. Implementing the 'no-go' option would entail no development. The 'no-go' option is a feasible option, however, this would prevent the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line from contributing to the environmental, social and economic benefits associated with the development of the renewables sector.

It should be noted that the significance of 'no-go' alternative(s) has not been rated as part of the Surface Water Impact Assessment.

As mentioned, the identified impacts can be reduced to either a negative medium or negative low impact, after the implementation of the recommended mitigation measures. The significance of the surface water related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**.

### *9.2.4 Agricultural and Soils Impacts*

The Agricultural and Soils Compliance statement was conducted by Garry Paterson (**SACNASP registration:** 400463/04) of the ARC-ISCW unit and is included in **Appendix 6A**.

The major potential impacts that would occur as a result of the construction of the solar plant, 132kV power line and associated infrastructure (including related activities) would be:

- The loss of potentially productive agricultural land, along with a reduction in land capability, and
- Increased incidence of soil erosion, mainly by wind.

However, with a greater percentage of the soils having at best a low potential for agricultural production, the impact on the loss of land would be low (**Table 24**). In addition, the Google Earth map shows that the existing land use in the proposed development area shows no evidence of cultivation or other agricultural activities (**Figure 55**).

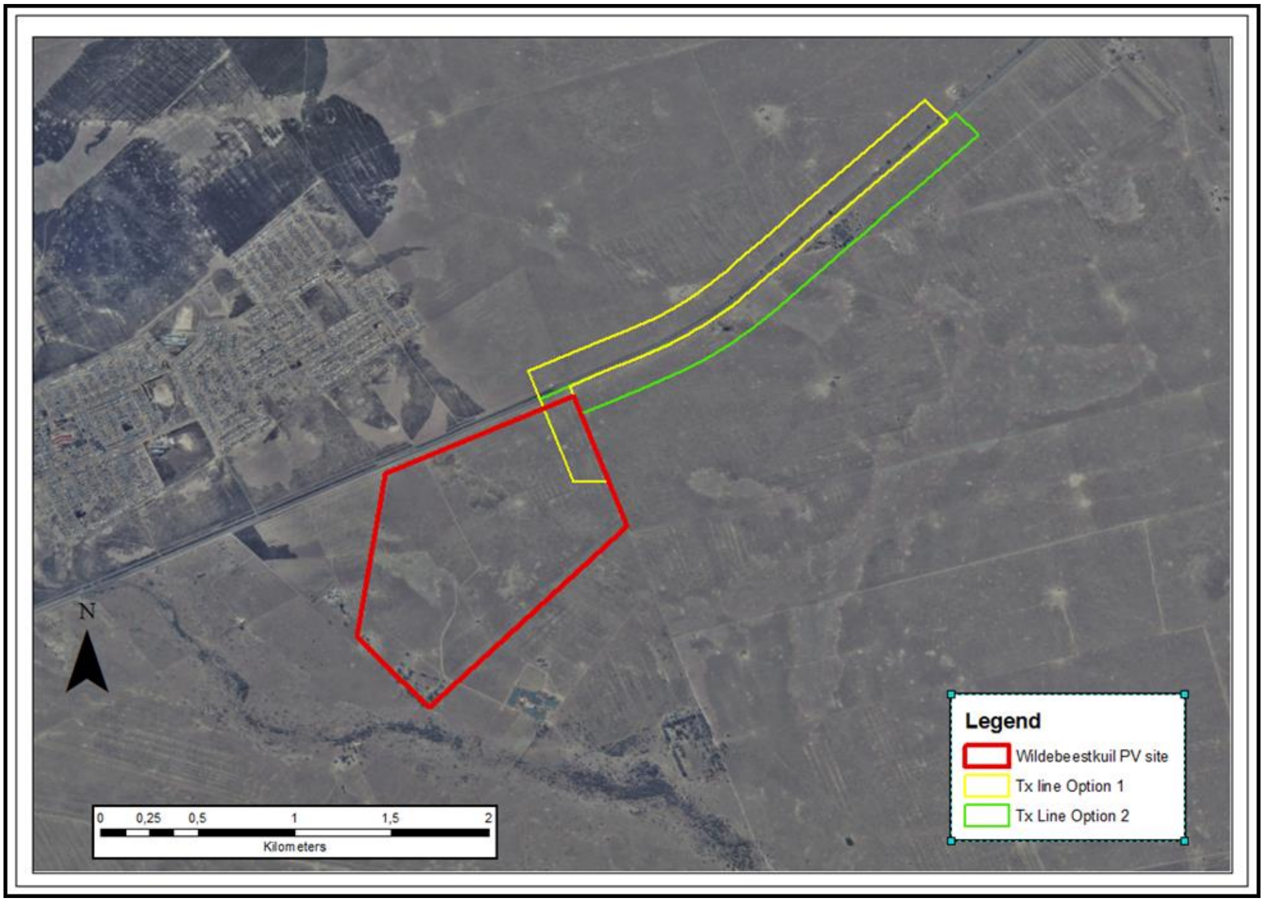


**Figure 55:** Land use patterns

Where buildings and associated infrastructure are established, this impact is virtually permanent. The area that will be covered by the panels will remain unused and disturbed to some degree with regard to the frames holding the panels. Underground cabling is foreseen to add to the disturbance of the soil's natural state and thus deemed impactful on these soils. There may also be an increased hazard of soil erosion, due to disturbance. However, due to the medium texture of the soils, as well as the virtually flat topography, this is not seen as significant if proper mitigation measures are taken.

Such mitigation would involve keeping the removal of surface vegetation to an absolute minimum, putting in soil conservation measures (ridges, culverts etc.) where necessary, and periodic monitoring of the immediate vicinity to ensure that no excessive erosion has commenced.

The impacts mentioned above can be reduced to either a negative medium or negative low impact, after the implementation of the recommended mitigation measures. The significance of the agricultural and soils related impacts associated with the proposed PV plant and overhead power line are detailed in **Table 24** on **page 188**.

#### *9.2.4.1 Design / pre-construction phase impacts*

No design / pre-construction phase impacts were identified.

#### *9.2.4.2 Construction phase impacts*

Construction phase impacts include the following:

- Loss of agricultural land; and
- Soil erosion (wind or water) caused by surface disturbance.

#### *9.2.4.3 Operational phase impacts*

Operational phase impacts include the following:

- Loss of agricultural land; and
- Soil erosion (wind or water) caused by surface disturbance.

#### *9.2.4.4 Decommissioning phase impacts*

Decommissioning phase impacts include the following:

- Loss of agricultural land; and
- Soil erosion (wind or water) caused by surface disturbance.

#### *9.2.4.5 'No-go' alternative*

The 'no-go' option assumes that the site remains in its current state, i.e. there is no construction of a solar PV plant, 132kV power line and associated infrastructure in the proposed project area and the *status quo* would proceed.

It should be noted that the significance of 'no-go' alternative(s) has not been rated as part of the Agricultural and Soils Assessment.

As mentioned, the impacts identified can be reduced to either a negative medium or negative low impact, after the implementation of the recommended mitigation measures. The significance of the agricultural and soils related impacts associated with the proposed PV plant, power line and associated infrastructure are detailed in **Table 24** on **page 188**.

### *9.2.5 Geotechnical Impacts*

The Geotechnical Impact Assessment was conducted by Keval Singh of JG Afrika (Pty) Ltd and is included in **Appendix 6F**.

The potential impacts that would occur from a geotechnical perspective include the following:

- Displacement of natural earth material and overlying vegetation during the construction phase; and
- Displacement of natural earth material during the operation phase; and
- Decommissioning of the structure will disturb the geological environment.

All of the impacts listed above can be reduced to a low negative impact after the implementation of the recommended mitigation measures. In addition, **from a preliminary geological and geotechnical**

**assessment, no fatal flaws have been identified**. The significance of the geotechnical related impacts associated with the proposed PV plant, power line and associated infrastructure are provided below and detailed in **Table 24** on **page 188**.

##### *9.2.5.1 Impact of the Project on the Geological Environment*

The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock referred to in this report as 'subsoils'. The levelling of areas to create building platforms will also result in the displacement and exposure of subsoils. These impacts will have a negative visual impact on the environment, which in some cases can be remediated

The potential impact of the development on the terrain and geological environment, will be the increased potential for soil erosion, caused by construction activities and the removal of vegetation. Areas of concentrated surface flow conditions can be anticipated at Wildebeestkuil 2 Solar PV Plant and 132kV Power Line, resulting in gradual erosion of unconsolidated soil, during the operational life of the facility. This can result in the creation of preferential drainage features, unless remediated through proper engineering design (i.e. storm water drainage).

Based on the impact assessment matrix undertaken for this project, from a geotechnical perspective the impact of the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line was found to be *'Negative low impact - The anticipated impact will have negligible negative effects and will require little to no mitigation.'*

##### *9.2.5.2 Design phase / pre-construction impacts*

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

##### *9.2.5.3 Construction phase impacts*

Displacement of natural earth material and overlying vegetation:

- Increase in soil and wind erosion due to clearing of vegetation;
- Construction and earthmoving vehicles may displace soil during operations;
- Creation of drainage paths along access tracks;
- Potential oil spillages from heavy plant; and
- Excessive dust.

##### *9.2.5.4 Operational phase impacts*

Displacement of natural earth material:

- Increase in soil erosion due to concentrated flow received off PV Panels;
- Potential oil spillages from maintenance vehicles; and
- Sedimentation of non-perennial features caused by soil erosion.

##### *9.2.5.5 Decommissioning phase impacts*

Decommissioning of the structure will disturb the geological environment:

- Increase in soil and wind erosion due to clearance of structures;
- Construction and earthmoving vehicles will displace the soil;
- Creation of drainage paths;
- Potential oil spillages from vehicles; and
- Excessive sediments in non-perennial features.

#### *9.2.5.6 'No-go' alternative*

No 'no-go' alternatives identified and/or assessed as part of Geotechnical Impact Assessment. Significance of 'no-go' alternative(s) thus not rated as part of Geotechnical Impact Assessment.

As mentioned, all of the impacts identified can be reduced to a low negative impact after the implementation of the recommended mitigation measures. The significance of the geotechnical related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**. In addition, **no fatal flaws have been identified from a preliminary geological and geotechnical assessment perspective**.

### *9.2.6 Visual Impacts*

The VIA was conducted by Kerry Schwartz of SiVEST and is included in **Appendix 6H**.

The potential visual issues / impacts identified during the VIA for the proposed solar PV project, associated infrastructure and 132kV power line include:

- Potential alteration of the visual character of the area during both construction and operation of the solar PV plant and the 132kV power line;
- Potential visual impact on receptors in the study area;
- Potential visual intrusion resulting from vehicles and equipment during construction and decommissioning phases;
- Potential impacts of increased dust emissions from construction / decommissioning activities and related traffic during construction and decommissioning phases;
- Potential impacts of increased dust emissions from maintenance vehicles accessing the site and the power line servitude;
- Potential visual scarring of the landscape as a result of site clearance and earthworks during construction;
- Potential visual intrusion resulting from PV arrays and power line during operation;
- Potential visual clutter in the landscape resulting from the PV arrays and associated on-site infrastructure;
- Potential alteration of the night time visual environment as a result operational and security lighting at the proposed solar PV facility;
- Potential visual intrusion of any remaining infrastructure on the site during decommissioning; and
- Combined visual impacts (i.e. cumulative visual impacts) from other renewable energy facilities in the broader area could potentially alter the sense of place and visual character of the area.

The impacts listed above can be reduced to either a low or medium negative impact after the implementation of the recommended mitigation measures. Potential visual issues / impacts resulting from the proposed Wildebeestkuil 2 Solar PV Plant project and associated 132kV power line are outlined below.

The significance of the visual related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**.

### *9.2.6.1 Generic Visual Impacts Associated with Solar PV Facilities*

In this section, the typical visual issues related to the establishment of solar PV facilities, associated on-site infrastructure and power lines as proposed are discussed. It is important to note that the renewable energy industry is still relatively new in South Africa and as such this report draws on international literature and web material (of which there is significant material available) to describe the generic impacts associated with solar PV energy facility.

**<u>Solar PV Fields</u>**

The solar PV component of the proposed development consists of PV panels, which grouped together form a 'solar field'. As mentioned above, each PV panel is a large structure that is typically between 1 and 4m high (**Figure 3**). The height of these objects will make them visible, especially in the context of a relatively flat landscape.

More importantly, the concentration of these panels will increase their visibility, depending on the number of panels in each solar field. Solar fields with a large spatial extent (footprint) will become distinctly visible features that contrast with the landscape, especially where the landscape is natural in character or undeveloped. In this context the solar field could be considered a visual intrusion, potentially altering the visual environment towards a more industrial character.

The establishment of solar PV facilities generally requires some levelling of the terrain and the clearance of taller shrubs and vegetation. This will intensify the visual prominence of the solar PV energy facility, particularly in natural locations where little transformation has taken place (**Figure 56**).

**Figure 56:** Kathu Solar Power Plant (photo courtesy of 'visits to the park'), near Kathu, Northern Cape Province

**Associated On-Site Infrastructure**

The infrastructure associated with the proposed development will include the following (in addition to the PV arrays):

- Underground cabling (approximately 0,8m x 0,6m wide);
- Permanent Guard house (≈876m²);
- Temporary building zone (≈2994m²);
- Switching Substation (≈2000m²)
- Internal gravel roads (as required) (≈3.5m width);
- Upgrades to existing roads; and
- Site fencing (approximately 2.1m high).

Switching substations are generally large, highly visible structures which are relatively industrial in character. As they are not features of the natural environment, but are representative of human (anthropogenic) alteration, substations will be perceived to be incongruous when placed in largely natural landscapes. In this instance, the switching substation is intended to serve the proposed solar PV plant and as such, is likely to be perceived as part of the greater solar PV facility. Thus, the visual impact of the substation will be relatively minor when compared to the visual impact associated with the development as a whole.

Surface clearance for cable trenches, road upgrading and temporary building zones areas may result in the increased visual prominence of these features, thus increasing the level of contrast with the surrounding landscape. Buildings and associated infrastructure placed in prominent positions such as on ridge tops may break the natural skyline, drawing the attention of the viewer. In addition, security lighting on the site may impact on the nightscape (section 8.3 of VIA Report – **Appendix 6H**).

However, the visual impact of infrastructure associated with the proposed development is generally not regarded as a significant factor when compared to the visual impact associated with large PV arrays. The infrastructure would, however, increase the visual 'clutter' of the proposed development and magnify the visual prominence of the development if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation to conceal the impact.

**132kV Power Lines**

As previously mentioned, three (3) power line corridor alternatives have been considered. The proposed power line corridor alternatives have been aligned to run parallel to the R502 in a north-eastern direction, culminating at the proposed Leeudoringstad Solar Plant Substation on Portion 37 of the Farm Leeuwbosch No 44 (part of a separate BA process).

Power line towers and substations are by their nature very large objects and thus highly visible. Although no information has been provided regarding tower heights, for the purposes of the VIA, it is assumed that the maximum tower height for the proposed overhead power line is assumed to be 30m (equivalent in height to a ten storey building). Although a pylon / tower structure would be less visible than a building, the height of the structure means that the pylon would still typically be visible from a considerable distance. Visibility would be increased by the fact that the power line comprises a series of towers typically spaced approximately 200m to 400m apart in a linear alignment.

As described above, power lines are not features of the natural environment, but are representative of human (anthropogenic) alteration of the natural environment. Thus, elements of grid connection infrastructure could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the power line will exacerbate this incongruity, as the towers may impinge on views within the landscape. In addition, the practice of clearing taller vegetation from areas within the power line servitude can increase the visibility and incongruity of the power line. In a largely natural, bushy setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the power line more visible and drawing the viewer's attention to the servitude.

In this instance, the proposed power line corridor alternatives run through an area which is significantly transformed due to the presence of urban development and existing electrical, road and rail infrastructure. This factor is therefore expected to lessen the visual contrast associated with the introduction of a new power line. In addition, the proposed power line development is intended to serve the proposed Wildebeestkuil 2 Solar PV Plant and as such, will only be built if the project goes ahead. The power line is therefore likely to be perceived as part of the greater solar PV development and the visual impact will be relatively minor when compared to the visual impact associated with the solar PV plant as a whole.

#### *9.2.6.2 Receptor Impact Rating*

**Table 19** in **section 8.10.8** of the DBAR presents a summary of the overall visual impact of the proposed development on each of the potentially sensitive visual receptor locations which were identified within 5km of the proposed application site and the combined 132kV power line assessment corridors.

As mentioned in **section 8.10.8**, none of the potentially sensitive receptor locations are expected to experience high levels of visual impact as a result of the proposed development. Thirty-one (31) of the potentially sensitive visual receptors identified within the study area, will experience moderate levels of visual impact as a result of the proposed project and twenty-five (25) potentially sensitive receptors will experience moderate levels of impact as a result of the proposed 132kV power line. None of these receptors are tourism-related facilities, and as such they are not considered to be Sensitive Receptors. Thus the moderate impact rating assigned will not affect the overall impact ratings determined.

Twenty-seven (27) potentially sensitive visual receptors will be subjected to low levels of visual impact as a result of the proposed solar PV plant, while seventeen (17) will experience low levels of impact as a result of the 132kV power line.

#### *9.2.6.3 Night-time Impacts*

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed development at night.

The town of Leeudoringstad and Kgakala Township, located approximately 3.3km to the south-west and 0.5km north of the application site respectively, are the main sources of light within the surrounding area. These built-up areas are therefore expected to have a significant impact on the night scene in the vicinity of the project. Another prominent light source within the study area at night is the security lighting at the existing Leeubos TR 132kV Traction Substation. It is expected that the lights from this substation will be visible at night from relatively far away. Other sources of light are limited to localised lighting from the surrounding farmsteads and residential dwellings. These farmsteads are located within largely undisturbed / untransformed parts of the study area and are therefore characterised by limited amounts of lighting at night. Accordingly, the visual character of the night environment within the study area is considered to be slightly 'polluted' and will therefore not be regarded as pristine.

Due to the fact that a significant amount of light is already present within the surrounding area, the nightscape is not expected to be sensitive to the impact of additional lighting at night. The relatively natural dark character of the nightscape experienced from many of the identified farmsteads is however expected to be moderately sensitive to the impact of additional lighting at night as these areas are characterised by limited disturbance / transformation. Existing night time views from these areas are characteristic of a relatively dark night scene with some light sources visible in the distance as well as those from the Kgakala Township, the town of Leeudoringstad and the existing Leeubos TR 132kV Traction substation.

The security lighting required for the proposed solar PV plant and associated infrastructure is expected to intrude slightly on the nightscape and create additional glare, which would increase the existing light pollution in the surrounding area. Power lines and associated towers or pylons however are not generally lit up at night and thus the proposed 132kV power line is not expected to result in significant lighting impacts.

#### *9.2.6.4 Summary of Key Issues identified*

As mentioned, the potential visual issues / impacts identified during the VIA for the proposed solar PV project, associated infrastructure and 132kV power line include:

- Potential alteration of the visual character of the area during both construction and operation of the solar PV plant and the 132kV power line;
- Potential visual impact on receptors in the study area;
- Potential visual intrusion resulting from vehicles and equipment during construction and decommissioning phases;
- Potential impacts of increased dust emissions from construction / decommissioning activities and related traffic during construction and decommissioning phases;
- Potential impacts of increased dust emissions from maintenance vehicles accessing the site and the power line servitude;
- Potential visual scarring of the landscape as a result of site clearance and earthworks during construction;
- Potential visual intrusion resulting from PV arrays and power line during operation;
- Potential visual clutter in the landscape resulting from the PV arrays and associated on-site infrastructure;
- Potential alteration of the night time visual environment as a result operational and security lighting at the proposed solar PV facility;
- Potential visual intrusion of any remaining infrastructure on the site during decommissioning; and
- Combined visual impacts (i.e. cumulative visual impacts) from other renewable energy facilities in the broader area could potentially alter the sense of place and visual character of the area.

#### *9.2.6.5 Design / Pre-construction phase impacts*

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

#### *9.2.6.6 Construction phase impacts*

Construction phase impacts include the following:

- Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.
- Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers.
- Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment.
- Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.
- The night time visual environment will be altered as a result of construction-related lighting at the proposed solar PV facility.

#### *9.2.6.7 Operational phase impacts*

Operational phase impacts include the following:

- The PV arrays, on-site infrastructure and 132kV power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.
- The proposed solar PV facility, on-site infrastructure and 132kV power line will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.
- Dust emissions and dust plumes from maintenance vehicles accessing the site and power line servitude via gravel roads may evoke negative sentiments from surrounding viewers.
- The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility.

#### *9.2.6.8 Decommissioning phase impacts*

Decommissioning phase impacts include the following:

- Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts.
- Decommissioning activities may be perceived as an unwelcome visual intrusion.
- Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers.
- Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment.
- Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.

#### *9.2.6.9 'No-go' alternative*

The 'No-go' alternative is essentially the option of not developing the Solar PV Plant, Power Line or associated infrastructure in this area. The area would thus retain its visual character and sense of place and no visual impacts would be experienced by any locally occurring receptors. If the Solar PV Facility is not developed in this area, there will be no change in the visual character or the sense of place. There will be no visual impacts on receptors or on the night-time visual environment. The significance of the 'no-go' alternative has been found to be negligible.

As mentioned, the impacts identified can be reduced to either a low or medium negative impact after the implementation of the recommended mitigation measures. The significance of the visual related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**.

### *9.2.7 Heritage Impacts*

The HIA (including Archaeology, Palaeontology and Cultural Landscapes) was conducted by Wouter Fourie of PGS Heritage (Pty) Ltd and is included in **Appendix 6D**. As mentioned, the HIA and PIA were undertaken as standalone assessments, however, the findings of the PIA were used in order to inform the HIA.

The potential heritage related impacts associated with the proposed development (including associated infrastructure) include the following:

- Impact on heritage resources as a result of site clearance and vegetation stripping during construction and decommissioning;
- Cumulative impacts on heritage resources as a result of site clearance and vegetation stripping; and
- Impact on heritage resources as a result of no development (i.e. 'No-go' alternative).

Considering the absence of heritage resources within the Wildebeestkuil 2 Solar PV Plant footprints (**Figure 51** and **Figure 52**) and the low sensitivity of possible palaeontological heritage resources within the geological units, an overall low impact rating for all the phases of implementation for the project is predicted (**Table 24**).

The identified heritage related impacts associated with the proposed PV plant, power line and associated infrastructure are detailed below and are provided in **Table 24** on **page 188**. The significance of the heritage related impacts are also provided in this table.

#### *9.2.7.1 Design / Pre-construction phase impacts*

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

#### *9.2.7.2 Construction phase impacts*

Impacts during the construction phase include the following:

- Impact on heritage resources as a result of site clearance and vegetation stripping

#### *9.2.7.3 Operational phase impacts*

No impacts were identified during the operational phase of the proposed development.

#### *9.2.7.4 Decommissioning phase impacts*

Impacts during the decommissioning phase include the following:

- Impact on heritage resources as a result of site clearance and vegetation stripping.

##### *9.2.7.5 'No–go' alternative*

The no development alternative option assumes the site remains in its current state, i.e. there is no construction of a solar PV plant and power line in the proposed project area and the *status quo* would continue. The significance of 'no-go' alternative(s) has been rated as negative low after the implementation of mitigation measures.

As mentioned, an overall low impact rating for all the phases of implementation for the project is predicted. Significance of 'no-go' alternative rated as part of HIA. The significance of the heritage related impacts associated with the proposed PV plant, power line and associated infrastructure are detailed in **Table 24** on **page 188**.

##### *9.2.7.6 Mitigation Measures*

The following mitigation is suggested to reduce impacts on heritage resources:

- Features WB02-WB08 must be considered no-go areas with a **30-meter** buffer for the burial ground at **WB08** and a **20-meter** buffer for the other sites.
- In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.

Following the impact rating it was concluded that, considering the absence of heritage resources within the footprint (**Figure 51** and **Figure 52**) and the low sensitivity of possible palaeontological heritage resources within the geological units, an overall low impact rating for all the phases of implementation for the respective projects is predicted (**Table 24**).

As mentioned, the significance of the heritage related impacts associated with the proposed PV plant, power line and associated infrastructure are detailed in **Table 24** on **page 188**.

#### *9.2.8 Palaeontological Impacts*

The Desktop PIA was conducted by Elize Butler of Banzai Environmental (Pty) Ltd and is included in **Appendix 6D**. As mentioned, the HIA and PIA were undertaken as standalone assessments, however, the findings of the PIA were used in order to inform the HIA.

The potential palaeontological related impacts associated with the proposed development (including associated infrastructure) include the following:

- Impact on palaeontological resources as a result of site clearance and excavations during construction and decommissioning;
- Cumulative impacts on palaeontological resources as a result of site clearance and vegetation stripping; and
- Impact on palaeontological resources as a result of no development (i.e. 'No-go' alternative).

Considering the sensitivity of possible palaeontological heritage resources within the geological units, an overall low impact rating for all the phases of the project implementation predicted. The identified palaeontological related impacts associated with the proposed PV plant, power line and associated infrastructure are detailed below and are provided in **Table 24** on **page 188**. The significance of the palaeontological related impacts are also provided in this table.

#### *9.2.8.1 Design / Pre-construction phase impacts*

No impact occurs during the design / pre-construction phase of the project. Nevertheless, measures taken during the design / pre-construction phase of the project can potentially have a significant effect on the nature, extent and intensity of impacts experienced during the construction phase.

#### *9.2.8.2 Construction phase impacts*

Impacts during the construction phase include the following:

- Impact on palaeontological resources as a result of site clearance and excavations.

#### *9.2.8.3 Operational phase impacts*

No impacts were identified during the operational phase of the proposed development.

#### *9.2.8.4 Decommissioning phase impacts*

Impacts during the decommissioning phase include the following:

- Impact on palaeontological resources as a result of site clearance and excavations.

#### *9.2.8.5 ‘No–go’ alternative*

The no development alternative option assumes the site remains in its current state, i.e. there is no construction of a solar PV plant and power line in the proposed project area and the *status quo* would continue. The significance of the ‘no-go’ alternative has been rated as negative low after the implementation of mitigation measures.

#### *9.2.8.6 Summary of impact findings*

**Table 23** below provides a summary of the findings of the impact rating and mitigation proposals.

**Table 23:** Geological summary of the area

| **Geological Unit** | **Rock types and age** | **Fossil heritage** | **Palaeontological sensitivity** | **Recommended mitigation** |
|---|---|---|---|---|
| Allanridge Formation<br><br>Ventersdorp Supergroup | Lavas and pyroclastics with minor siliciclastic lenses<br><br>Late Archaean (C. 2.7 GA) | No Fossil heritage known from Formation | Insensitive | None recommended |

As mentioned, considering the sensitivity of possible palaeontological heritage resources within the geological units, an overall low impact rating for all the phases of the project implementation is predicted (**Table 24**). The significance of the palaeontological related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**.

### *9.2.9 Social Impacts*

The Desktop Socio-Economic Impact Assessment was conducted by Tsebo Majoro of Urban Econ Development Economists and is included in **Appendix 6E**.

Issues / impacts identified from a social perspective include the following:

- Availability of sufficient local construction materials of PV Plant during design / pre-construction phase;
- Increase in production of the national and local economies due to project capital expenditure during the construction phase;
- The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure);
- The solar PV plant and 132kV power line will increase the size of the local utility sector and stimulate economic production through multiplier effects during the operational phase;
- Creation of jobs to support operation and maintenance of the plant during the operational phase;
- Generated electricity will improve the security of electricity in the local municipality and increase government's revenue and service delivery during the operational phase;
- Land demarcated for the solar PV plant and 132kV power line will be sterilised and all current activities taking place on said land will be discontinued during the decommissioning phase;
- Positive cumulative effects on the socio-economic environment, including:
  - Stimulation of the economy and increased production;
  - Creation of employment and business opportunities;
  - Increased household income and standard of living; and
  - Adoption of clean, renewable energy and benefits in terms of global warming and climate change.

The impacts identified were informed by interviews with I&APs, as well as the information available about the project. Project-related information concerning the capital costs and employment were sourced from the client and are assumed to be the most accurate data available at the time of the study.

All of the impacts listed above can be reduced to either a low negative or low positive impact after the implementation of the recommended mitigation measures. Potential social issues / impacts resulting from the proposed development are outlined below. The significance of the social related impacts associated with the proposed development are detailed in **Table 24** on **page 188**.

#### *9.2.9.1 Design / pre-construction phase impacts*

Impacts during the design / pre-construction phase include the following:

- Availability of sufficient local construction materials of PV Plant.

#### *9.2.9.2 Construction phase impacts*

Impacts during the construction phase include the following:

- Increase in production of the national and local economies due to project capital expenditure during the construction phase; and
- The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure).

The above-mentioned impacts are discussed below.

**Stimulation of the Economy during Construction**

The establishment of the proposed solar PV and power line project will be associated with numerous capital expenses. Expenses would usually include expenditure on transport and erection of solar PV modules, power lines, electrical and grid connection, foundation, civil works and construction of supporting structures. If goods and services are procured locally, i.e. within South Africa, it increases the production of the respective industries.

This has a positive impact on the national economy and economies of the municipalities where inputs are procured. The capital investment of R135 million in current prices, is required for the development and construction of the proposed projects. Some of this is expected to be spent in South Africa, which will resultantly stimulate the national economy, although for a temporary period of about six months.

The size of the Maquassi Hills LM's economy was estimated at R 3 515,9 million in current prices and primarily comprises of the agricultural and tertiary services sectors. Considering the small economic base of the municipality, the opportunities for the procurement of goods and services within the local economy will be very limited.

Having said this, it is likely that some of the local businesses will benefit from sub-contracting opportunities, consumer expenditure of the construction crew, and an increase in income of locals who are directly employed in the construction activities, or who benefit from the project through local procurement.

The stimulation of the economy will not be dependent on the layout of the solar PV plant within the application site; thus, there are no fatal flaws associated with the layout being proposed. In addition, the stimulation of the economy will not be dependent on the route of the power line corridor within the study area; thus the power line corridor route alternatives are equally preferred.

***Assessment of economy stimulation per power line corridor route alternative***

| Proposed PV Site Layout | Preference | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | R135 million CAPEX will lead to an increase in production in the national and local economies. | None Identified |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | The above-ground power line will have a short-term impact on both direct and indirect economic sectors. | None Identified |
| **Power Line Corridor Alternative Option 2A** | No Preference | The above-ground power line will have a short-term impact on both direct and indirect economic sectors. | None Identified |
| **Power Line Corridor Alternative Option 2B** | No Preference | The underground power line will have a higher direct short-term impact on in the construction sector | None Identified |

**Creation of Employment during Construction**

| **Info Box: Full Time Equivalent (FTE) man-year or FTE jobs** |
|---|
| Employment impacts are calculated in terms of the Full Time Equivalent (FTE) employment positions, which is the same as a FTE job or one man-year of work. This does not directly translate into the headcount of people employed or into new job opportunities. Generally, one FTE man-year is equal to one person working for 40 hours per week for about 50 weeks per year; however, it could vary depending on the industry.<br><br>A FTE man-year means that if one person worked only 20 hours per week for 50 weeks in a year, its FTE equivalent would be 0.5; if two (2) people worked for 20 hours per week for 50 weeks in a year, the combined work load would be estimated as one FTE man-year or one FTE job. In the short-term, an increase in FTE employment positions could be absorbed by the existing workforce, either by working overtime or if these labour resources are underutilised in the industry. |

The construction of the solar PV plant and associated infrastructure will require temporary employment of construction workers, foremen, and engineers on site. For the first two (2) months, about 30 people will be working on site, for the following three months – 60 jobs will be created, and for the last month, an additional 10 jobs will be created.

Thus, the construction phase will span over six (6) months and create between 10 and 60 temporary employment opportunities throughout its duration, which equates to about 20 FTE. About 90% of the jobs will be allocated to unskilled workers and the remaining 10% will be filled by skilled workers. Considering the current skills profile of the local municipality, a good portion of these jobs are likely to be filled by people from the local communities.

This project will thus contribute to improving the employment situation in the local municipality for a temporary period, as semi-skilled individuals make up most of the local municipality. Employment of the individuals, albeit temporary, will increase their household income, improve their standard of living and benefit their families.

In addition to those benefitting from direct employment created at the project, various multiplier effects will assist in temporarily supporting existing jobs in the businesses offering services and goods that will be procured during construction activities. The increased temporary income earned by these businesses will in turn stimulate consumption spending, creating another round of multiplier effect.

***Assessment of Employment for proposed site layout***

| **Proposed PV Site Layout** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | Between 10 and 60 temporary jobs will be created during different stages of the construction period, with an equivalent of 20 FTE. | None Identified |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | The above-ground power line will have a short-term impact on both direct and indirect employment. | None Identified |
| **Power Line Corridor Alternative Option 2A** | No Preference | The above-ground power line will have a short-term impact on both direct and indirect employment | None Identified |

| Proposed PV Site Layout | Preference | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Power Line Corridor Alternative Option 2B** | Preference | The underground power line will have a higher direct short-term impact on construction sector employment | None Identified |

**Loss of Agricultural Production due to Land Sterilisation**

The proposed project location and surrounding land is currently used for commercial farming. The current economic activity(ies) and residences on the directly impacted farm, adjacent farms as well as the farms located in immediate proximity from the proposed site are summarised in **Table 21** on **page 145** in **section 8.13.8.**

It is estimated that the solar PV plant and facilities footprint will be approximately 22ha[30]. These will be established on land currently used for commercial livestock farming. The area where the solar PV plant and facilities are located will be sterilised, i.e. any activity that is currently taking place on the site that will be affected by the plant's footprint will be stopped.

The agreement between the landowner and the property developer is that livestock farming activities will continue along the periphery of the fenced solar PV plant's footprint. Therefore, loss of agricultural activity and income will not occur.

The nature of the activities taking place on the farms adjacent to the proposed project's site is also not expected to be sensitive to the proposed project's construction or operation; therefore, no negative effects on the commercial activities observed in the surrounding area are expected due to visual or noise effects that may be created by the development of the solar PV plant and power line.

***Assessment of land sterilization per power line corridor route alternative***

| Proposed PV Site Layout | Preference | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | 22ha of land will be sterilised. | None Identified. |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | The above-ground power line will sterilise approximately 37 ha of land. | None Identified |
| **Power Line Corridor Alternative Option 2A** | No Preference | The above-ground power line will sterilise approximately 37 ha of land. | None Identified |
| **Power Line Corridor Alternative Option 2B** | Preference | The underground power line will have no significant impact on agricultural land | None Identified |

#### *9.2.9.3 Operational phase impacts*

Impacts during the construction phase include the following:

- The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure);
- The solar PV plant and 132kV power line will increase the size of the local utility sector and stimulate economic production through multiplier effects during the operational phase;

[30] Area where PV panels will be erected. It should be noted that although the PV array area will cover an area of up to approximately 23.864ha, the entire area will not be cleared as the PV panels only require small areas of vegetation to be cleared. It should be noted that less than 20ha of indigenous vegetation will ultimately be cleared (as determined by the specialist)

- Creation of jobs to support operation and maintenance of the plant during the operational phase; and
- Generated electricity will improve the security of electricity in the local municipality and increase government's revenue and service delivery during the operational phase.

The above-mentioned impacts are discussed below.

**Stimulation of the Local Economy during Operations**

The operational period of the proposed Solar PV plant and power line is 20 years. Approximately R200 000 will be spent annually during the operations period, of which a significant portion will comprise of salaries and wages of the plant's employees. The operations of the plant will make some contribution towards the growth of the local economy, as it will increase the size of the local electricity sector, as well as stimulate the demand for other sector's services and goods such as water, transportation, and trade.

The proposed power line alternatives will result in the same level of production output during operations; no differential among layout alternatives can be made, as seen in the table below.

***Assessment of economy stimulation for proposed site layout***

| Proposed PV Site Layout | Preference | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | Operational Expenditure (OPEX) of R200 000 will stimulate the local economy. | OPEX of R200 000 will stimulate the local economy. |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | The above-ground power line will have no distinguishable economic impact from the proposed PV | None Identified |
| **Power Line Corridor Alternative Option 2A** | No Preference | The above-ground power line will have no distinguishable economic impact from the proposed PV | None Identified |
| **Power Line Corridor Alternative Option 2B** | No Preference | The underground power line will have no distinguishable economic impact from the proposed PV | None Identified |

**Creation of Employment and Increased Household Income during Operations**

The operation of the solar PV plant and associated infrastructure will require functional and maintenance employees. It is envisaged that about six direct jobs will be created during the operations phase, which will occur for a duration of 20 years. Half of these jobs are to be filled by people from the local communities. Employment of the six individuals for the entire operational period will increase their household income, improve their standard of living and benefit their families.

The proposed power line alternatives will create no additional employment opportunities, regardless of its location on the site; thus, layout alternatives are equally preferred, as seen in the table below.

***Assessment of employment per power line corridor route alternative***

| Proposed PV Site Layout | Preference | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | Six (6) sustainable jobs will be created. | None Identified. |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | No distinguishable additional employment opportunities | None Identified |

| | | | |
|---|---|---|---|
| **Power Line Corridor Alternative Option 2A** | No Preference | No distinguishable additional employment opportunities | None Identified |
| **Power Line Corridor Alternative Option 2B** | No Preference | No distinguishable additional employment opportunities | None Identified |

**<u>Improved Municipal Service Delivery</u>**

The proposed 9.9MW Solar PV Plant will be connected to the Leeudoringstad Solar Plant Substation via a 132kV power line (part of this project) and generated electricity will be sold nationwide. As stated before, the municipality's electricity network has aged, and a notable electricity supply backlog exists. The proposed project, albeit relatively small, will contribute towards diminishing this backlog; thus, improving the government service delivery, and could potentially also aid in growing the local economy by increasing the overall supply of electricity in the local economy.

Furthermore, due to the taxes and rates that will be paid by the project to the municipality, the revenue of the latter will be increased, thus allowing it to improve the service delivery in other areas.

***Assessment of service delivery improvement for proposed site layout***

| **Proposed PV Site Layout** | **Preference** | Concerns / Impact Summary | Fatal Flaws |
|---|---|---|---|
| **Wildebeestkuil 2 Solar PV Plant Layout** | No Alternatives | An improvement in municipal service delivery will take place. | None Identified. |
| **Power line Options** | **Preference** | **Concerns / Impact Summary** | **Fatal Flaws** |
| **Power Line Corridor Alternative Option 1** | No Preference | The above-ground power line will assist the transfer of electricity only | None Identified |
| **Power Line Corridor Alternative Option 2A** | No Preference | The above-ground power line will assist the transfer of electricity only | None Identified |
| **Power Line Corridor Alternative Option 2B** | No Preference | The above-ground power line will assist the transfer of electricity only | None Identified |

#### *9.2.9.4 Decommissioning phase impacts*

Impacts during the decommissioning phase include the following:

- Land demarcated for the solar PV plant and 132kV power line will be sterilised and all current activities taking place on said land will be discontinued during the decommissioning phase.

**<u>Loss of Agricultural Production due to Land Sterilisation</u>**

The above-mentioned impact is discussed in **section 9.2.9.2** above.

#### *9.2.9.5 'No–go' alternative*

The proposed introduction of a solar PV plant and power line on the project site near the town of Leeudoringstad will have several significant impacts, as discussed above. In the case were the project is delayed or abandoned, it could be expected that the baseline information will remain the same. There will be no economic and employment growth directly attributable to the solar PV plant and power line.

The continued strain placed on the national energy grid will continue to worsen as population growth adds higher demands for energy, therefore the load-shedding strategy utilised by Eskom will continue to hamper businesses production and leave households without energy for heating, cooking and lighting. It should be noted that the significance of 'no-go' alternative(s) has not been rated as part of the Social Impact Assessment.

As mentioned, the identified impacts can be reduced to either a low negative or low positive impact after the implementation of the recommended mitigation measures. The significance of the social related impacts associated with the proposed PV plant and power line are detailed in **Table 24** on **page 188**.

## 9.3 Overall Impact Assessment: Significance of all Potential Impacts

The impact assessment in the table below (**Table 24**) is relevant to all alternatives under consideration and is an extension of the impacts discussed above, with recommended mitigation measures provided (where applicable / required).

**Table 24:** Assessment of identified environmental impacts (all phases) associated with solar PV Plant and 132kV Power Line (including associated infrastructure)

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| **Pre-construction Phase** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |
| Artificial Wetland 1 Impacts associated with the Temporary Building Zones | Impacts associated with the Temporary Building Zone within 55m to Artificial Wetland 1 | 1 | 3 | 2 | 2 | 2 | 2 | 20 | - | Low | **<u>Preventing Indirect Erosion, Sedimentation and Run-off Impacts</u>** – In general, adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased / accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian 'sausage' nets can be used to around the lay-down area to prevent run-off flowing into the surrounding area and possibly, any nearby surface water resources. This will additionally assist with preventing consequent erosion and sedimentation in susceptible surrounding areas.<br><br>**<u>Preventing Water Quality and Soil Contamination Impacts</u>** – All fuels, oils and any other hazardous substances or liquids must be contained in bunded areas of 110% capacity to prevent fuels, oils and any | 1 | 3 | 1 | 1 | 1 | 1 | 7 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | other hazardous substances or liquids contamination in run-off affecting any surface water resources on the study site. Additionally, any fuelling and re-fuelling activities must also take place over a bunded area of 110% capacity to prevent contamination in run-off entering surface water resources on the study site. Drainage in bunded areas must be removed or drained to capture sumps, grit / oil separators and/or sand filter traps.<br><br>All vehicles and equipment must be regularly maintained to avoid any oil, fuel or hazardous leaks or spills. Spillage clean up kits must be readily available on site should an incident occur. All leaks and spillages must be cleared as soon as practically possible.<br><br>A spill contingency plan must be compiled and implemented. All staff must be made aware of this protocol. In addition, soil contingency measures must be provided e.g. oil spill kits and fire extinguishers.<br><br>Temporary chemical toilets must be provided and must be serviced on a regular basis. | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | Solid waste must be removed on a regular basis as soon as practically possible.<br><br>**Preventing Fire Risks** – Operational fire extinguishers are to be available in the case of a fire emergency. Given the dry seasons and strong winds that the region experiences, it is recommended that a fire management and emergency plan is compiled. A suitably qualified health and safety officer must compile the fire management and emergency plan for proposed development. | | | | | | | | | |
| **Agriculture and soils** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Heritage and Palaeontology** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Social** | | | | | | | | | | | | | | | | | | | | |
| Construction Materials | Availability of sufficient local construction materials of PV Plant | 1 | 3 | 3 | 2 | 1 | 4 | 14 | - | High | Source unavailable materials from abroad (import) | 4 | 3 | 1 | 2 | 2 | 4 | 16 | + | Low |
| **Construction Phase** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| Indigenous natural vegetation | Loss and/or fragmentation of | 1 | 4 | 3 | 3 | 4 | 3 | 45 | - | High | ▪ Use existing road infrastructure for access roads. | 1 | 4 | 3 | 2 | 4 | 3 | 42 | - | Medium |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | vegetation due to clearing for construction of infrastructure – solar PV plant & associated infrastructure | | | | | | | | | | ▪ Avoid construction of infrastructure within sensitive habitats.<br>▪ Minimise vegetation clearing and disturbance to footprint areas only.<br>▪ Compile a rehabilitation programme and rehabilitate disturbed areas.<br>▪ Compile an Alien Invasive Management Plan. | | | | | | | | | |
| Protected trees | Loss of individuals due to clearing for construction of infrastructure – solar PV plant & associated infrastructure | 1 | 2 | 2 | 2 | 2 | 1 | 9 | - | Low | ▪ Avoid damage or loss of trees in neighbouring areas (none were found within footprint areas during walk-through survey). | 1 | 2 | 2 | 2 | 1 | 1 | 8 | - | Low |
| Fauna | Loss of habitat due to clearing for construction of infrastructure – solar PV plant & associated infrastructure | 1 | 3 | 2 | 2 | 3 | 2 | 22 | - | Low | • Use existing road infrastructure for access roads.<br>• Avoid construction of infrastructure within sensitive habitats.<br>• Minimise vegetation clearing and disturbance to footprint areas only.<br>• Compile a rehabilitation programme and rehabilitate disturbed areas.<br>• Compile an Alien Invasive Management Plan. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| Fauna | Direct mortality due to machinery, construction and increased traffic – solar PV plant & associated infrastructure | 1 | 2 | 2 | 2 | 3 | 2 | 20 | - | Low | • Avoid construction of infrastructure within sensitive habitats.<br>• Implement traffic control measures, including speed limits and 'no-go' zones. | 1 | 1 | 2 | 2 | 3 | 1 | 9 | - | Low |
| Fauna | Displacement and disturbance due to increased activity and noise levels – solar PV plant & associated infrastructure | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low | • Avoid construction of infrastructure within sensitive habitats.<br>• Implement traffic control measures, including speed limits and no-go zones. | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low |
| Indigenous natural vegetation | Loss and/or fragmentation of vegetation due to clearing for construction of infrastructure - grid connection infrastructure | 1 | 3 | 2 | 2 | 3 | 2 | 22 | - | Low | • Use existing road infrastructure for access roads.<br>• Avoid construction of infrastructure within sensitive habitats.<br>• Minimise vegetation clearing and disturbance to footprint areas only.<br>• Compile a rehabilitation programme and rehabilitate disturbed areas. | 1 | 3 | 2 | 2 | 2 | 2 | 20 | - | Low |
| Protected trees | Loss of individuals due to clearing for construction of infrastructure - grid connection infrastructure | 1 | 3 | 2 | 2 | 3 | 2 | 22 | - | Low | Avoid trees in surrounding areas. | 1 | 3 | 1 | 2 | 1 | 1 | 8 | - | Low |
| Fauna | Loss of habitat due to clearing for construction of infrastructure - grid connection infrastructure | 1 | 3 | 2 | 2 | 3 | 2 | 22 | - | Low | • Use existing road infrastructure for access roads.<br>• Avoid construction of infrastructure within sensitive habitats. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | • Minimise vegetation clearing and disturbance to footprint areas only.<br>• Compile a rehabilitation programme and rehabilitate disturbed areas. | | | | | | | | | |
| Fauna | Direct mortality due to machinery, construction and increased traffic - grid connection infrastructure | 1 | 2 | 2 | 2 | 1 | 2 | 16 | - | Low | • Avoid construction of infrastructure within sensitive habitats.<br>• Implement traffic control measures, including speed limits and 'no-go' zones. | 1 | 2 | 2 | 2 | 1 | 1 | 8 | - | Low |
| Fauna | Displacement and disturbance due to increased activity and noise levels - grid connection infrastructure | 1 | 2 | 2 | 2 | 1 | 2 | 16 | - | Low | • Avoid construction of infrastructure within sensitive habitats.<br>• Implement traffic control measures, including speed limits and 'no-go' zones. | 1 | 2 | 2 | 2 | 1 | 1 | 8 | - | Low |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| Avifauna | Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure | 1 | 4 | 2 | 3 | 1 | 3 | 33 | - | Medium | • Construction activity should be restricted to the immediate footprint of the infrastructure.<br>• Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.<br>• Measures to control noise and dust should be applied according to current best practice in the industry.<br>• Maximum used should be made of existing access roads and the | 1 | 3 | 2 | 3 | 1 | 3 | 30 | - | Medium |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | construction of new roads should be kept to a minimum. | | | | | | | | | |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 - Vehicle and Machinery Degradation Impacts | Vehicle and machinery degradation | 1 | 3 | 2 | 2 | 3 | 3 | 33 | - | Medium | **Preventing Physical Degradation of the Surface Water Resources** – No construction is to take place within 50m nor directly within any of the identified and delineated surface water resources unless absolutely necessary. The delineated surface water resources and associated buffer zones are to be clearly demarcated as highly sensitive, and no access into these areas is to be allowed unless being authorized / licensed to do so.<br><br>**Limiting Physical Degradation to Surface Water Resources** – Where construction directly within and / or in close proximity (50m) to surface water resources is absolutely required, the relevant environmental authorization and water licenses must be obtained before construction is allowed to commence. Where obtained, the stipulated conditions and any further mitigation measures are to be adhered to accordingly.<br><br>Should an Environmental Authorization and / or WUL permit be issued, a single access route or "Right of Way" (RoW) is to be established | 1 | 2 | 2 | 2 | 3 | 3 | 30 | - | Medium |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | through or in the desired construction area in the surface water resource(s). The environmentally authorized and water use license permitted construction area is to be demarcated and made clearly visible in conjunction to the RoW. The width of the RoW must be limited to the width of the vehicles required to enter the surface water resources (no more than a 3m width). An area around the locations of the proposed construction area(s) and / or structures (including associated infrastructure) will be required in order for construction vehicles and machinery to operate / manoeuvre where required. This too must be limited to the smallest possible area and made clearly visible by means of demarcation. Ideally, vegetation should not be cleared across the entire RoW. Rather, only the vehicle tracks should be cleared. Remaining vegetation can be kept trimmed to below 30cm but not lower than 5cm height. As the wetlands can be seasonal, gravel running tracks can be used for stability. The gravel tracks will however need to be removed as soon as construction is complete. No tracks may be crossed in any surface water resource either during or directly after a rainfall event. The affected areas will | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | need to be rehabilitated. A wetland rehabilitation plan will be required. This must be compiled by a suitably qualified wetland specialist. The rehabilitation plan must also be approved by the relevant environmental and water authorities.<br><br>**Preventing Soil Contamination** – No vehicles are to be allowed in the highly sensitive areas unless authorised. Should vehicles be authorised in highly sensitive areas, all vehicles and machinery are to be checked for oil, fuel or any other fluid leaks before entering the required construction areas. All vehicles and machinery must be regularly serviced and maintained before being allowed to enter the construction areas. No fuelling, re-fuelling, vehicle and machinery servicing or maintenance is to take place in the highly sensitive areas. The construction site is to contain sufficient spill contingency measures throughout the construction process. These include, but are not limited to, oil spill kits to be available, fire extinguishers, fuel, oil or hazardous substances storage areas must be bunded to prevent oil or fuel contamination of the ground and / or | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | nearby surface water resources or the associated buffer zone. | | | | | | | | | |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1- Human Degradation of Flora and Fauna associated with the Surface Water Resources | Human degradation to fauna and flora associated with the surface water resources | 1 | 3 | 1 | 2 | 2 | 2 | 18 | - | Low | **<u>Minimising Human Physical Degradation of Surface Water Resources</u>** – Construction workers are only allowed in the designated construction areas and not into the surrounding surface water resources. Highly sensitive areas are to be clearly demarcated and made clearly visible prior to the commencement of construction and no access beyond these areas is to be allowed to construction workers unless in RoW areas.<br><br>In general, no animals on the construction site or surrounding areas are to be hunted, captured, trapped, removed, injured, killed or eaten. Should any party be found guilty of such an offence, stringent penalties should be imposed. However, where animals (including snakes and reptiles) pose a threat to the safety of workers, the appointed environmental control officer (ECO) is to be contacted for removal thereof. No animals that are removed are allowed to be killed. Removed animals must be relocated a safe distance from the RoW in close proximity to where they were found. | 1 | 1 | 1 | 1 | 1 | 1 | 5 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | No 'long drop"' toilets are allowed on the study site. Suitable temporary chemical sanitation facilities are to be provided. Temporary chemical sanitation facilities must not be placed within any surface water resource and / or the associated buffer zone. Temporary sanitation facilities must rather be placed at least 100m from the surface water resources where these are required. Temporary chemical sanitation facilities must be regularly cleaned and adequately maintained (checked for leaks) to prevent pollution impacts.<br><br>No water is to be abstracted unless a water use license is granted for specific quantities for a specific water resource or abstraction is within Schedule 1 water uses in terms of the NWA.<br><br>No hazardous or building materials are to be stored or brought into the highly sensitive areas. Should a designated storage area be required, the storage area must be placed at the furthest location from the highly sensitive area. Appropriate safety measures as stipulated above must be implemented. | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | No cement mixing is to take place directly in the surface water resources or the associated buffer zones. In general, any cement mixing should take place over a bin lined (impermeable) surface or alternatively in the load bin of a vehicle to prevent the mixing of cement with the ground. Importantly, no mixing of cement directly on the surface is allowed in the highly sensitive areas. | | | | | | | | | |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 - Degradation and Removal of Soils and Vegetation associated with the Surface Water Resources | Degradation and removal of soils and vegetation associated with the surface water resources | 1 | 3 | 3 | 2 | 3 | 3 | 36 | - | Medium | **<u>Avoiding Direct Impacts to Surface Water Resources</u>** – The preferred power line corridor alternatives should be selected as the preferred alternatives for the environmental authorisation process in order to avoid direct impacts to the relevant surface water resources. Should the preferred corridor alternatives not be selected as preferred and construction will be required directly within surface water resources the necessary Environmental Authorization and / or WUL permit must be obtained prior to construction. Accordingly, in this scenario, the permitted construction area is to be established as a RoW area, as described in Sections 8.2.1 and 8.2.2 of the Surface Water Impact Assessment Report (**Appendix 6B**). | 1 | 2 | 3 | 2 | 3 | 2 | 22 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | **<u>Preservation of Surface Water Resources as a Result of Power Line Construction</u>** – For **Wildebeestkuil Overhead Power Line Corridor Option 2A**, excavations for power line towers (where authorised and permitted) must be undertaken by hand as far as practically possible to limit vehicles inside of the surface water resources. Where any soils are to be removed from surface water resource areas, these are to be stockpiled. Top soil must be stockpiled separately from the sub-soil types. All soil stockpiles from general construction activities in or within 50metres from the delineated surface water resource must be adequately bunded by suitable materials. Bunding materials can include a brick layer (three bricks in height) boundary around the soil stockpile. Alternatively, wooden planks approximately 40-50cm high fixed with pegs can be used. Sand bags may also potentially be used. This will prevent soil run-off and potential sedimentation pollution (environmental incident) impacting on the surface water resource.<br><br>**<u>For Wildebeestkuil Underground Power Line Corridor Option 2B,</u>** | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | **<u>Limiting Removal of Excavated Soils</u>** – Where the underground cable is to be constructed in the within Natural Depression Wetland 1 and the associated buffer zone, excavated topsoils should be stockpiled separately from subsoils so that it can be backfilled in the correct soil horizon order for rehabilitation purposes. Wetland soils must not be removed unless there is a surplus. The soils are therefore to be re-used when back filling. Should there be a surplus of soils after backfilling has taken place, these should be taken to a registered landfill site that has sufficient capacity to assimilate the spoil. The topsoil is to be used for rehabilitation purposes and must not be removed from the site. It is critical that when the soils are reinstated, the subsoils are to be backfilled first followed by the topsoil. Topsoils (first 300mm of soil) will therefore need to be stockpiled separately from sub-soils. The topsoil contains a natural seedbank from which the affected wetlands, riparian habitat and buffer zone can naturally rehabilitate.<br><br>Where the soils are excavated from the sensitive areas, it is preferable for them to be stockpiled adjacent to the | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | excavation trench to limit worker/vehicle and any other movement activities around the excavation areas. From a safety perspective, potential mud slides can occur during construction activities in wet weather which must be avoided. The stockpiled soils adjacent the trench will however require bunding of suitable materials to prevent erosion and sedimentation into the wetland itself. It is recommended that sand bags of sufficient height are pegged at the foot of the stockpiles to perform the dual role of preventing sedimentation and act as a supporting structure. Stockpiles are not to exceed 1.2m to prevent collapse potential.<br><br>**Rehabilitation of RoW Areas** – Ideally, the affected RoW zones in the sensitive areas must be re-instated with the soils removed from the surface water resource(s), and the affected areas must be levelled, or appropriately sloped and scarified to loosen the soil and allow seeds contained in the natural seed bank to re-establish. However, given the aridity of the study area, it is likely that vegetation recovery will be slow. Rehabilitation areas will need to be monitored for erosion and invasion of | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | alien vegetation species until re-growth can establish where prevalent. | | | | | | | | | |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 - Increased Run-off, Erosion and Sedimentation Impacts | Increased storm water run-off, erosion and increased sedimentation impacting on the surface water resources | 1 | 3 | 2 | 3 | 2 | 3 | 33 | - | Medium | **<u>Preventing Increased Run-off and Sedimentation Impacts</u>** – Vegetation clearing should take place in a phased manner, only clearing areas that will be constructed on immediately. Vegetation clearing must not take place in areas where construction will only take place in the distant future.<br><br>An appropriate storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off in the designated construction areas.<br><br>In general, adequate structures must be put into place (temporary or permanent where necessary in extreme cases) to deal with increased/accelerated run-off and sediment volumes. The use of silt fencing and potentially sandbags or hessian “sausage” nets can be used to prevent erosion in susceptible construction areas. All impacted areas are to be adequately sloped to prevent the onset of erosion. | 1 | 4 | 1 | 2 | 1 | 1 | 9 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | | | | | | | | | | Importantly, special attention must be given and implemented at the recommendation of the ECO for site specific erosion, sedimentation and run-off mitigation measures at the edge of the buffer zones of the surface water resources if and where required. | | | | | | | | | |
| **Agriculture and Soils** | | | | | | | | | | | | | | | | | | | | |
| Soil and Agricultural Potential | Loss of agricultural land | 1 | 3 | 2 | 2 | 3 | 2 | 26 | - | Medium | Avoid any cultivated and especially irrigated areas, if possible. | 1 | 3 | 2 | 2 | 3 | 1 | 24 | - | Medium |
| Soil and Agricultural Potential | Soil erosion (wind or water) caused by surface disturbance | 2 | 3 | 3 | 3 | 3 | 3 | 42 | - | Medium | Avoid extensive vegetation removal; re-vegetate as soon as possible and maintain cover (irrigate if necessary). | 1 | 2 | 1 | 2 | 1 | 2 | 14 | - | Low |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| Removal of subsoils (soil, rock) | Displacement of natural earth material and overlying vegetation:<br>▪ Increase in soil and wind erosion due to clearing of vegetation.<br>▪ Construction and earthmoving vehicles may displace soil during operations.<br>▪ Creation of drainage paths along access tracks.<br>▪ Potential oil spillages from heavy plant.<br>▪ Excessive dust. | 1 | 3 | 2 | 2 | 2 | 2 | 20 | - | Low | ▪ Identify protected areas prior to construction.<br>▪ Construction of temporary berms and drainage channels to divert surface water.<br>▪ Minimize earthworks and fills.<br>▪ Use existing road network and access tracks.<br>▪ Rehabilitation of affected areas (such as re-grassing, mechanical stabilization).<br>▪ Correct engineering design and construction of gravel roads and water crossings.<br>▪ Correct construction methods for foundation installations.<br>▪ Vehicle repairs to be undertaken in designated areas. | 1 | 2 | 2 | 1 | 4 | 2 | 20 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | | | | | | | | | | ▪ Control storm water flow<br>▪ Dust suppression | | | | | | | | | |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| **<u>Solar PV Plant</u>**<br>▪ Potential alteration of the visual character and sense of place.<br>▪ Potential visual impact on receptors in the study area | ▪ Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.<br>▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.<br>▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers.<br>▪ Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment. | 2 | 3 | 1 | 2 | 1 | 2 | 18 | - | Low | ▪ Carefully plan to mimimise the construction period and avoid construction delays.<br>▪ Inform receptors within 500m of the site of the construction programme and schedules.<br>▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.<br>▪ Vegetation clearing should take place in a phased manner.<br>▪ Where possible, re-vegetate all reinstated cable trenches with the same vegetation that existed prior to the cable being laid.<br>▪ Establish erosion control measures on areas which will be exposed for long periods of time. This is to reduce the potential impact heavy rains may have on the bare soil.<br>▪ Suitable buffers of intact natural vegetation should be provided along the perimeter of the development area.<br>▪ Maintain a neat construction site by removing rubble and waste materials regularly.<br>▪ Where possible, underground cabling should be utilised. | 2 | 2 | 1 | 2 | 1 | 2 | 16 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. | | | | | | | | | | ▪ Make use of existing gravel access roads where possible.<br>▪ Limit the number of vehicles and trucks travelling to and from the construction site, where possible.<br>▪ Ensure that dust suppression techniques are implemented:<br>○ on all access roads;<br>○ in all areas where vegetation clearing has taken place;<br>○ on all soil stockpiles.<br>▪ Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. | | | | | | | | | |
| **Associated On-Site Infrastructure & 132kV Power Line**<br>▪ Potential alteration of the visual character and sense of place.<br>▪ Potential visual impact on receptors in the study area | ▪ Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.<br>▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.<br>▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving | 2 | 3 | 1 | 2 | 1 | 2 | 18 | - | Low | ▪ Carefully plan to mimimise the construction period and avoid construction delays.<br>▪ Inform receptors within 500m of the site of the construction programme and schedules.<br>▪ Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.<br>▪ Vegetation clearing should take place in a phased manner.<br>▪ Maintain a neat construction site by removing rubble and waste materials regularly.<br>▪ Where possible, underground cabling should be utilised.<br>▪ Make use of existing gravel access roads where possible. | 2 | 2 | 1 | 1 | 1 | 2 | 14 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | the construction site may evoke negative sentiments from surrounding viewers.<br>▪ Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment.<br>▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. | | | | | | | | | | ▪ Limit the number of vehicles and trucks travelling to and from the Make use of existing gravel access roads where possible.<br>▪ Limit the number of vehicles and trucks travelling to and from the construction site, where possible.<br>▪ Ensure that dust suppression techniques are implemented:<br>○ on all access roads;<br>○ in all areas where vegetation clearing has taken place;<br>○ on all soil stockpiles.<br>▪ Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. | | | | | | | | | |
| **Heritage and Paleontology** | | | | | | | | | | | | | | | | | | | | |
| Impact on heritage resources | Site clearance and vegetation stripping | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | ▪ Implement a chance finds procedures to handle any heritage resources discovered during construction.<br>▪ Implement recommendation in section 6.5 of HIA report (**Appendix 6D**), namely:<br>○ Features **WB02-WB08** must be considered no-go areas with a **30-meter** buffer for the burial ground at **WB08** | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |

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| | | | | | | | | | | | and a **20-meter** buffer for the other sites.<br>○ In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures. | | | | | | | | | |
| Impact on palaeontological resources | Site clearance and excavations | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | Same as above | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| **Social** | | | | | | | | | | | | | | | | | | | | |
| Economic Production | Increase in production of the national and local economies due to project capital expenditure. | 4 | 4 | 1 | 1 | 1 | 2 | 22 | + | Low | ▪ Procure inputs from local and domestic suppliers<br>▪ Employ local contractors where possible | 4 | 4 | 1 | 1 | 1 | 2 | 22 | + | Low |
| Employment measured in Full-time Equivalent Enrolment (FTE)-person years | The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure) | 4 | 4 | 1 | 1 | 1 | 1 | 11 | + | Low | ▪ Employ labour-intensive methods<br>▪ Employ local residents and communities<br>▪ Sub-contract to local construction companies<br>▪ Utilise local suppliers | 4 | 4 | 1 | 1 | 1 | 1 | 11 | + | Low |
| **Operational Phase** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| Fauna | Direct mortality of fauna through traffic, illegal | 2 | 2 | 2 | 2 | 3 | 1 | 11 | - | Low | ▪ Implement traffic control measures, including speed limits. | 2 | 2 | 2 | 1 | 3 | 1 | 10 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | collecting, poaching and collisions and/or entanglement with infrastructure – solar PV plant & associated infrastructure | | | | | | | | | | ▪ Environmental awareness education for staff and visitors. | | | | | | | | | |
| Vegetation | Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors – solar PV plant & associated infrastructure | 2 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ Compile and implement Alien Invasive Management Plan.<br>▪ Rehabilitate disturbed areas. | 1 | 2 | 1 | 2 | 3 | 1 | 9 | - | Low |
| Vegetation | Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape – solar PV plant & associated infrastructure | 1 | 3 | 2 | 3 | 3 | 2 | 24 | - | Medium | ▪ Compile and implement a storm water management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Undertake regular monitoring to detect erosion features early so that they can be controlled.<br>▪ Implement control measures.<br>▪ Avoid building on or near steep or unstable slopes.<br>▪ Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| Fauna | Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with | 1 | 2 | 2 | 2 | 1 | 2 | 16 | - | Low | ▪ Implement traffic control measures, including speed limits.<br>▪ Environmental awareness education for staff and visitors. | 1 | 2 | 2 | 2 | 1 | 1 | 8 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | infrastructure - grid connection infrastructure | | | | | | | | | | | | | | | | | | | |
| Vegetation | Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors - grid connection infrastructure | 2 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ Compile and implement Alien Invasive Management Plan.<br>▪ Rehabilitate disturbed areas. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| Vegetation | Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape - grid connection infrastructure | 1 | 2 | 2 | 3 | 3 | 2 | 22 | - | Medium | ▪ Compile and implement a storm water management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Undertake regular monitoring to detect erosion features early so that they can be controlled.<br>▪ Implement control measures.<br>▪ Avoid building on or near steep or unstable slopes.<br>▪ Construct proper culverts, bridges and/or crossings at drainage-line crossings, and other attenuation devices to limit overland flow | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| Avifauna | Displacement of priority species due to habitat transformation associated with construction of the | 1 | 4 | 3 | 3 | 3 | 3 | 42 | - | Medium | ▪ Construction activity should be restricted to the immediate footprint of the infrastructure. Access to the remainder of the site should be strictly controlled to | 1 | 2 | 2 | 2 | 3 | 2 | 20 | - | Low |

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| | PV plant and associated infrastructure. | | | | | | | | | | prevent unnecessary degradation of habitat.<br>▪ Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum.<br>▪ The mitigation measures proposed by the vegetation specialist must be strictly enforced. | | | | | | | | | |
| Avifauna | Entrapment of large-bodied birds in the double perimeter fence | 2 | 2 | 1 | 2 | 3 | 2 | 20 | - | Low | It is recommended that a single perimeter fence is used | 2 | 1 | 1 | 2 | 3 | 2 | 18 | - | Low |
| Avifauna | Mortality of priority species due to collisions with the 132kV grid connection | 2 | 2 | 2 | 2 | 3 | 2 | 22 | - | Low | A walk-through exercise should be conducted by the avifaunal specialist once the tower positions have been finalised with the objective of demarcating the spans that need to be marked Bird Flight Diverters (BFDs). | 2 | 1 | 2 | 2 | 3 | 2 | 20 | - | Low |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 - Vehicle Damage to the Surface Water Resources | Vehicle damage to the surface water resources | 1 | 3 | 2 | 2 | 3 | 3 | 33 | - | Medium | **Minimising Vehicle Damage to Surface Water Resources** – Potential impacts can be completely avoided by the routing of access and service roads outside of and away from the surface water resources and the associated buffer zones. The existing road on the study site will therefore need to be re-aligned as it currently routes through Drainage Line 1 and is within the buffer zone of Artificial Depression Wetland 1. | 1 | 1 | 1 | 1 | 3 | 1 | 7 | - | Low |

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| | | | | | | | | | | | However, where access through the surface water resources are unavoidable and absolutely required, it is recommended that any road plan and associated structures be submitted to the relevant environmental and water departments for approval prior to implementation.<br><br>The access roads that are environmentally authorised and have been permitted in terms of water use licensing in the surface water resources will have to be regularly monitored and checked for erosion. Monitoring should be conducted once every month in the rainy season (October to March). Additionally, after short or long periods of heavy rainfall or after long periods of sustained rainfall, the roads will need to be checked on an *ad hoc* basis for erosion. Rehabilitation measures will need to be employed should erosion be identified.<br><br>Where erosion begins to take place, this must be dealt with immediately to prevent significant erosion damage to the surface water resources. Should large scale erosion occur, a rehabilitation plan will be required. Input, reporting and recommendations | | | | | | | | | |

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| | | | | | | | | | | Medium | from a suitably qualified wetland/surface water specialist must be obtained in this respect. | | | | | | | | | Low |
| Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1 - Storm water Run-off Impacts to Surface Water Resources | Impermeable and hardened surfaces creating accelerated run-off, consequent erosion and sedimentation | 1 | 3 | 2 | 2 | 3 | 3 | 33 | - | Medium | Any hardstand area or building within 50m proximity to a surface water resource must have energy dissipating structures in an appropriate location to prevent increased run-off and sediments contained in the run-off entering adjacent areas or surface water resources. This can be in the form of hard concrete structures or soft engineering structures (such as grass blocks for example).<br><br>Alternatively, a suitable operational storm water management design or plan can be compiled and implemented that accounts for the use of appropriate alternative structures or devices that will prevent increased run-off and sediment entering adjacent areas or surface water resources. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| **Agriculture and Soils** | | | | | | | | | | | | | | | | | | | | |
| Soil and Agricultural Potential | Loss of agricultural land | 1 | 3 | 2 | 2 | 3 | 2 | 26 | - | Medium | Avoid any cultivated and especially irrigated areas, if possible. | 1 | 3 | 2 | 2 | 3 | 1 | 24 | - | Medium |
| Soil and Agricultural Potential | Soil erosion (wind or water) caused by surface disturbance | 2 | 3 | 3 | 3 | 3 | 4 | 56 | - | High | Avoid extensive vegetation removal; re-vegetate as soon as possible and maintain cover (irrigate if necessary) | 1 | 2 | 1 | 2 | 1 | 2 | 14 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| Removal of subsoils (soil, rock) | Displacement of natural earth material:<br>▪ Increase in soil erosion due to concentrated flow received off PV Panels<br>▪ Potential oil spillages from maintenance vehicles.<br>▪ Sedimentation of non-perennial features caused by soil erosion. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low | ▪ Use of existing roads and tracks.<br>▪ Rehabilitation of affected areas (such as erosion control mats).<br>▪ Correct engineering design and construction of roads and water crossings.<br>▪ Vehicle repairs to be undertaken in<br>▪ designated areas.<br>▪ Maintenance of storm water system. | 1 | 3 | 2 | 2 | 3 | 2 | 22 | - | Low |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| **<u>Solar PV Plant</u>**<br>▪ Potential alteration of the visual character and sense of place.<br>▪ Potential visual impact on receptors in the study area.<br>▪ Potential visual impact on the night time visual environment. | ▪ The PV arrays may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.<br>▪ The proposed solar PV facility will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts.<br>▪ Dust emissions and dust plumes from maintenance vehicles | 2 | 3 | 3 | 3 | 3 | 2 | 28 | - | Medium | ▪ Restrict vegetation clearance on the site to that which is required for the correct operation of the facility.<br>▪ Ensure that the PV arrays are not located within 500m of any farmhouses in order to minimise visual impacts on these dwellings.<br>▪ As far as possible, limit the number of maintenance vehicles which are allowed to access the site.<br>▪ Ensure that dust suppression techniques are implemented on all gravel access roads.<br>▪ Only clear vegetation on site and adjacent to the site which is required to be cleared for the correct operation of the facility. | 2 | 3 | 3 | 2 | 2 | 2 | 24 | - | Medium |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.<br>The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility. | | | | | | | | | | ▪ As far as possible, limit the amount of security and operational lighting present on site.<br>▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill.<br>▪ If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself);<br>▪ Lighting fixtures should make use of minimum lumen or wattage.<br>▪ Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used.<br>▪ If economically and technically feasible, make use of motion detectors on security lighting.<br>▪ Care should be taken with the layout of the security lights to prevent motorists on the R502 from being blinded by lights. | | | | | | | | | |
| <u>**Associated On-site Infrastructure & 132kV Power Line**</u><br>▪ Potential alteration of the visual character and sense of place. | ▪ The on-site infrastructure may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings.<br>▪ The on-site infrastructure will alter the visual character of the surrounding area | 2 | 3 | 2 | 2 | 3 | 1 | 12 | - | Low | ▪ Restrict vegetation clearance on the site to that which is required for the correct operation of the facility.<br>▪ As far as possible, limit the number of maintenance vehicles which are allowed to access the site.<br>▪ Ensure that dust suppression techniques are implemented on all gravel access roads. | 2 | 3 | 2 | 2 | 3 | 1 | 12 | - | Low |

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| ▪ Potential visual impact on receptors in the study area.<br>▪ Potential visual impact on the night time visual environment. | and expose potentially sensitive visual receptor locations to visual impacts.<br>▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers.<br>▪ The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility. | | | | | | | | | | ▪ As far as possible, limit the amount of security and operational lighting present on site.<br>▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill.<br>▪ If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself);<br>▪ Lighting fixtures should make use of minimum lumen or wattage.<br>▪ Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used.<br>▪ If economically and technically feasible, make use of motion detectors on security lighting.<br>▪ Care should be taken with the layout of the security lights to prevent motorists on the R502 from being blinded by lights.<br>▪ The operations and maintenance (O&M) buildings should not be illuminated at night unless for security measures.<br>▪ The on-site buildings should be painted in natural tones that fit with the surrounding environment. | | | | | | | | | |
| **Heritage and Palaeontology** | | | | | | | | | | | | | | | | | | | | |
| N/A – No operational phase impacts identified from heritage and palaeontological perspectives. | | | | | | | | | | | | | | | | | | | | |
| **Social** | | | | | | | | | | | | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| Economic Production | The solar PV plant and 132kV power line will increase the size of the local utility sector and stimulate economic production through multiplier effects. | 2 | 4 | 1 | 1 | 3 | 1 | 11 | + | Low | Procure goods and services required for the operation of the plant from the local economy. | 2 | 4 | 1 | 1 | 3 | 1 | 11 | + | Low |
| Employment | Creation of jobs to support operation and maintenance of the plant | 2 | 4 | 1 | 1 | 3 | 1 | 11 | + | Low | Aim to fill all the positions by labour from the local community | 2 | 4 | 1 | 1 | 3 | 1 | 11 | + | Low |
| Municipal Service Delivery | Generated electricity will improve the security of electricity in the local municipality and increase government's revenue and service delivery | 2 | 4 | 1 | 1 | 3 | 2 | 22 | + | Low | No mitigation measures proposed | 2 | 4 | 1 | 1 | 3 | 2 | 22 | + | Low |
| **Decommissioning Phase** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| Vegetation | Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites – solar PV plant & associated infrastructure | 1 | 2 | 2 | 2 | 2 | 2 | 18 | - | Low | ▪ No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities.<br>▪ If any additional infrastructure needs to be constructed, for example overhead power lines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts. | 1 | 2 | 2 | 2 | 2 | 1 | 9 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | ▪ No driving of vehicles off-road.<br>▪ Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas.<br>▪ Access to sensitive areas outside of development footprint should not be permitted during operation.<br>▪ Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible | | | | | | | | | |
| Fauna | Direct mortality of fauna due to machinery, construction and increased traffic – solar PV plant & associated infrastructure | 1 | 2 | 2 | 2 | 3 | 2 | 20 | - | Low | ▪ Personnel and vehicles to avoid sensitive habitats.<br>▪ No speeding on access roads – install speed control measures, such as speed humps, if necessary<br>▪ No illegal collecting of any individuals, particularly the Armadillo Girdled Lizard.<br>▪ No hunting of protected species or hunting of any other species without a valid permit.<br>▪ Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species.<br>▪ Report any sitings to conservation authorities. Prevent unauthorised access to the site – project roads provide access to remote areas | 1 | 2 | 2 | 1 | 3 | 1 | 9 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | that were not previously easily accessible for illegal collecting or hunting | | | | | | | | | |
| Fauna | Displacement and/or disturbance of fauna due to increased activity and noise levels – solar PV plant & associated infrastructure | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low | ▪ Restrict impact to development footprint only and limit disturbance spreading into surrounding areas.<br>▪ Access to sensitive areas outside of infrastructure footprint should not be permitted during construction.<br>▪ No speeding on access roads – install speed control measures, such as speed humps, if necessary<br>▪ No hunting of protected species.<br>▪ Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species.<br>▪ Report any sitings to conservation authorities | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low |
| Vegetation | Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors – solar PV plant & associated infrastructure | 2 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Undertake regular monitoring to detect alien invasions early so that they can be controlled.<br>▪ Post-decommissioning monitoring should continue for an appropriate length of time to | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | ensure that future problems are avoided.<br>▪ Do NOT use any alien plants during any rehabilitation that may be required. | | | | | | | | | |
| Vegetation | Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape – solar PV plant & associated infrastructure | 1 | 3 | 2 | 3 | 3 | 2 | 24 | - | Medium | ▪ Implement a storm water management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Following decommissioning, undertake regular monitoring for an appropriate length of time to detect erosion features early so that they can be controlled.<br>▪ Implement any control measures that may become necessary.<br>▪ Avoid undertaking any activities on or near steep or unstable slopes. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| Vegetation | Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites - grid connection infrastructure | 1 | 3 | 2 | 2 | 2 | 2 | 20 | - | Low | ▪ No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities.<br>▪ If any additional infrastructure needs to be constructed, for example overhead power lines, communication cables, etc., then these must be located next to existing infrastructure, and | 1 | 3 | 2 | 2 | 2 | 1 | 10 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | clustered to avoid dispersed impacts.<br>▪ No driving of vehicles off-road.<br>▪ Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas.<br>▪ Access to sensitive areas outside of development footprint should not be permitted during operation.<br>▪ Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible. | | | | | | | | | |
| Fauna | Direct mortality of fauna due to machinery, construction and increased traffic - grid connection infrastructure | 1 | 2 | 2 | 2 | 3 | 2 | 20 | - | Low | ▪ Personnel and vehicles to avoid sensitive habitats.<br>▪ No speeding on access roads – install speed control measures, such as speed humps, if necessary.<br>▪ No illegal collecting of any individuals, particularly the Armadillo Girdled Lizard.<br>▪ No hunting of protected species or hunting of any other species without a valid permit.<br>▪ Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species.<br>▪ Report any sitings to conservation authorities. | 1 | 2 | 2 | 1 | 3 | 1 | 9 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | ▪ Prevent unauthorised access to the site – project roads provide access to remote areas that were not previously easily accessible for illegal collecting or hunting. | | | | | | | | | |
| Fauna | Displacement and/or disturbance of fauna due to increased activity and noise levels - grid connection infrastructure | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low | ▪ Restrict impact to development footprint only and limit disturbance spreading into surrounding areas.<br>▪ Access to sensitive areas outside of infrastructure footprint should not be permitted during construction.<br>▪ No speeding on access roads – install speed control measures, such as speed humps, if necessary<br>▪ No hunting of protected species.<br>▪ Personnel to be educated about protection status of species, including distinguishing features to be able to identify protected species.<br>▪ Report any sitings to conservation authorities | 1 | 2 | 2 | 1 | 1 | 1 | 7 | - | Low |
| Vegetation | Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors - grid connection infrastructure | 2 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Undertake regular monitoring to detect alien invasions early so that they can be controlled. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | ▪ Post-decommissioning monitoring should continue for an appropriate length of time to ensure that future problems are avoided.<br>▪ Do NOT use any alien plants during any rehabilitation that may be required. | | | | | | | | | |
| Vegetation | Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape - grid connection infrastructure | 1 | 3 | 2 | 3 | 3 | 2 | 24 | - | Medium | ▪ Implement a storm water management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Following decommissioning, undertake regular monitoring for an appropriate length of time to detect erosion features early so that they can be controlled.<br>▪ Implement any control measures that may become necessary.<br>▪ Avoid undertaking any activities on or near steep or unstable slopes. | 1 | 2 | 2 | 2 | 3 | 1 | 10 | - | Low |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| Avifauna | Displacement of priority species due to disturbance associated with de-commissioning of the PV plant and associated infrastructure | 1 | 4 | 1 | 2 | 1 | 1 | 9 | - | Low | ▪ De-commissioning activity should be restricted to the immediate footprint of the infrastructure.<br>▪ Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.<br>▪ Measures to control noise and dust should be applied according | 1 | 3 | 1 | 2 | 1 | 1 | 8 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | | | | | | | | | | | to current best practice in the industry.<br>▪ Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum.<br>▪ The mitigation measures proposed by the vegetation specialist must be strictly enforced | | | | | | | | | |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |
| Should the proposed developments need to be decommissioned, the same impacts as identified for the construction phase of the proposed development can be anticipated. Similar potential impacts are therefore expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts. | | | | | | | | | | | | | | | | | | | | |
| **Agricultural and Soils** | | | | | | | | | | | | | | | | | | | | |
| Soil and Agricultural Potential | Loss of agricultural land | 1 | 3 | 2 | 2 | 3 | 2 | 26 | - | Medium | Avoid any cultivated and especially irrigated areas, if possible. | 1 | 3 | 2 | 2 | 3 | 1 | 24 | - | Medium |
| Soil and Agricultural Potential | Soil erosion (wind or water) caused by surface disturbance | 2 | 3 | 3 | 3 | 3 | 3 | 42 | - | Medium | ▪ Avoid extensive vegetation removal.<br>▪ Re-vegetate as soon as possible and maintain cover (irrigate if necessary). | 1 | 2 | 1 | 2 | 1 | 2 | 14 | - | Low |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| Removal of subsoils (soil, rock) | Decommissioning of the structure will disturb the geological environment:<br>▪ Increase in soil and wind erosion due to clearance of structures. | 1 | 4 | 2 | 1 | 1 | 3 | 27 | - | Low | ▪ Use of temporary berms and drainage channels to divert surface water during flooding.<br>▪ Minimize earthworks and demolish footprints.<br>▪ Use of existing roads and tracks.<br>▪ Rehabilitation of affected areas (such as re-grassing). | 1 | 3 | 4 | 2 | 2 | 2 | 24 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| | ▪ Construction and earthmoving vehicles will displace the soil.<br>▪ Creation of drainage paths.<br>▪ Potential oil spillages from vehicles.<br>▪ Excessive sediments in non-perennial features. | | | | | | | | | | ▪ Develop a chemical spill response plan.<br>▪ Develop dust and demolition fly suppression plan.<br>▪ Vehicle repairs to be undertaken in designated areas.<br>▪ Reinstate channelized drainage features. | | | | | | | | | |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| **Solar PV Plant**<br>▪ Potential visual intrusion resulting from vehicles and equipment involved in the de-commissioning process;<br>▪ Potential visual impacts of increased dust emissions from de-commissioning activities and related traffic; and<br>▪ Potential visual intrusion of any remaining | ▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts.<br>▪ Decommissioning activities may be perceived as an unwelcome visual intrusion.<br>▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. | 2 | 3 | 1 | 2 | 1 | 2 | 18 | - | Low | ▪ All infrastructure that is not required for post-decommissioning use should be removed.<br>▪ Carefully plan to minimize the decommissioning period and avoid delays.<br>▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly.<br>▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.<br>▪ All cleared areas should be rehabilitated as soon as possible<br>▪ Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required. | 2 | 2 | 1 | 2 | 1 | 2 | 16 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| infrastructure on the site. | ▪ Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment.<br>▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. | | | | | | | | | | | | | | | | | | | |
| **Associated On-site Infrastructure & 132kV Power Line**<br>▪ Potential visual intrusion resulting from vehicles and equipment involved in the de-commissioning process;<br>▪ Potential visual impacts of | ▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts.<br>▪ Decommissioning activities may be perceived as an unwelcome visual intrusion.<br>▪ Dust emissions and dust plumes from increased traffic on the | 2 | 3 | 1 | 2 | 1 | 2 | 18 | - | Low | ▪ All infrastructure that is not required for post-decommissioning use should be removed.<br>▪ Carefully plan to minimise the decommissioning period and avoid delays.<br>▪ Maintain a neat decommissioning site by removing rubble and waste materials regularly.<br>▪ Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.<br>▪ All cleared areas should be rehabilitated as soon as possible | 2 | 2 | 1 | 1 | 1 | 2 | 14 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| increased dust emissions from de-commissioning activities and related traffic; and<br>▪ Potential visual intrusion of any remaining infrastructure on the site. | gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers.<br>▪ Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment.<br>▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. | | | | | | | | | | ▪ Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required. | | | | | | | | | |
| **Heritage and Palaeontology** | | | | | | | | | | | | | | | | | | | | |
| Impact on heritage resources | Site clearance and vegetation stripping | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | ▪ Implement a chance finds procedures to handle any heritage resources discovered during construction.<br>▪ Implement recommendation in section 6.5 of HIA report (**Appendix 6D**), namely:<br>○ Features **WB02-WB08** must be considered no-go areas | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |

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| | | | | | | | | | | | with a **30-meter** buffer for the burial ground at **WB08** and a **20-meter** buffer for the other sites.<br>○ In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures. | | | | | | | | | |
| Impact on palaeontological resources | Site clearance and excavations | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | Same as above | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| **Social** | | | | | | | | | | | | | | | | | | | | |
| Loss of agricultural production | Land demarcated for the solar PV plant and 132kV power line will be sterilised and all current activities taking place on said land will be discontinued. | 1 | 4 | 1 | 2 | 3 | 1 | 11 | - | Low | Rehabilitation of land should take place at the end of the project's life to allow for the land to be used for commercial livestock farming after the project's closure. | 1 | 4 | 1 | 2 | 3 | 1 | 11 | - | Low |
| **Cumulative** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| Vegetation | Loss and/or fragmentation of indigenous natural vegetation due to clearing | 2 | 4 | 4 | 2 | 4 | 1 | 16 | - | Low | Apply project-specific mitigation measures. | 2 | 4 | 4 | 2 | 4 | 1 | 16 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| Plant species of concern and protected plants and trees | Loss of individuals | 2 | 4 | 2 | 2 | 2 | 1 | 12 | - | Low | It is a legal requirement to obtain permits for specimens that will be lost. | 2 | 4 | 2 | 2 | 2 | 1 | 12 | - | Low |
| Ecosystems | Changes to ecological processes at a landscape level | 2 | 2 | 2 | 3 | 2 | 2 | 22 | - | Low | Limit development within conservation zones, especially CBA1 areas. | 2 | 2 | 2 | 2 | 2 | 2 | 20 | - | Low |
| Fauna | Mortality, displacement and/or disturbance | 2 | 2 | 2 | 2 | 1 | 2 | 18 | - | Low | Apply site-specific mitigation measures. | 2 | 2 | 2 | 1 | 1 | 1 | 8 | - | Low |
| Vegetation, ecosystems and habitats | General increase in the spread and invasion of new habitats by alien invasive plant species | 2 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control.<br>▪ Undertake regular monitoring to detect alien invasions early so that they can be controlled.<br>▪ Post-decommissioning monitoring should continue for an appropriate length of time to ensure that future problems are avoided.<br>▪ Do NOT use any alien plants during any rehabilitation that may be required. | 2 | 2 | 2 | 2 | 3 | 1 | 11 | - | Low |
| Ecosystems and vegetation | Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape | 3 | 1 | 2 | 3 | 4 | 1 | 13 | - | Low | Avoid development within conservation zones, especially CBA1 areas. | 3 | 1 | 2 | 2 | 4 | 1 | 12 | - | Low |

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| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |
| With the other Solar Energy Facilities located a relatively considerable distance from the study site, direct and indirect surface water impacts will be negligible. No wetlands will be lost as a result of the renewable energy projects proposed. The cumulative loss of wetlands is therefore negligible. In addition, it is not expected that the cumulative impacts will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost. Thus no impact assessment has been undertaken, as no cumulative impact is likely (see section 8.5 of Surface Water Impact Assessment Report – **Appendix 6B**). | | | | | | | | | | | | | | | | | | | | |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| Avifauna | Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and grid connection and entrapment in fences | 1 | 3 | 3 | 2 | 3 | 2 | 24 | - | Medium | All mitigation measures listed as part of the construction, operation and decommissioning phase | 1 | 3 | 3 | 2 | 2 | 2 | 22 | - | Low |
| **Agriculture and Soils** | | | | | | | | | | | | | | | | | | | | |
| Soil ecology and functioning | Proposed project can contribute to overall loss of soil health and productivity | 2 | 3 | 3 | 3 | 3 | 4 | 56 | - | Medium | Minimise soil disturbance, re-vegetate all disturbed areas and monitor periodically (6-monthly or seasonally) | 1 | 3 | 2 | 2 | 2 | 2 | 20 | - | Low |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| None | | | | | | | | | | | | | | | | | | | | |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| <u>**Solar PV Plant**</u><br>▪ Potential alteration of the visual character and sense of place in the broader area.<br>▪ Potential visual impact on receptors in the study area. | ▪ Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. | 3 | 3 | 3 | 3 | 3 | 2 | 30 | - | Medium | ▪ Restrict vegetation clearance on development sites to that which is required for the correct operation of the facility.<br>▪ Ensure that the PV arrays are not located within 500m of any farmhouses in order to minimise visual impacts on these dwellings.<br>▪ As far as possible, limit the number of maintenance vehicles which are allowed to access the facility. | 3 | 3 | 3 | 2 | 2 | 2 | 26 | - | Medium |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| ▪ Potential visual impact on the night time visual environment. | ▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings.<br>▪ Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.<br>▪ The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area. | | | | | | | | | | ▪ Ensure that dust suppression techniques are implemented on all gravel access roads.<br>▪ As far as possible, limit the amount of security and operational lighting present on site.<br>▪ Light fittings for security at night should reflect the light toward the ground and prevent light spill.<br>▪ If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself);<br>▪ Lighting fixtures should make use of minimum lumen or wattage.<br>▪ Mounting heights of lighting fixtures should be limited, or alternatively foot-light or bollard level lights should be used.<br>▪ If possible, make use of motion detectors on security lighting.<br>▪ The operations and maintenance (O&M) buildings should not be illuminated at night, unless for safety purposes.<br>▪ The O&M buildings should be painted in natural tones that fit with the surrounding environment.<br>▪ Non-reflective surfaces should be utilised where possible. | | | | | | | | | |
| **132kV Power Line**<br>▪ Potential alteration of the | ▪ Additional renewable energy developments and associated grid connection | 3 | 3 | 2 | 3 | 3 | 2 | 26 | - | Medium | ▪ As far as possible, limit the number of maintenance vehicles using access roads. | 3 | 3 | 2 | 2 | 2 | 2 | 24 | - | Medium |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| visual character and sense of place in the broader area.<br>▪ Potential visual impact on receptors in the study area. | infrastructure in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts.<br>▪ Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings.<br>▪ Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes.<br>▪ The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area. | | | | | | | | | | ▪ Ensure that dust suppression techniques are implemented on all gravel access roads. | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| **Heritage and Palaeontology** | | | | | | | | | | | | | | | | | | | | |
| Impact on heritage resources | Site clearance and vegetation stripping | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | Implement a chance finds procedures handle any heritage resources discovered during construction | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| Impact on palaeontological resources | Site clearance and vegetation stripping | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low | Same as above | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| **Social** | | | | | | | | | | | | | | | | | | | | |
| The proposed project will result in several positive cumulative effects on the socio-economic environment | ▪ Stimulation of the economy and increased production<br>▪ Creation of employment and business opportunities<br>▪ Increased household income and standard of living<br>▪ Adoption of clean, renewable energy and benefits in terms of global warming and climate change. | 2 | 3 | 1 | 1 | 3 | 2 | 20 | + | Low | ▪ Implement the "locals first" policy Aim to employ the people who have already worked on other similar projects in the area to provide them with an opportunity for long-term employment and to continue developing their skills<br>▪ Apply labour-intensive construction methods, where feasible<br>▪ Use local suppliers, where feasible. | 2 | 3 | 1 | 1 | 3 | 2 | 20 | + | Low |
| **'No-go' Alternative** | | | | | | | | | | | | | | | | | | | | |
| **Terrestrial Ecology** | | | | | | | | | | | | | | | | | | | | |
| N/A - This alternative would result in no environmental impacts from the proposed project on the sites or surrounding local area. Implementing the 'no-go' option would entail no development. The 'no-go' option is a feasible option, however, this would prevent the proposed project from contributing to the environmental, social and economic benefits associated with the development of the renewables sector. | | | | | | | | | | | | | | | | | | | | |
| **Avifauna** | | | | | | | | | | | | | | | | | | | | |
| N/A - The 'no-go' alternative will result in the current *status quo* being maintained at the proposed development site as far as the avifauna is concerned. The development site itself consist mostly of natural grassland. The 'no-go option' would maintain the natural grassland which would be beneficial to the avifauna currently occurring there. | | | | | | | | | | | | | | | | | | | | |
| **Surface Water** | | | | | | | | | | | | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| N/A - The 'no-go' option is a feasible option, however, this would prevent the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line from contributing to the environmental, social and economic benefits associated with the development of the renewables sector. | | | | | | | | | | | | | | | | | | | | |
| **Agriculture and Soils** | | | | | | | | | | | | | | | | | | | | |
| N/A - The 'no-go' option assumes that the site remains in its current state, i.e. there is no construction of a solar PV plant, 132kV power line and associated infrastructure in the proposed project area and the *status quo* would proceed. This alternative would result in no environmental impacts from the proposed project on the site or surrounding local area. | | | | | | | | | | | | | | | | | | | | |
| **Visual** | | | | | | | | | | | | | | | | | | | | |
| ▪ Potential alteration of the visual character and sense of place in the broader area.<br>▪ Potential visual impact on receptors in the study area.<br>▪ Potential visual impact on the night time visual environment. | If the Solar PV Facility is not developed in this area, there will be no change in the visual character or the sense of place. There will be no visual impacts on receptors or on the night-time visual environment. | NIL | NIL | NIL | NIL | NIL | NIL | 0 | - | NIL | N/A | NIL | NIL | NIL | NIL | NIL | NIL | 0 | - | NIL |
| **Geotechnical** | | | | | | | | | | | | | | | | | | | | |
| N/A | | | | | | | | | | | | | | | | | | | | |
| **Heritage and Palaeontology** | | | | | | | | | | | | | | | | | | | | |
| Impact on heritage resources | No development | 1 | 4 | 1 | 1 | 3 | 1 | 10 | + | Low | Implement a chance finds procedures handle any heritage resources discovered during construction | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| Impact on palaeontological resources | No development | 1 | 4 | 1 | 1 | 3 | 1 | 10 | + | Low | Implement a chance finds procedures handle any heritage resources discovered during construction | 1 | 1 | 4 | 1 | 3 | 1 | 10 | - | Low |
| **Social** | | | | | | | | | | | | | | | | | | | | |

| ENVIRONMENTAL PARAMETER | ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE | ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION | | | | | | | | | RECOMMENDED MITIGATION MEASURES | ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S | | E | P | R | L | D | I / M | TOTAL | (+ OR -) | S |
| N/A - The proposed introduction of a solar PV plant and power line on the project site near the town of Leeudoringstad will have several significant impacts, as discussed in **section 9.2.9**. In the case were the project is delayed or abandoned, it could be expected that the baseline information will remain the same. There will be no economic and employment growth directly attributable to the solar PV plant and power line. The continued strain placed on the national energy grid will continue to worsen as population growth adds higher demands for energy, therefore the load-shedding strategy utilised by Eskom will continue to hamper businesses production and leave households without energy for heating, cooking and lighting. | | | | | | | | | | | | | | | | | | | | |

## 9.4 Assessment of Cumulative Impacts

The area has seen a notable interest from developers of various renewable energy developments, which could be associated with the energy resource potential found in the region, proximity to the grid access and its evacuation capacity, as well as other factors. Such developments, whether already approved or only proposed, need to be considered as they have the potential to create cumulative impacts, whether positive or negative, if implemented. The potential cumulative impact of the proposed solar PV plant and associated power line in combination with other renewable energy facilities in the area have been identified and assessed per environmental aspect and mitigation measures identified to address the cumulative impact, where possible and applicable. Cumulative impacts were also rated as part of the impact rating system and used to determine the significance of the impacts (refer to **Table 24** in **section 9.3** above).

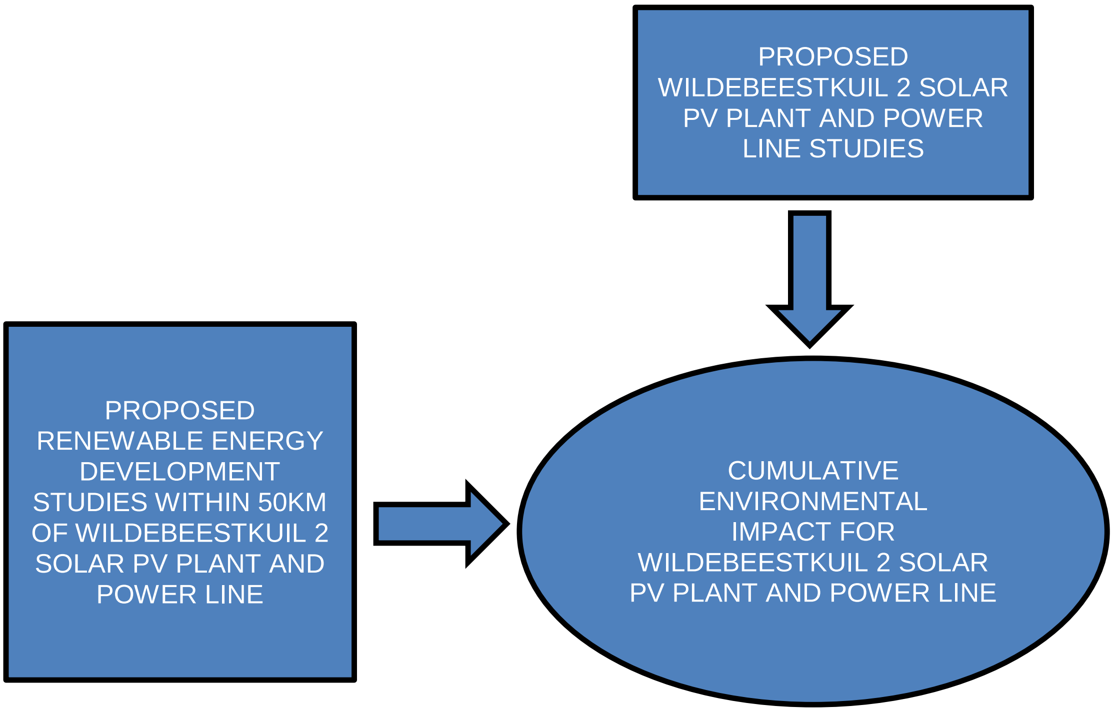


**Figure 57:** Cumulative Impact Organogram

**Table 25** below highlights the renewable energy developments that are being proposed and/or which are approved within a 50km radius of the proposed solar PV plant's application site, as well as the various stages of the development. Their location relative to the proposed development under review is illustrated in **Figure 58** on **page 238**.

**Table 25:** Renewable energy developments identified within 50km radius of proposed Wildebeestkuil 2 Solar PV Plant application site

| Applicant | Project | Technology | Capacity | Status of Application / Development |
|---|---|---|---|---|
| Bokomoso Energy (Pty) Ltd | Bokomoso PV Solar Energy Facility | Solar PV | 75MW | Under Construction |
| Kabi Solar (Pty) Ltd | Kabi Vaalkop Solar PV Facility | Solar PV | 75MW | Approved |
| Kabi Solar (Pty) Ltd | Kabi Witkop Solar PV Facility | Solar PV | 75MW | In process |
| Genesis Orkney Solar (Pty) Ltd | Orkney PV SEF | Solar PV | 100MW | Approved |
| Blue Wave Capital SA (Pty) Ltd | Wolmaransstad Solar Energy Facility | Solar PV | 75MW | In process |
| Upgrade Energy (Pty) Ltd | Wildebeestkuil 2 Solar PV Plant and 132kV Power Line | Solar PV | 9.9MW | In process |
| Upgrade Energy (Pty) Ltd | Leeuwbosch 1 Solar PV Plant | Solar PV | 9.9MW | In process |

| Applicant | Project | Technology | Capacity | Status of Application / Development |
|---|---|---|---|---|
| Upgrade Energy (Pty) Ltd | Leeuwbosch 2 Solar PV Plant | Solar PV | 9.9MW | In process |

The renewable energy development listed above are in different stages of planning, ranging from developments that have been authorized (i.e. EAs issued), to developments where the EIA / BA processes are still being conducted and/or underway.

It should be noted that the respective specialists undertook every effort to obtain the information (including specialist studies, BA / EIA / Scoping and EMPr Reports) for the surrounding developments. However, many of the documents are not currently publicly available to download. It should be noted that applications in respect of most of these facilities were submitted many years ago and as such, efforts to obtain additional information about the proposed projects have been largely unsuccessful.

The information (including specialist studies, BA / EIA / Scoping and EMPr Reports) that could be obtained for the surrounding proposed renewable energy sites that were taken into account by the various specialists is elaborated on in the sub-sections below.

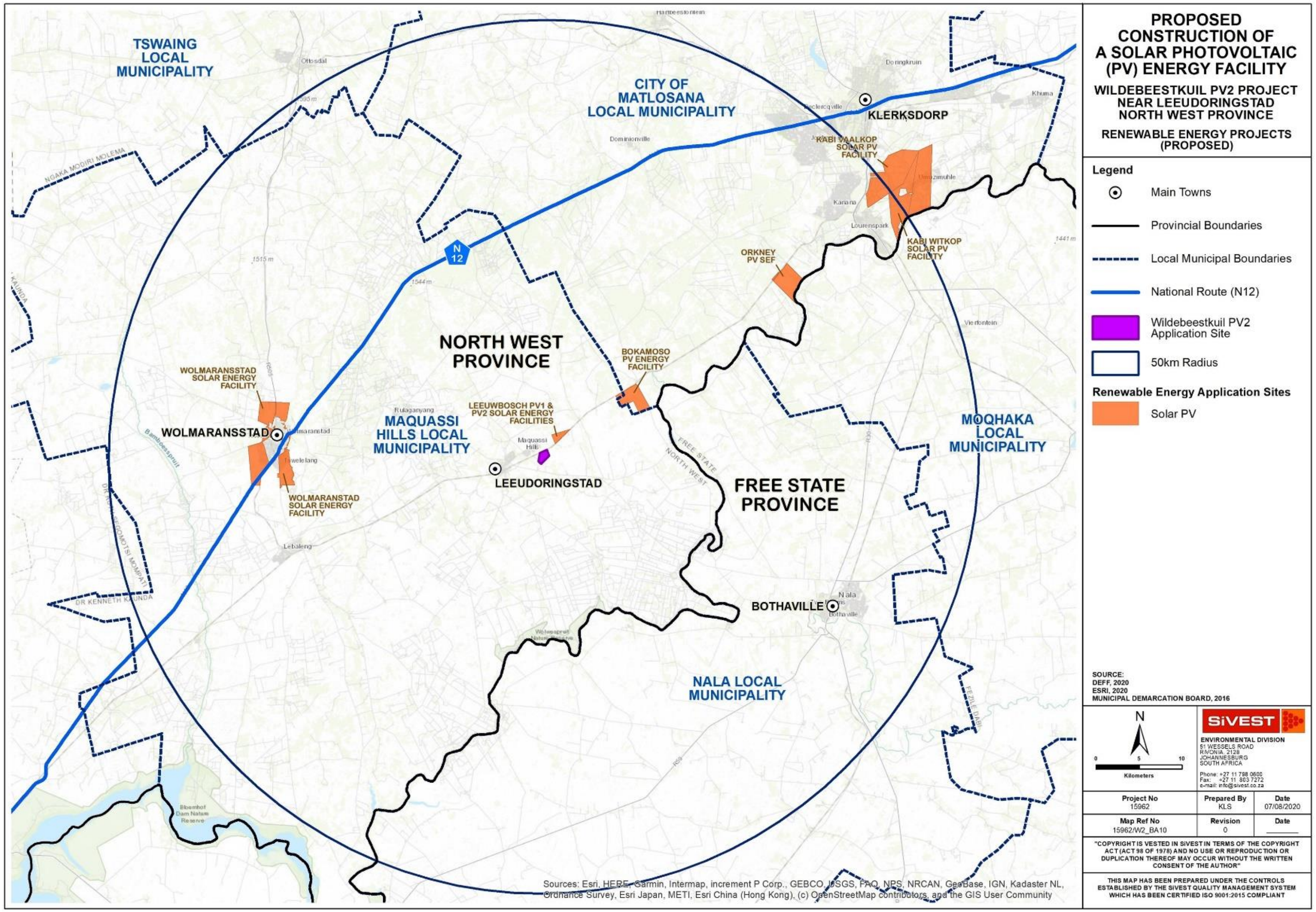


**Figure 58:** Map showing other proposed renewable energy developments within 50km radius of Wildebeestkuil 2 Solar PV Plant application site

### *9.4.1 Terrestrial Ecology*

There are various cumulative impacts that may occur as a result of the combined impact of a number of similar projects in the area, as follows:

- Loss and/or fragmentation of indigenous natural vegetation due to clearing;
- Loss of individuals of plant species of conservation concern and/or protected plants or trees;
- Changes to ecological processes at a landscape level;
- Mortality, displacement and/or disturbance of fauna;
- General increase in the spread and invasion of new habitats by alien invasive plant species; and
- Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape.

Based on the assessment provided (**Table 24**), all cumulative impacts can be reduced to a **Low** significance with mitigation measures.

The above-mentioned impacts are discussed in more detail below.

**Cumulative impacts on indigenous natural vegetation**

The regional terrestrial vegetation type in the broad study area is listed as Vulnerable. Loss of habitat will definitely occur for each project, each of which will be a small area in comparison to the total area of the vegetation type. The total loss of habitat due to a number of projects together will be greater than for any single project, so a cumulative effect will occur. However, the area lost in total will be small compared to the total area of the vegetation types concerned. Direct loss of habitat will not result in a change in the conservation status of the vegetation types, but overall degradation due to fragmentation effects may be cause for concern. The cumulative effect will therefore be low for vegetation loss.

**Cumulative impacts on plant species of concern and protected plant species**

There are no plant species of conservation concern for the site, but there are various protected plant species that may occur in the study area, all of which are relatively widespread. Constructing the current project increases the likelihood of individuals being affected, but unless large numbers of individuals are directly affected, there will only be small cumulative effects.

**Cumulative impacts on ecological processes**

There are various ecological processes that may be affected at a landscape level by the presence of multiple projects. This includes obvious processes, such as migration, pollination and dispersal, but also more difficult to interpret factors, such as spatial heterogeneity, community composition and environmental gradients, that can become disrupted when landscapes are disturbed at a high level. Disturbance can alter the pattern of variation in the structure or function of ecosystems. Fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. An important consequence of repeated, random clearing is that contiguous cover can break down into isolated patches. This happens when the area cleared exceed a critical level and landscapes start to become disconnected. Spatially heterogeneous patterns can be interpreted as individualistic responses to environmental gradients and lead to natural patterns in the landscape. Disrupting gradients and creating disturbance edges across wide areas is very disruptive of natural processes and will lead to fundamental changes in ecosystem function. It is possible that this could be a cumulative consequence of the combined projects but is difficult to determine without a detailed assessment of fragmentation of the combination of all the projects.

**Cumulative impacts on fauna**

Construction activities, loss of habitat, noise, dust and general activity associated with the construction phase of the project are likely to cause all mobile species to move away from the area. This effect will be increased if there are a number of projects being constructed at the same time or in quick succession, so the effect is likely to be cumulative. However, the geographical ranges of the species of concern are wide and it is considered that the significance of the effect will be low in the long-term. It is possible that some species will be more significantly negatively affected than others, especially shy species, territorial species that get displaced, or those with large territories that get shrunk. It is also possible that some species will benefit from the increased presence of humans and will migrate into the area. This will possibly cause additional shifts in other species that are affected by the increase in numbers or new species.

**Cumulative impacts due to spread of declared weeds and alien invader plants**

There is a moderate to high possibility that alien plants could be introduced to areas within the footprint of the proposed infrastructure from surrounding areas in the absence of control measures. The greater the number of projects, the more likely this effect will happen; therefore, the effect is cumulative. For the current site, the impact is predicted to be a moderate to high risk due to the current presence of various invasive species on site and in surrounding areas. The significance will probably be low if control measures are implemented. However, the increased overall disturbance of the landscape will create invasion opportunities and, if new invasions are not controlled, can create nodes that spread to new locations due to the heightened disturbance levels.

**Cumulative impacts due to loss of protected animals**

There are various animal species protected according to National legislation that occur in the geographical area covered by the combined projects. Some of these animals may be vulnerable to secondary impacts, such as hunting, roadkill and illegal collecting. The greater the number of projects, the more likely this effect will happen; therefore, the effect is cumulative. However, in all cases, the geographical distribution of each species is much wider than the combined project areas. The significance will therefore be low, especially if control measures are implemented.

**Cumulative impacts on CBAs and conservation planning**

Some parts of the site and surrounding areas are included in Critical Biodiversity Areas for the North West Province. Disruption of these areas means that conservation planners have to find alternative sites to include in future CBAs according to an algorithm that seeks a least-cost outcome for preserving biodiversity, i.e., the least amount of land space for preserving the greatest amount of area of biodiversity importance, as well as meeting specific conservation targets. At some point, the loss of suitable sites leads to a situation where it is no longer possible to plan effective conservation networks or the cost of doing so increases due to a lack of choice. The higher the density of similar projects in a uniform area, the less chance there is of finding sites suitable for conservation that contain all the attributes that are desired to be conserved, including both ecological processes and ecological patterns. Due to the small number of projects within 50km of the current site, this effect is not considered to be significant.

#### *9.4.1.1 Assessment of cumulative impacts*

Based on the assessment provided (**Table 24**), all cumulative impacts can be reduced to a **Low** significance with mitigation measures. Based on this assessment, it is considered that the cumulative impacts are acceptable.

### 9.4.2 Avifauna

A cumulative impact, in relation to an activity, is the impact of an activity that may not be significant on its own but may become significant when added to the existing and potential impacts arising from similar or other activities in the area[31].

Currently there is no agreed method for determining significant adverse cumulative impacts on ornithological receptors. The Scottish Natural Heritage (2005) recommends a five (5)-stage process to aid in the ornithological assessment:

- Define the species / habitat to be considered;
- Consider the limits or 'search area' of the study;
- Decide the methods to be employed;
- Review the findings of existing studies; and
- Draw conclusions of cumulative effects within the application site.

The table below sets out the criteria applied to rank potential cumulative impacts.

**Table 26:** Framework for assessing significance of cumulative effects

| Significance | Effect |
|---|---|
| Severe | Effects that the decision-maker must consider because the receptor / resource is irretrievably compromised, resulting in a fatal flaw. |
| Major | Effects that may become a key decision-making issue, potential fatal-flaw. |
| Moderate | Effects that are unlikely to affect the viability of the project, but mitigation might be required. |
| Minor | Effects which might be locally / site significant, but probably insignificant for the greater application site. |
| Not Significant | Effects that are within the ability of the resource to absorb such change both at local/site level and within the greater application site. |

#### 9.4.2.1 Current impacts on avifauna

In the current instance, not all the criteria proposed above by the Scottish Natural Heritage can be met in assessing the cumulative impact of the proposed solar PV plant. In the absence of comprehensive scientifically verified data, general knowledge and experience will have to suffice. The following impacts on avifauna can reasonably be assumed in the 30km radius around the development:

- Overgrazing results in degradation of habitat, potentially reducing populations of wide-ranging species such as bustards, which depend on large foraging areas.
- Extensive agricultural operations have led to large areas of grassland having been converted into agricultural crops, which is relatively sterile environments for most priority species.
- Invasive alien plants are a continuing threat, especially along drainage lines.
- Historically, poisons were used extensively in the region to control damage-causing predators, such as Black-backed Jackal *Canis mesomelas* and Caracal *Caracal caracal*. Poison use may be continuing in the surrounding livestock farming areas, but is likely to be at a lower level than previously. The potential impacts of poison use on several threatened raptor species has not been quantified.

[31] The DFFE requested that the EAP and specialists consider all active or approved applications for solar facilities situated with a 50km radius of the current project.

- Renewable energy developments are a new threat. Possible impacts on birds are loss of habitat, breeding disturbance during construction, collisions with the reflective solar panels. Existing and new power lines from substations to renewable energy facilities are also threats to priority species.

The cumulative impact of the solar PV plant and 132kV power line on priority avifauna within a 50km radius around the proposed development (considering all current impacts on avifauna) is assessed to be **Low**, mainly due to the small size of the proposed development.

##### *9.4.2.2 The cumulative impact of the proposed Wildebeestkuil 2 Solar PV Plant and 132kV Power Line on avifauna within a 50km radius*

**Displacement of priority species due to habitat transformation and disturbance**

The difficulties associated with the quantification of cumulative impacts of the renewable energy facilities have already been explained above. Stock farming is not displacing any priority species although it may be that periodic overgrazing might have an impact on the habitat and therefore the densities of some species. However, that cannot be categorically confirmed without more research. However, the extensive habitat transformation due to the cultivation of agricultural crops has a catastrophic impact on the natural grassland (Harrison *et al.,* 1997). As far as potential future impacts are concerned, the cumulative impact of habitat transformation due to the combined effect of all the proposed solar facilities in the area is currently low, due to the small number and small size of proposed developments.

Overall, the cumulative significance of this impact is rated at **Low**, due to the small size of the proposed development.

**Potential mortality due to collisions with the proposed photovoltaic panels**

Collisions with the solar PV panels are a possible threat to priority species known to potentially occur at the development area. As far as potential future impacts are concerned, the cumulative impact of PV collision mortality due to the combined effect of all the proposed solar facilities in the area is currently low, due to the small number and small size of proposed developments.

Overall, the cumulative significance of this impact is rated at **Low**, due to the small size of the proposed development.

**Potential mortality due to entrapment in the double perimeter fence**

Entrapment in the double perimeter fence is a possible threat to large-bodied priority species known to potentially occur at the development area. As far as potential future impacts are concerned, the cumulative impact of entrapment due to the combined effect of all the proposed solar facilities in the area is currently low, due to the small number and small size of proposed developments.

Overall, the cumulative significance of this impact is rated at **Low**, due to the small size of the proposed development.

**Potential mortality due to collisions with the proposed 132kV grid connection**

Collisions with the 132kV grid connection are a possible threat to priority species known to potentially occur at the development area. As far as potential future impacts are concerned, the cumulative impact of power line collision mortality due to the combined effect of all the existing and future power lines in the area is currently moderate, as the area contains a fair number of high voltage lines.

Overall, the cumulative significance of the proposed grid connection is rated at Low, due to the short length of the proposed power line, and the location of it next to a busy provincial road.

An assessment of the cumulative impacts is conducted in **Table 24** on **page 188** of **section 9.3**, with proposed mitigation measures. The cumulative impact of the solar PV plant and 132kV power line on priority avifauna within a 50km radius around the proposed development (considering all current impacts on avifauna) is assessed to be **Low**, mainly due to the small size of the proposed development.

### *9.4.3 Surface Water*

In the context of the proposed development, surrounding renewable energy projects include a number of developments to the east and west of the site (**Figure 58**). No other renewable energy developments are known to be in the surrounding area.

With the other Solar Energy Facilities located a relatively considerable distance from the proposed development's study site, direct and indirect surface water impacts will be negligible. No wetlands will be lost as a result of the renewable energy projects proposed. The cumulative loss of wetlands is therefore negligible.

In consideration of the nearby Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant (part of separate respective BA processes), indirect impacts in terms of increased run-off, sedimentation and erosion may potentially be expected. However, none of the surface water resources appear to be hydrologically connected. Downstream impacts are therefore unlikely. Additionally, aside from the distance (approximately 1km) which separates the two (2) renewable energy developments, the R502 and existing railway line acts as a barrier between the two (2) project sites.

In light of the above, it is not expected that the cumulative impacts will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost.

Thus no impact assessment has been undertaken, as **no cumulative impact is likely** (**Table 24**).

### *9.4.4 Agriculture and Soils*

Cumulative impact assessments must be undertaken for the proposed solar PV plant and power line in order to determine the cumulative impact that will materialise should other Renewable Energy Facilities (REFs) and large-scale industrial developments be constructed within 50km of the proposed development (**Figure 58** and **Table 25**).

Regarding the soil resource and agricultural potential, there will be little or no impacts on any specific site due to other developments in the vicinity. Virtually all impacts would be confined to site. The only impact that could occur from another site might be soil removal by wind, due to large-scale vegetation clearance that could produce a bare soil surface. However, this area (Leeudoringstad) is not identified as being susceptible to wind erosion.

The significance of the cumulative impacts associated with the proposed development have been rated in **Table 24** on **page 188** in **section 9.3**. The impact assessment has revealed that cumulative impacts are expected to be **Low** after the implementation of the recommended mitigation measures. In addition, as far as the soils are concerned, as long as the proposed mitigation measures are adhered to, there should not be any significant cumulative impacts occurring, as any impact on agricultural potential will be contained to the specific site itself.

### *9.4.5 Geotechnical*

No cumulative impacts have been identified as part of Desktop Geotechnical Impact Assessment (**Appendix 6F**).

### *9.4.6 Visual*

Cumulative impacts from a visual perspective include the following:

- Additional renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts;
- Visual intrusion of multiple renewable energy developments may be exacerbated, particularly in more natural undisturbed settings;
- Additional renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes and
- The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area.

The impact assessment has revealed that cumulative impacts are expected to be **Medium** after the implementation of the recommended mitigation measures (**Table 24**).

Renewable energy facilities have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region and also exacerbate the visual impacts on surrounding visual receptors, once constructed. Although power lines and substations are relatively small developments when compared to renewable energy facilities, they may still introduce a more industrial character into the landscape, thus altering the sense of place.

Seven (7) renewable energy projects were identified within a 50km radius of the proposed development as shown in **Figure 58**. The projects, as listed in **Table 25**, were identified using the DFFE's Renewable Energy EIA Application Database for SA. It is assumed that all of these renewable energy developments include grid connection infrastructure, although few details of this infrastructure were available at the time of writing the VIA Report (**Appendix 6H**).

It should be noted that, applications in respect of most of these facilities were submitted many years ago and as such, efforts to obtain additional information about the proposed projects have been largely unsuccessful. The assessment of the likely cumulative impacts of these developments has therefore been largely based on some broad assumptions regarding the likely impacts of solar energy developments.

Four (4) of the Solar PV Energy Facilities (SPEFs) identified are located more than 30km from the Wildebeestkuil 2 Solar PV Plant application site, these being the Wolmaransstad Solar Energy Facility to the west, and Orkney PV and the two (2) Kabi SPEFs to the north-east of the application site. These projects are therefore well outside the visual assessment zone for this study and although the introduction of an increasingly industrial character into the broader area is inevitable, it is not anticipated that this development will result in any significant cumulative impacts affecting the landscape or the visual receptors within the visual assessment zone.

**Figure 58** shows that the remaining three (3) sites proposed for SPEF development are located within 10km of the application site and in close proximity to the R502 Main Road, these being the Leeuwbosch 1 Solar PV Plant, Leeuwbosch 2 Solar PV Plant and Bokamoso Solar Energy Facility (SEF). The proposed Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant projects are the subject of separate respective BA processes which are currently being undertaken in parallel to the BA processes for the proposed Wildebeestkuil 2 Solar PV Plant & 132kV Power Line project. It should also be noted that, related to the renewable energy developments, is a significant electrical infrastructure project in the form of the proposed Leeudoringstad Solar Plant Substation. This proposed substation is located on the Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant application site and is intended to serve the respective Leeuwbosch Solar PV projects as well as the respective Wildebeestkuil Solar PV projects. The proposed substation is the subject of a separate BA process which is currently being undertaken in parallel with the Wildebeestkuil and Leeuwbosch Solar PV project BAs.

As the proposed Leeuwbosch 1 and Leeuwbosch 2 Solar PV Plant projects are located within 5km of the Wildebeestkuil Solar PV and Power Line project and the proposed solar plant substation, it is anticipated that the identified potentially sensitive visual receptors will experience significant cumulative visual impacts should all of these SPEF Projects be constructed. Bokamoso SEF is however some 3km outside the visual assessment zone for the Wildebeestkuil Solar PV and Power Line project and is only expected to affect the few receptors located in the eastern sector of the assessment zone. It is however important to note that the sensitivity of these farmsteads is largely subjective.

Areas in close proximity to the R503 have already undergone noticeable change as a result of road, rail and electricity infrastructure and this will be exacerbated with the development of additional SPEFs and associated infrastructure in these areas as proposed. Impacts of this transformation will however be reduced by the fact that the landscape in the vicinity of the proposed Wildebeestkuil 2 Solar PV Plant & 132kV Power Line project has already been disturbed by anthropogenic elements such as the built-up areas of the town of Leeudorinstad and Kgakala Township, the R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line. In addition, it is possible that the Wildebeestkuil and Leeuwbosch Solar PV projects and associated grid connection infrastructure, located in close proximity to each other, could be seen as one large SPEF rather than separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

An examination of the literature available for the environmental assessments undertaken for some of these renewable energy applications showed that the visual impacts identified and the recommendations and mitigation measures provided are largely consistent with those identified in this report. Where additional, relevant mitigation measures were provided in respect of the other renewable energy applications, these have been incorporated into this report, where relevant.

From a visual perspective, the further concentration of renewable energy facilities as proposed will inevitably change the visual character of the area and alter the inherent sense of place, introducing an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures put forward by the visual specialists in their respective reports.

The significance of the cumulative impacts associated with the proposed development have been rated in **Table 24** in **section 9.3**. The impact assessment has revealed that cumulative impacts are expected to be **Medium** after the implementation of the recommended mitigation measures.

#### *9.4.7 Heritage*

This section evaluates the possible cumulative impacts on heritage resources with the addition of the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line. The cumulative impacts on heritage resources evaluated a 50km radius (**Figure 58**). **Table 25** lists the projects that will need to be considered when examining the cumulative impacts.

Cumulative impacts from a heritage perspective include the following:

- Cumulative impact(s) on heritage resources as a result of site clearance and vegetation stripping.

An analysis of the heritage resources and evaluation of the cumulative impact has shown that the possible cumulative impact will be of a **Low** significance (**Table 24**).

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- **Fixed datum or dataset:** There is no comprehensive heritage data set for the Komsberg region. Although various studies were done in the past 10 years the combined coverage of the Komsberg region is still sparse and due to the vastness of the area not representative. Thus, we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated. Almond (2020) further reiterates that cumulative impacts must be done on comparable fossil assemblages present in the same formations in a stud area as well as the broader region;
- **Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource; and
- **Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011)

The cumulative impact that is foreseen is on the cultural landscape with the implementation of additional solar projects (including power lines) in the region. There are areas within the region with concentrations of archaeological remains such as Iron Age Sites or rock engravings. The historical buildings illustrate the specific culture of the area as well as further insight into the historical background of the area's development. Destruction of this historical landscape will dispossess the region of its heritage. However, the area is not seen as a major tourism zone, the archaeology is sporadic and many of the historical structures are in a state of disrepair.

The significance of the cumulative impacts associated with the proposed development have been rated in **Table 24** on **page 188** in **section 9.3**. An analysis of the heritage resources and evaluation of the cumulative impact has shown that the possible cumulative impact will be of a **Low** significance (**Table 24**).

#### *9.4.8 Palaeontology*

This section evaluates the possible cumulative impacts on palaeontological resources with the addition of the Wildebeestkuil 2 Solar PV Plant & 132kV Power Line. The cumulative impacts on palaeontological resources evaluated a 50km radius (**Figure 58**). **Table 25** lists the projects that will need to be considered when examining the cumulative impacts.

Cumulative impacts from a palaeontological perspective include the following:

- Cumulative impact(s) on palaeontological resources as a result of site clearance and vegetation stripping.

The significance of the cumulative impacts associated with the proposed development have been rated in **Table 24** on **page 188** in **section 9.3**. An analysis of the palaeontological resources and evaluation of the cumulative impact has shown that the possible cumulative impact will be of a low significance as the broader area is not considered as highly fossiliferous.

#### *9.4.9 Social*

Cumulative impacts from a social perspective include the following:

- Stimulation of the economy and increased production;
- Creation of employment and business opportunities;
- Increased household income and standard of living; and
- Adoption of clean, renewable energy and benefits in terms of global warming and climate change.

The impact assessment has revealed that cumulative impacts are expected to be **Positive Low** after the implementation of the recommended mitigation measures. The significance of the cumulative impacts associated with the proposed development have been rated in **Table 24** on **page 188** in **section 9.3**.

##### *9.4.9.1 Existing and Planned Developments in the Area*

The proposed project is to be located in an area of very limited activity when it comes to renewable energy projects. However, when evaluating the potential impacts, one (1) renewable energy project has already been approved under the REIPPPP and refers to the Bokamoso Solar PV project (**Table 25** and **Figure 58**).

Bokamoso is the site for the approved 75MW solar PV plant. It is approximately 10km from the proposed 9.9MW Wildebeestkuil 2 Solar PV Plant site (energyblog, 2016). In addition, another 9.9MW solar PV plant, namely Wildebeestkuil 2 Solar PV Plant (part of separate BA process), will be located on Portion 13, Portion 14 and Remainder of Portion 22 of the Farm Wildebeestkuil No. 59, adjacent to the Wildebeestkuil 2 Solar PV Plant (this project). Two (2) more 9.9MW Solar PV Plants, namely the Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant (part of separate respective BA processes), will also be located on Portion 37 of the Farm Leeuwbosch No. 44, 1km from the project area. The next closest approved renewable energy project is just over 150km from the Wildebeestkuil 2 Solar PV Plant. Thus, the immediate area surrounding the proposed project has very limited renewable energy projects.

Bokamoso, due to its size, is expected to have a much larger impact, both positive and negative, in the area compared to the proposed project. Therefore, when assessing the cumulative effect of the proposed 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line considering other developments in the area, the effects are expected to be of lower significance.

#### *9.4.9.2 Potential cumulative effects*

As mentioned, the area has seen a notable interest from developers of various renewable energy projects, which could be associated with the solar energy resource potential found in the region, proximity to the existing substation and its evacuation capacity, as well as other factors. As a result, four (4) additional solar PV projects are planned in the area. These are:

- The 9.9MW Wildebeeskuil 2 Solar PV Plant and 132kV Power Line (part of separate BA process) on the Farm Wildebeeskuil and Leeuwbosch No.44, adjacent to the 9.9MW Wildebeeskuil 1 Solar PV Plant and 132kV Power Line (this project);
- The two (2) 9.9MW Leeuwbosch solar PV plants, namely the Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant (part of separate respective BA processes), on the Farm Leeuwbosch No.44, 1km west from proposed project area, and
- The 75MW Solar PV facility on Farm Matjesspruit, 10km east from the project area.

None of the solar projects have been developed yet, therefore there is a possibility that the construction and operational phases of all five (5) developments, including this proposed development (namely the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line), may coincide. In this case, the socio-economic cumulative effects will be more evident; however, most of these will be created by the larger project planned to be built on Farm Matjesspruit (namely the Bokamoso Solar Energy Facility).

The significance of the cumulative impacts associated with the proposed development have been rated according to SiVEST's Impact Rating Methodology (**Appendix 9C**) in **Table 24** on **page 188** in **section 9.3**. The impact assessment has revealed that cumulative impacts are expected to be **Positive Low** after the implementation of the recommended mitigation measures.

## 9.5 Assessment of Layout Alternatives

One (1) of the aims of the BA process was to identify alternatives for detailed assessment (as was discussed in **section 5**). The selection of alternatives helped to focus investigations, both in terms of the environmental investigations required and the scope of the public participation process.

As mentioned in **section 5,** no design or layout alternatives for the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been considered or assessed as part of the current BA process. Design and layout alternatives were considered and assessed as part of a previous BA process that was never completed (see **section 1.2**), and as such the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been placed to avoid site sensitivities identified as part of a previous BA process as well as the current BA process. Specialist studies were originally undertaken in 2016 and the current layout being proposed was selected based on the environmental sensitivities identified as part of these studies in 2016. All specialist studies which were undertaken in 2016 were however updated in 2020 (including ground-truthing, where required) to focus on the impacts of the layout being proposed as part of the current BA application. The results of the updated specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or 'no-go' areas.

**Three (3) power line corridor route alternatives for the proposed 132kV power line were however identified and assessed by the respective specialists as part of the current BA process**. These alternatives essentially provide for different power line route alignments contained within an assessment corridor. For the purpose of this BA, corridors between approximately 60m and 150m wide were assessed for the proposed power line corridor route alternatives. This is to allow for flexibility to route the power line within the assessed corridor. The final servitude width of the proposed 132kV power line will be determined during the BA process, however, it expected that it will not exceed 32m. As such, the selected preferred power line will be routed within the assessed corridor.

The various power line corridor alternatives, as shown in **Figure 59** below, are described below.

- **Power Line Corridor Option 1 (approximately 2.49km in length):**

This involves an overhead power line which will run north of the R502, from the switching substation located within the Wildebeestkuil 2 Solar PV Plant application site (namely Portion 13 of the Farm Wildebeestkuil No. 59) to either Option 1 or Option 2 of the Leeudoringstad Solar Plant Substation, depending on the alternative chosen as 'preferred' for the Leeudoringstad Solar Plant Substation site[32]. The Leeudoringstad Solar Plant Substation site alternatives are situated approximately 2km to the north-east of the Wildebeestkuil 2 Solar PV Plant application site, within Portion 37 of the Farm Leeuwbosch No. 44.

- **Power Line Corridor Option 2A (approximately 2.55km in length):**

This involves an overhead power line which will run south of the R502, from the switching substation located within the Wildebeestkuil 2 Solar PV Plant application site (namely Portion 13 of the Farm Wildebeestkuil No. 59) to either Option 1 or Option 2 of the Leeudoringstad Solar Plant Substation, depending on the alternative chosen as 'preferred' for the Leeudoringstad Solar Plant Substation site[32]. The Leeudoringstad Solar Plant Substation site alternatives are situated approximately 2km to the north-east of the Wildebeestkuil 2 Solar PV Plant application site, within Portion 37 of the Farm Leeuwbosch No. 44.

- **Power Line Corridor Option 2B (approximately 2.55km in length):**

This involves an underground power line which will run south of the R502, from the switching substation located within the Wildebeestkuil 2 Solar PV Plant application site (namely Portion 13 of the Farm Wildebeestkuil No. 59) to either Option 1 or Option 2 of the Leeudoringstad Solar Plant Substation, depending on the alternative chosen as 'preferred' for the Leeudoringstad Solar Plant Substation site[32]. The Leeudoringstad Solar Plant Substation site alternatives are situated approximately 2km to the north-east of the Wildebeestkuil 2 Solar PV Plant application site, within Portion 37 of the Farm Leeuwbosch No. 44.

[32] 132kV power line corridor route associated with solar PV plant intrinsically linked to Leeudoringstad Solar Plant Substation site (part of separate on-going BA process). Leeudoringstad Solar Plant Substation site chosen as 'preferred' by respective specialists as part of that separate BA process therefore informed connection point for power line corridor being proposed as part of this BA application.

Various environmental specialists assessed the solar PV plant's site and power line corridor route alternatives during their respective field investigations. Their assessments focused on the entire solar PV plant's application site and power line corridor route alternatives, as well as specific impacts of the proposed PV development area and solar PV plant and power line infrastructure in detail. In addition, their assessments also included the identification of sensitive and/or 'no-go' areas. Based on the specialist assessments which were conducted, sensitive and/or 'no-go' areas have been identified within the solar PV plant's application site and power line corridor route alternatives. These areas were subsequently used to inform the buildable area for the PV panels and associated infrastructure (such as the on-site switching substation and permanent guard house) within the application site (referred to as the proposed PV development area)[33] as well as the route for the 132kV overhead power line within the assessed corridors.

The identified sensitive and/or 'no-go' areas were precluded from the proposed PV development area (where required). In addition, the alignment of the power line within the authorised 'preferred' power line corridor will be determined and confirmed during the detailed design phase, taking the identified sensitive and/or 'no-go' areas into account. This is to enable the avoidance of any unidentified features on-site, or any design constraints when the proposed development reaches construction.

The above-mentioned sensitive / 'no-go' areas were also used to perform a comparison of alternatives, which were extensively investigated (see below).

## 9.6 Comparative Assessment of Alternatives

The proposed PV development area for the PV panels and associated infrastructure as well as the power line corridor route alternatives which were investigated and comparatively assessed as part of the BA process, in relation to the identified environmental sensitive and/or 'no-go' areas, is shown in **Figure 59** and **Figure 60** below. Each of the power line corridor route alternatives have been comparatively assessed in terms of the findings from the specialist assessments conducted as part of the BA process.

[33] PV modules will not necessarily be erected in the entire proposed PV development area, particularly where PV modules cannot be placed

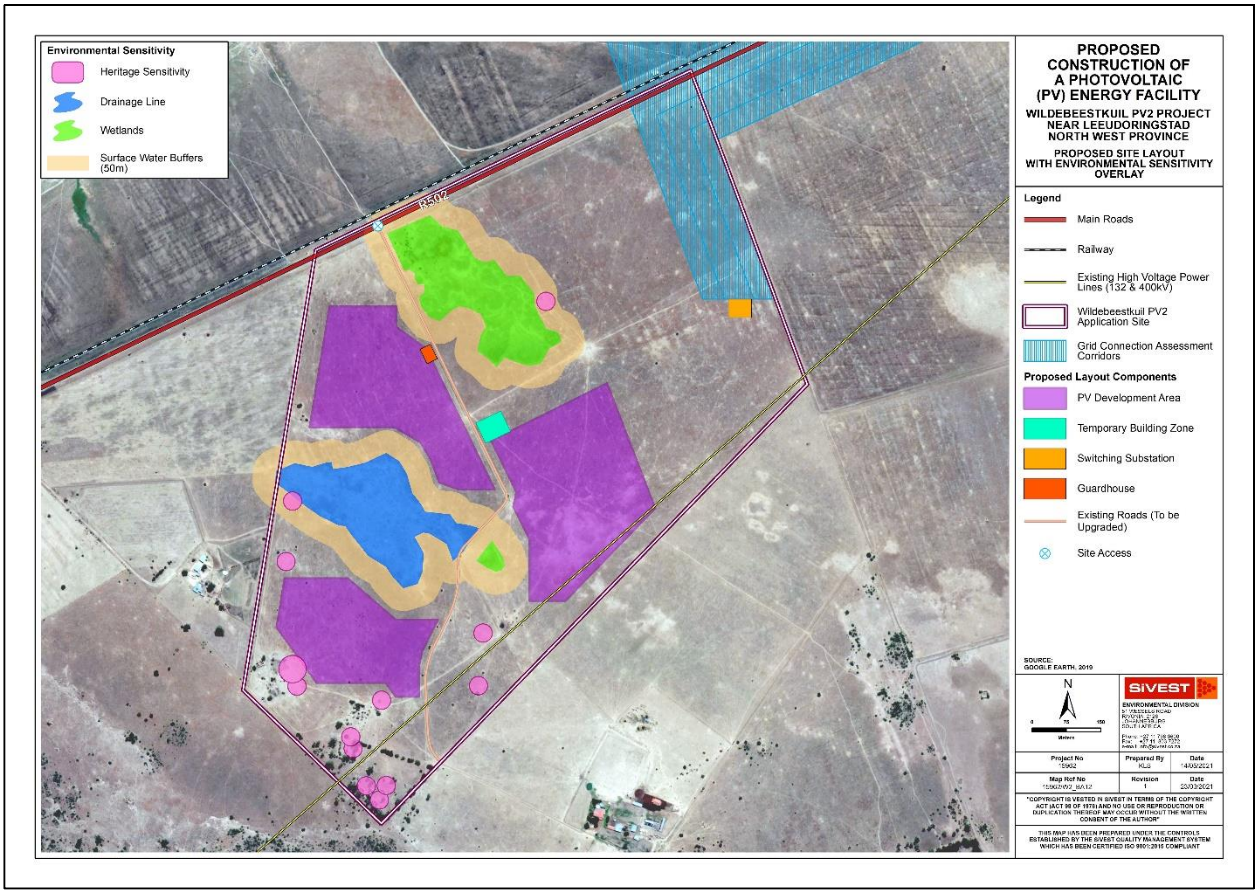


**Figure 59:** Proposed PV development area for PV panels and associated infrastructure in relation to environmental sensitive and/or 'no-go' areas.

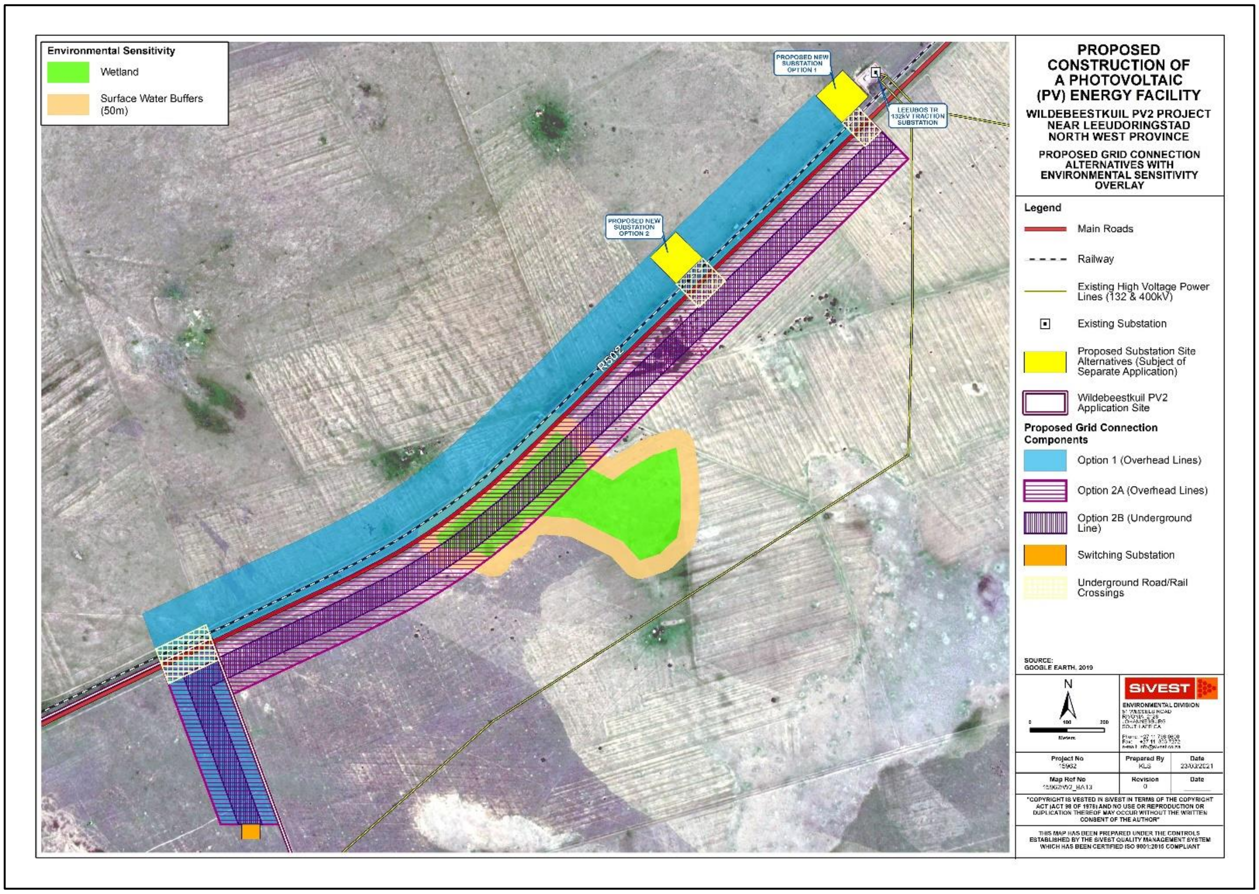


**Figure 60:** Proposed power line corridor alternatives in relation to environmental sensitive and/or 'no-go' areas.

**Table 27** below summarised the preferences associated with each power line corridor route alternative, thereby identifying the 'preferred' alternative.

**Key**

| | |
|---|---|
| **PREFERRED** | The alternative will result in a low impact / reduce the impact |
| **FAVOURABLE** | The impact will be relatively insignificant |
| **NOT PREFERRED** | The alternative will result in a high impact / increase the impact |
| **NO PREFERENCE** | The alternative will result in equal impacts |

**Table 27:** Summary of comparative assessment of power line corridor alternatives for 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line

| ALTERNATIVE | ENVIRONMENTAL ASPECT | | | | | | | | | FATAL FLAW (YES / NO) | PREFERRED (YES / NO) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Terrestrial Ecology | Surface Water | Visual | Geotech | Avifauna | Social | Palaeo | Agric. and Soils | Heritage | | |
| **POWER LINE CORRIDOR ROUTE ALTERNATIVES** | | | | | | | | | | | |
| **Option 1** | Favourable | Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **YES** |
| **Option 2A** | Favourable | Not Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **NO** |
| **Option 2B** | Favourable | Not Preferred | Preferred | No Preference | Preferred | Preferred | No preference | No preference | No preference | **NO** | **NO** |

Based on the results of the comparative assessment of power line corridor alternatives (as depicted in **Table 27** above), the following power line corridor alternative was found to be the most preferred alternative from an environmental perspective:

- **Power Line Corridor Option 1**.

This is due to the fact that none of the specialists found this alternative to be 'Not Preferred'. In addition, this alternative was found to be 'Preferred' from a Surface Water perspective, while three (3) of the specialists found this alternative to be 'Favourable', these being Terrestrial Ecology, Visual and Avifauna. Five (5) of the specialists (namely Geotechnical, Social, Palaeontology, Agriculture and Heritage) also found this alternative to have 'No Preference'. It should also be noted that the Surface Water specialist strongly recommended that **Power Line Corridor Option 1** be presented as the 'preferred' alternative. Where this is not possible, the more intensive mitigation measures stipulated will need to be implemented where the necessary EA and water use license is obtained. The above-mentioned power line corridor route alternative is also preferred from a technical perspective.

In light of the information above, **Power Line Corridor Option 1 is the preferred power line corridor route alternative from an environmental perspective and is being proposed for authorisation**. It should be noted that no fatal flaws were identified and therefore the above-mentioned power line corridor route alternative is considered to be acceptable alternatives. As such, the layout being proposed for the solar PV array areas, 132kV power line corridor and associated infrastructure is considered to be acceptable form an environmental perspective.

The Surface Water specialist has recommended that the access route be re-aligned outside of all the delineated surface water resources as well as the associated buffer zones, where possible. However, it was confirmed that the crossing of the wetland by the road is not a fatal flaw. In addition, should it not be possible to re-align the access route outside of all the delineated surface water resources as well as the associated buffer zones, it was recommended that the more intensive mitigation measures stipulated be implemented where the necessary EA and water use license are obtained. In light of this, the more intensive mitigation measures will be implemented accordingly, as recommended, and the necessary EA and water use license will be obtained. As such, there are no fatal flaws and the layout being proposed is considered to be acceptable from an environmental perspective.

It is therefore requested that the above-mentioned alternative **(Power Line Corridor Option 1)** be authorised by the Department. It must be noted that the specialist sensitivities and 'no-go' areas informed the location of all alternatives and have been incorporated into the layout design of the preferred site layout (**Figure 61** and **Figure 62**). In addition, as mentioned, no fatal flaws were identified and therefore all of the alternatives are considered to be acceptable, although not necessarily preferable from an environmental perspective.

The preferred site layout in relation to the sensitive / 'no-go' areas identified by the specialists is indicated in **Figure 61** and **Figure 62** below.

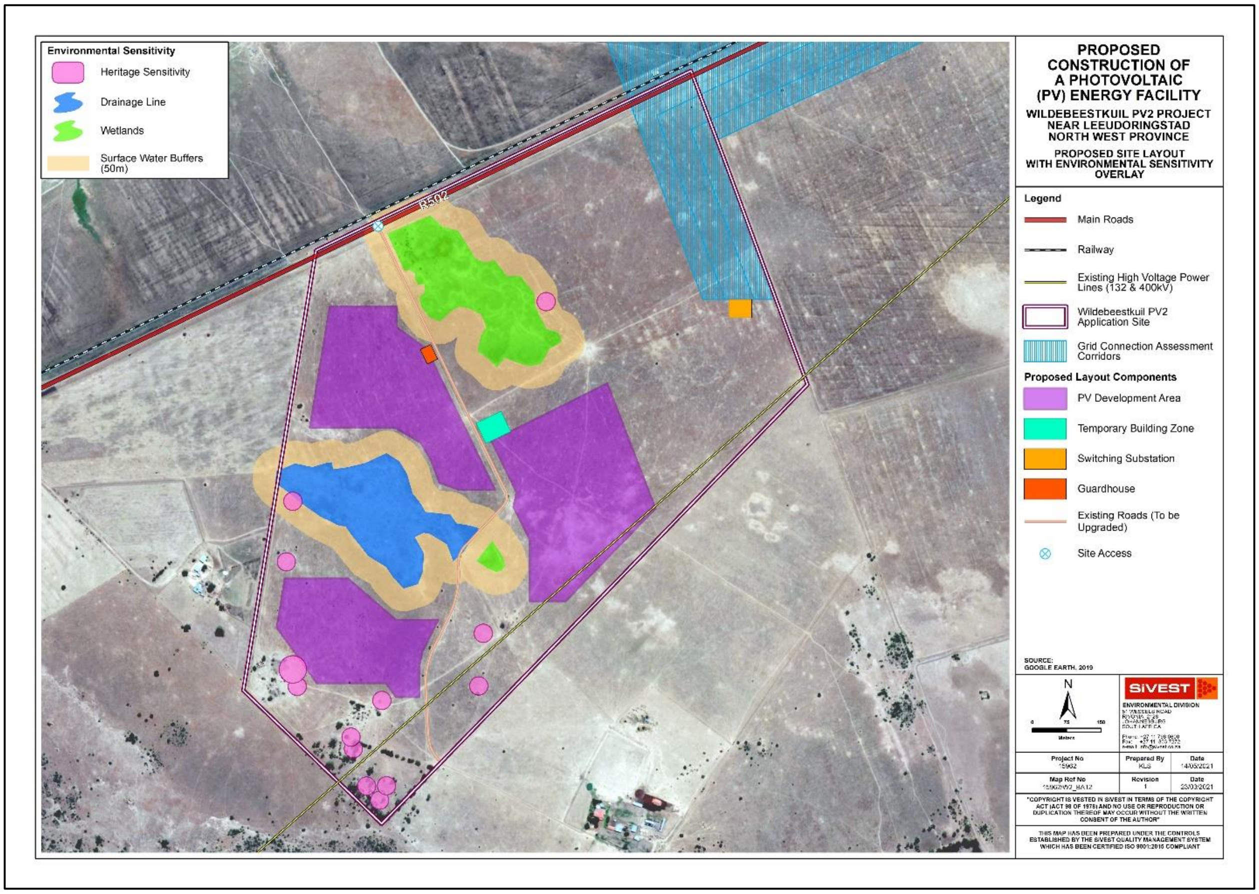


**Figure 61:** Preferred site layout in relation to identified environmental sensitive / 'no-go' areas - Solar PV Plant

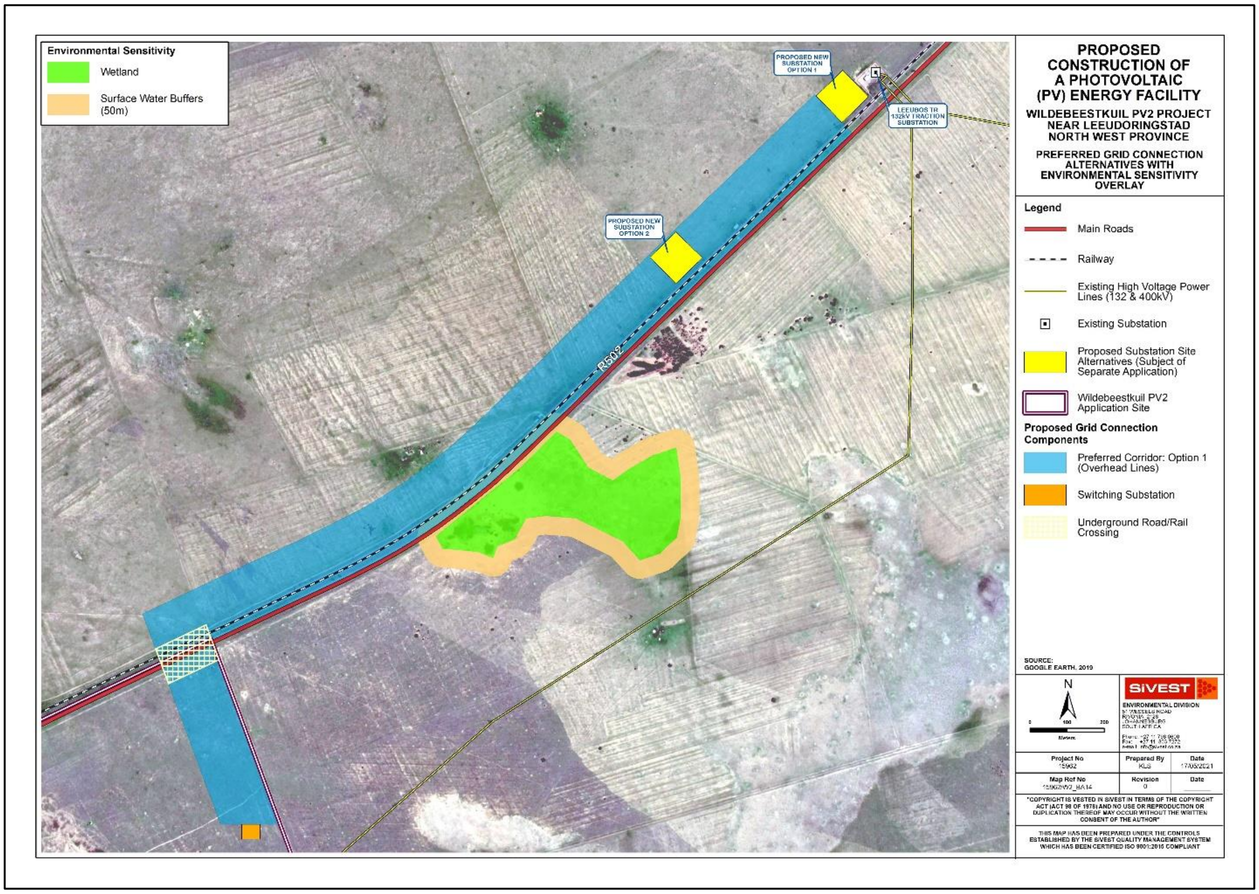


**Figure 62:** Preferred site layout in relation to identified environmental sensitive / 'no-go' areas - 132kV Overhead Power Line

Refer to **Appendix 9A** for the coordinates of the preferred site layout.

As mentioned, no fatal flaws were identified and therefore the layout being proposed is considered to be acceptable from an environmental perspective. It is however important to note that the preferred layout provided above is **not** the final layout for the proposed development. **A final layout will be submitted to the Department for review and approval, along with a Final EMPr, prior to construction commencing.**

# 10 PUBLIC PARTICIPATION PROCESS

Public participation is the cornerstone of any BA process. The principles of the National Environmental Management Act (NEMA) as well as the EIA Regulations 2014 (as amended) govern the BA process, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth.

The primary aims of the Public Participation Process are:

- To inform I&APs and key stakeholders of the proposed development;
- To initiate meaningful and timeous participation of I&APs and key stakeholders;
- To identify issues and/or concerns of key stakeholders and I&APs with regards to the proposed development;
- To promote transparency and an understanding of the proposed development and its potential environmental impacts;
- To provide information used for decision-making;
- To provide a structure for liaison and communication with I&APs and key stakeholders;
- To assist in identifying potential environmental impacts associated with the proposed development;
- To ensure inclusivity (the views, needs, interests and values of I&APs and key stakeholders must be considered in the decision-making process);
- To focus on issues relevant to the proposed development and issues considered important by I&APs and key stakeholders;
- To provide responses to I&AP and key stakeholder queries / comments / concerns;
- To encourage co-regulation, shared responsibility and a sense of ownership; and
- Meet the requirements for Public Participation as stated in Chapter 6 of the EIA Regulations, 2014 (as amended).

In addition to the guidance of the Public Participation Process in the EIA Regulations, 2014 (as amended), every effort was also made to conform to the requirements of the Promotion of Administrative Justice Act, 2000 (Act No. 3 of 2000).

## 10.1 Compliance with Regulations and Subsequent Circulars / Notices

In light of the country wide restriction which has resulted in the entire country being placed in a national state of disaster and limits on the movement and gatherings of people in an effort to curb the spread of CoVID-19, the public participation process has been amended and adjusted. In response, SiVEST has formulated a unique Public Participation process which is as closely related to the requirements of Regulations 39 to 44 of the EIA Regulations, 2014, as amended, (GN R. 326) as possible.

**Alternative means** of undertaking the required stakeholder engagement have been designed and implemented by SiVEST to ensure that all I&APs are afforded reasonable opportunity to engage meaningfully. As such, SiVEST are proposing the following amendments to the public participation process, described in more detail below[34].

[34] Based on correspondence with Competent Authority, a Public Participation Plan was not deemed necessary and thus one (1) has not been compiled. EAP is adhering to requirements of Regulations 39 to 44 of EIA Regulations, 2014 (as amended) (GN R. 326), as it pertains to public participation

**Figure 63** below provides an overview of the tools that are available to I&APs and stakeholders to access project information and interact with the public participation team to obtain project information and resolve any queries that may arise. **Table 28** below shows how the amended Public Participation Process has been implemented in accordance to Regulations 39 to 44 of the EIA Regulations, 2014 (as amended) (GN R. 326), as well as adherence to the applicable provisions of the Disaster Management Act and associated Regulations (e.g. restrictions on gatherings for public meetings).

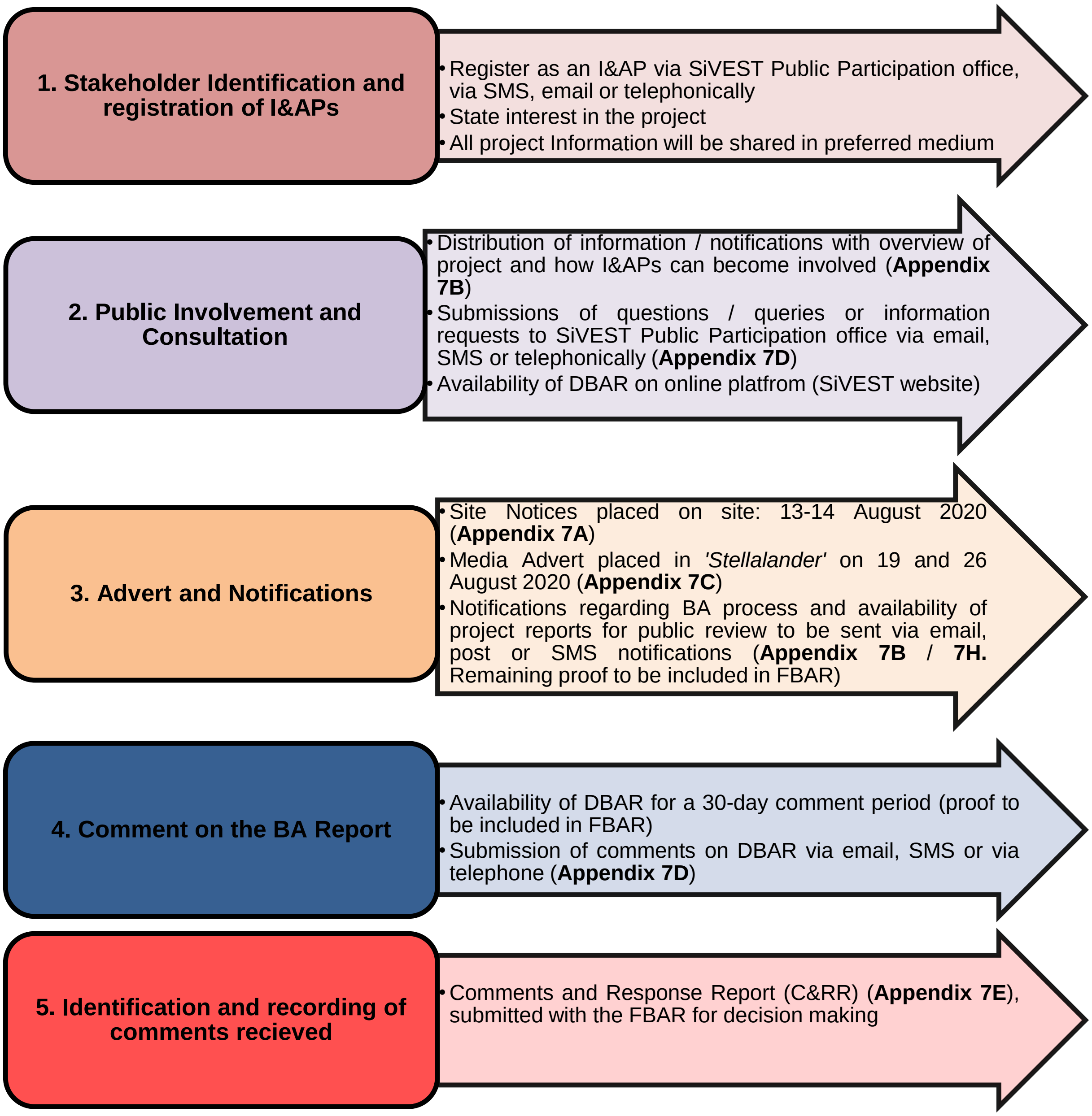


**Figure 63:** Schematic illustration of PPP tools

**Table 28:** Discussion of approach and methodology to meet the requirements of the Regulations

<table>
<tr><th>Regulation / circular</th><th>Approach & Methodology to meet requirements</th></tr>
<tr>
<td>Regulation 40(1), Regulation 40(3) & Regulation 43 – provide all potential or registered interested and affected parties, including the competent authority, access to project related information, access to the Draft BA Report (DBAR) which will each be made available for a period of at least 30 days to submit comments on the draft report prior to submission of Final BA Report (FBAR) for decision-making.</td>
<td>
It is the intention to release all relevant project information to all interested and affected parties for a 30-day period.
<u>Notification of BA process to be undertaken for application for EA to be distributed using the following means:</u>
<ul>
<li>Initial project notifications and initial landowner consultation (circulated to all I&APs in June 2021).</li>
<li>Site notices in English and Afrikaans (as per regulations) were erected on the boundary of one (1) of the affected properties (namely Portion 14 of the Farm Wildebeestkuil No. 59) 14 August 2020 (Coordinates: 27°13'12.90"S; 26°16'58.10"E).</li>
<li>Notification letter sent via E-mail or sms (if cellphone number / email is available, it is assuming the I&AP have an email or cellphone).</li>
<li>ALL identified I&APs had access to at least email or cellphone (Appendix 7F)</li>
<li>Public notification - BA process advertised in a local newspaper (namely 'Stellalander') on 19 and 26 August 2020 (Appendix 7C), as required according to Regulation 41 (2) (c) of the EIA Regulations (2014), as amended.</li>
</ul>
<u>Availability of report for review:</u>
<ul>
<li>Report available on SiVEST's website for free viewing and/or download.</li>
<li>Dedicated email address (sivest_ppp@sivest.co.za) for stakeholder engagement.</li>
<li>Digital Tablets uploaded with the DBAR at the Maquassi Hills Library and Kgakala Library.</li>
<li>Electronic copies will be made available to parties via a secure digital link that will be emailed upon request for the documentation.</li>
<li>Hard copy of DBAR or CDs / Flash drive posted, only if requested[35].</li>
</ul>
The tablets will be located at the following locations and will be available for review at the below designated times:
<table>
<tr><th>Locations</th><th>Address</th><th>Open Hours</th><th>Contact</th></tr>
<tr><td>Maquassi Hills Library</td><td>56 Smuts Street<br>Leeudoringstad<br>North West<br>2891</td><td>Monday - Friday<br>08h30 - 16:30</td><td>Moeketsi Medupe<br>084 795 2889<br>moeketsimedupe@yahoo.com / mooketsi@gmail.com</td></tr>
<tr><td>Kgakala Library</td><td>415 Tladi Street<br>Leeudoringstad</td><td>Monday - Friday<br>08h00 – 16h30</td><td>Esther Hlongwane<br>073 659 7219</td></tr>
</table>
</td>
</tr>
</table>

[35] The use of postage will only be required in the event that an I&AP requests that the documents be sent to them via CD, flash drive or as a hard copy. All I&APs and OoS have either email / sms and will be sent an electronic link to the website where the report can be reviewed or downloaded, as well as SiVEST's website where the report can either be reviewed or downloaded electronically. Should I&APs / stakeholders / Oos request that documents be sent via post or courier, this will be indicated and proof will be provided in the Final BA Report (**Appendix 7B** and **Appendix 7I**).

<table>
<tr><th>Regulation / circular</th><th>Approach & Methodology to meet requirements</th></tr>
<tr><td></td><td>
<table>
<tr><td></td><td>North West<br>2891</td><td></td><td>mabinak@gmail.com</td></tr>
</table>
<br>
<u>Availability to comment</u>:<br>
Comments can be submitted in various mediums detailed in the row below, and will be captured and responded to by the SiVEST PPP Office.<br>
<br>
*****Where I&APs do not have the applicable facilities i.e. access to internet, mobile phones, or computers, provision will be made for the use of electronic tablets which contains the full DBAR, whereby all members of the community can view the report.
</td></tr>
<tr><td>Regulation 40(2) - Provide access to all project information that has the potential to influence any decision regarding the application, unless protected by law, and must include consultation with Competent Authority, Organs of State & registered I&APs.<br>
<br>
Regulation 41(6) – Relevant information available and accessible</td><td>
<ul>
<li>One (1) hard copy and one (1) electronic copy (via CD) of the DBAR and FBAR will be submitted to the Competent Authority respectively, as confirmed by the Department.</li>
<li>DBAR will be submitted to Organs of State (OoS) and commenting authorities via an agreed electronic platform (via a secure digital link).</li>
</ul>
<u>Availability of reports via means described above.</u><br>
<br>
<u>Submission of comments to EAP</u>:
<ul>
<li>Comments can be submitted directly to the EAP using the SiVEST sivest_ppp@sivest.co.za email address or cell phone via call, SMS or WhatsApp.</li>
<li>Written comments can also be submitted via email or fax.</li>
<li>This is deemed to be sufficient as all I&APs have either access to email or cellphone.</li>
</ul>
Any comments provided telephonically or via instant message will be transcribed and recorded as formal comments.<br>
<br>
Provision of project information and consultation via various means, including:
<ul>
<li>Telephonic consultation.</li>
<li>Email correspondence.</li>
<li>SMS and/or WhatsApp.</li>
<li>The SiVEST website will ensure that I&APs are afforded sufficient opportunity to participate in the project and raise comments on the project with interest in the BA process.</li>
<li>Virtual meetings, if required / requested, will be conducted using an appropriate platform agreeable to all parties (such as Zoom, Skype or Microsoft Teams). The meeting(s) will be recorded, and the attendees' details captured in an attendance register. Confirmation of their attendance will also be requested by e-mail and any correspondence will be included in the report.</li>
</ul>
</td></tr>
</table>

| Regulation / circular | Approach & Methodology to meet requirements |
|---|---|
| Regulation 41(2)(a) – **Site notice board** | ▪ Site notices in English and Afrikaans (as per the regulations) were erected on the boundary of one (1) of the affected properties (namely Portion 14 of the Farm Wildebeestkuil No. 59) 14 August 2020 (Coordinates: 27°13'12.90"S; 26°16'58.10"E).<br>▪ Size and content is in accordance with Regulation 41(3) & 41(4).<br>▪ Proof incorporated into the DBAR (**Appendix 7A**) |
| Regulation 41(2)(b) – **Written notification** to affected and neighbouring landowners and occupiers; municipality; ward councilors; Organs of State & other parties required by the Competent Authority | ▪ Notification letters to all I&APs and OoS will be sent via email and SMS.<br>▪ Proof of notifications will be incorporated into the FBAR (**Appendix 7B** and **7H**) |
| Regulation 41(2)(c) – (e) – Media **Advertisements** | ▪ Public notification - BA process advertised in a local newspaper (namely *'Stellalander'*) on 19 and 26 August 2020 (**Appendix 7C**), as required according to Regulation 41 (2) (c) of the EIA Regulations,2014 (as amended).<br>▪ Note: It was not deemed necessary to place a media advertisement in a provincial newspaper or national newspaper. Process notices (A4 size) with site notice details to be distributed to Ward Councillors to distribute or communicate to potential I&APs, where practically possible. |
| Regulation 42 – **Project database** | ▪ Preliminary I&APs were identified through a process of networking and referral, obtaining information from the SiVEST existing stakeholder database and liaison with potentially affected parties in the greater surrounding area.<br>▪ Organs of State (OoS), key stakeholders and affected and surrounding landowners were identified and registered on the project database.<br>▪ Other stakeholders are required to formally register their interest in the project through either directly contacting the SiVEST Public Participation team via phone, email or fax, or through the use of the SiVEST website.<br>▪ The register of I&APs submitted with the Final BA Report will contain the names of:<br>○ all persons who requested to be registered on the database through the use of the SiVEST website, or in writing and who disclosed their interest in the project;<br>○ all OoS which hold jurisdiction in respect of the activity to which the application relates; and<br>○ all persons who submitted written comments or attended virtual meetings and viewed virtual presentations on the SiVEST website during the public participation process.<br>▪ The information captured on the project database contains the names, organisation and contact details, as required |
| Regulation 44 – **Comments** to be recorded | ▪ Comments can be submitted directly to the EAP using the SiVEST email address (sivest_ppp@sivest.co.za) or cell phone via call, SMS or WhatsApp.<br>▪ Written comments can also be submitted via calls, SMS, WhatsApp, email or fax.<br>▪ Any comments provided telephonically or via instant message will be transcribed and recorded as formal comments. |

| Regulation / circular | Approach & Methodology to meet requirements |
|---|---|
| | ▪ I&APs without the applicable electronic facilities to access the SiVEST website will be provided with the opportunity to submit their comments and communicate with the public participation team via SMS, WhatsApp or by sending a 'Please-call-me' notification. These comments will be transcribed and recorded as formal comments.<br>▪ All comments received throughout the BA process will be acknowledged and captured in the C&RR, with a relevant response provided.<br>▪ The C&RR has been included as part of the DBAR (**Appendix 7E**) and will also be updated and included in the final report which will be submitted to the CA for decision-making.<br><br>***It should be noted that I&APs / stakeholders / OoS will be notified throughout the BA process to provide comments via the methods mentioned in this report. They will also be advised to contact SiVEST directly, if required, in which case other arrangements will be made (if required). SiVEST's public participation email address will be monitored on a daily basis to confirm whether any comments or queries have been received. Once a comment is received, the project team will save a copy, respond accordingly (using an appropriate method) and the comment / query will also be added to the C&RR (along with an appropriate response), which has been attached to the BA Report for consideration. SiVEST will also include all proof of correspondence with I&APs, stakeholder and OoS as part of the Final BA Report, while the project database in the BA Report will reflect whether any I&AP / stakeholder / OoS / Authority received the documents via post or courier.*** |
| Regulation 4(2) – Notification of **decision** on application | **Notification of decision using the following means:**<br>▪ Notification letter with details as outlined in the decision issued will be sent via email and SMS (same method used during public consultation described above).<br>▪ Notification will be available on the project website. |

Input into the public participation process or registration by members of the public, I&APs and key stakeholders can be given at various stages of the BA process up until the FBAR is submitted to the Department for decision-making. Registration on the project database can take place at any time during the BA process up until the final BA report is submitted to the Department for decision-making.

Any I&APs that wish to register or comment on the various reports are encouraged to contact the SiVEST environmental division. The contact details are as follows:

Contact: Hlengiwe Ntuli or Stephan Jacobs
PO Box 2921, RIVONIA, 2128
☎ Phone: (011) 798 0600
E-mail: sivest_ppp@sivest.co.za
Fax: (011) 803 7272
Websites: www.sivest.com

As stipulated in the EIA Regulations, 2014 (as amended), the DBAR will undergo a 30-day comment and review period from **from 11 June 2021 until 12 July 2021** (excluding public holidays). Where I&APs may not have the applicable facilities (i.e. access to internet), provision has been made for the use of electronic tablets which contain the full DBAR where all members of the community can view the report. As such, electronic copies of the DBAR will be made available on digital Tablets at public venues (namely the Maquassi Hills Library and Kgakala Library) and an electronic copy is also available to view or download electronically on SiVEST's website.

All I&APs and key stakeholders, such as OoS / authorities, who are registered on the project database, will be notified of the submission of the DBAR as well as the 30-day comment and review period accordingly. In addition, all OoS / authorities will be sent electronic links of the DBAR. Comments received on the DBAR will be taken into consideration, incorporated into the report (where possible) and will be used when compiling the FBAR, which will be submitted to the competent authority for decision-making.

## 10.2 Overview of the Public Participation Process to date

It should be noted that based on correspondence with the competent authority, a Public Participation Plan was not deemed necessary and thus one (1) has not been compiled. The EAP is therefore adhering to the requirements of Regulations 39 to 44 of EIA Regulations, 2014 (as amended) (GN R. 326), as it pertains to public participation.

The public participation process was initiated in August 2020.The following activities have been undertaken as part of the public participation process to date:

- An I&AP database was compiled which includes all affected landowners, adjacent landowners, occupiers of affected and adjacent land, other I&APs and key stakeholders (such as OoS).
    - The I&AP database is included in **Appendix 7F**. The OoS list is incorporated in **Appendix 7I**
- English and Afrikaans site notices (as per regulations) were placed within the study area during a site visit undertaken on the 14th of August 2020 respectively.
    - Proof of the site notices is shown in **Appendix 7A**. Refer to **Table 28** in **section 10.1** for more information regarding the site notices.

- A project related notification (English and Afrikaans) containing information about the proposed development and BA process was compiled and distributed to I&APs and key stakeholders registered on the project database between 31 May 2021 – 11 June 2021, along with written notification to all I&APs and key stakeholders.
    - Copies of the written notifications to all I&APs and key stakeholders are provided in **Appendix 7B**. Proof of distribution is also included in **Appendix 7B** and **Appendix 7D** of this report;
- Public notification of the BA process was advertised (in English and Afrikaans) in a regional newspaper (namely *the Stellalander*), as required under the EIA Regulations, 2014 (as amended), on 19 and 26 August 2020 respectively.
    - Proof of the advertisements is provided in **Appendix 7C**;
- Contacting all affected and adjacent landowners to request contact details of the occupiers residing on their land was undertaken and informed the I&AP database.
    - Proof of this is included in **Appendix 7H**.
    - **Appendix 7H** provides details regarding the landowners / occupiers (affected and adjacent) who have been contacted and/or notified with regards to the BA process, as well as the method in which they were contacted.

The stages that typically form part of the public participation process during a BA process are reflected in **Figure 64** below.

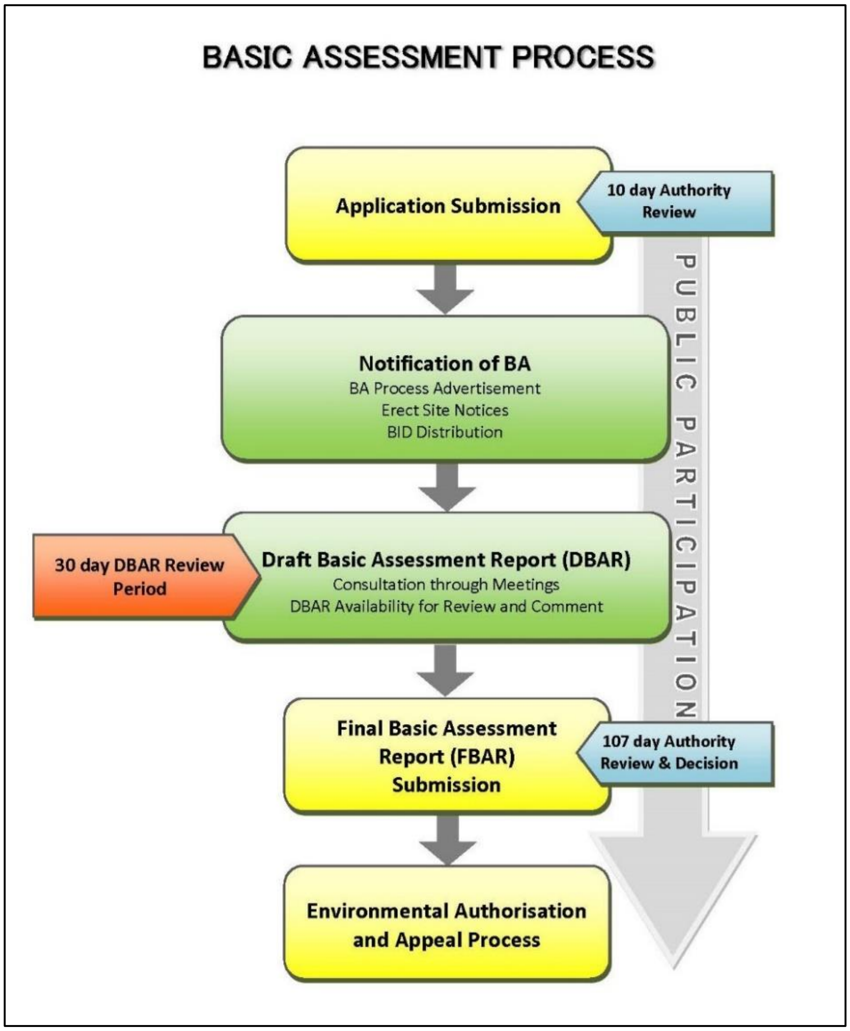


**Figure 64:** BA and Public Participation Process

On-going consultation with key stakeholders (e.g. provincial, district and local authorities, relevant government departments, local business etc.) and identified I&APs will ensure that I&APs and key stakeholders are kept informed regarding the BA process. Networking with I&APs and key stakeholders will effectively continue throughout the BA process until the final BA report is submitted to the competent authority for decision-making. Where required, key stakeholders and I&APs will be engaged on an individual basis.

During the BA process, individuals, businesses, institutions and organisations, and the following sectors of society have been identified and will be afforded the opportunity to comment and/or raise concerns (the full stakeholder / OoS database is included in **Appendix 7I**):

- National Authorities;
- Provincial Authorities;
- Maquassi Hills Local Municipality;
- Dr Kenneth Kaunda District Municipality;
- Government Structures such as SAHRA, SANRAL, SENTECH, Eskom Telkom, etc.;
- Agriculture Associations;

- Department of Agriculture;
- Department of Agriculture, Land Reform & Rural Development;
- Department of Cultural Affairs & Sport;
- Department of Mineral Resources (DMR);
- Department of Transport and Public Works;
- Endangered Wildlife Trust (EWT);
- Department of Water and Sanitation (DWS);
- Community representatives, CBOs, development bodies;
- Landowners;
- I&APs;
- South African Civil Aviation Authority (SA CAA);
- South African Local Government Association;
- Square Kilometre Array (SKA);
- TELKOM;
- Transnet Freight Rail
- All telecommunication service providers;
- Wildlife and Environment Society South Africa (WESSA); and
- Air Traffic and Navigation Services (ATNS).

## 10.3 Landowner Consent and Notification

Regulation 39 (1) of the EIA Regulations, 2014 (as amended), states that '*if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land*'.

Regulation 39 (2) of the 2014 NEMA EIA Regulations, 2014 (as amended), further states that '*sub-regulation (1) does not apply in respect of: (a) linear activities; (b) activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and (c) strategic integrated projects as contemplated in the Infrastructure Development Act, 2014'*.

The proposed Wildebeestkuil 2 Solar PV Plant development constitutes a non-linear activity and landowner consent is therefore required. Landowner consent has therefore been obtained for the following land portions:

**Table 29:** Land portions where consent for the BA process to occur was obtained

| FARM DESCRIPTION | 21 DIGIT SURVEYOR GENERAL (SG) CODE |
|---|---|
| Portion 13 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900013 |
| Portion 14 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900014 |
| Remainder of Portion 22 of the Farm Wildebeestkuil No. 59 | T0HP00000000005900022 |

Landowner consent has subsequently been obtained for the above-mentioned farms / land portions and is included in **Appendix 7H** of the DBAR. The affected landowner was also subsequently notified of the proposed development in terms of Chapter 6, Section 39 of the EIA Regulations, 2014 (as amended).

However, since the proposed 132kV overhead power line development constitutes a linear activity according to (b) of Regulation 39 (2) of the 2014 NEMA EIA Regulations, 2014 (as amended), namely the construction of an overhead power line, landowner consent is not required for this component of the proposed development. The affected and adjacent landowners were however notified of the proposed development in terms of Chapter 6, Section 39 of the EIA Regulations, 2014 (as amended).

The notifications have been included as **Appendix 7H** and have been submitted to the competent authority for consideration, together with the DBAR for comment. **Appendix 7H** contains a full landowner database with contact details and details regarding the method in which they have been notified and/or contacted.

## 10.4 Comment and Review of DBAR

The DBAR will be circulated to all I&APs and key stakeholders including OoS and authorities for comment and review for a period of 30-days after submission to the Competent Authority, **from 11 June 2021 until 12 July 2021**, excluding public holidays (**Table 28**).

The report can also be downloaded from the following website (http://www.sivest.com/, click on '*Downloads*' then browse to the folder '*15962 Leeudoringstad*' and finally to the sub-folder '*Wildebeestkuil 2*') during the 30-day comment and review period.

Written notice via email and SMS will be given to all registered I&APs and key stakeholders on the project database that the DBAR is available for comment and review (**Appendix 7B**). Electronic copies (via email) of the DBAR will also be distributed on written request, otherwise a link to the DBAR will be shared with all I&APs.

## 10.5 Comments and Response Report (C&RR)

Comments and concerns raised during the Public Participation Process will be captured in the C&RR (**Appendix 7E**). The C&RR provides a summary of the comments received and concerns raised by I&APs and key stakeholders, as well as the responses provided. This information will be used to feed into the evaluation of environmental and social impacts and will be taken into consideration when compiling the FBAR. The C&RR will be updated following the completion of the DBAR review and comment period and will be included in the FBAR which will be submitted to the competent authority for decision-making.

Original copies of all comments and/or correspondence received are provided verbatim in **Appendix 7D**.

# 11 CONCLUSIONS AND RECOMMENDATIONS

Wildebeestkuil PV Generation is proposing to construct the Wildebeestkuil 2 Solar PV Plant, 132kV Power Line and associated infrastructure on a number of properties, approximately 4km east of the town of Leeudoringstad in the Maquassi Hills Local Municipality, which falls within the Dr Kenneth Kaunda District Municipality in the North West Province of South Africa. The proposed development will have a total maximum generation capacity of up to approximately 9.9MW.

The overall objective of the proposed development is to generate electricity (by capturing solar energy) to feed into the national electricity grid and 'wheel' the power to customers based on a PPA. The electricity generated by the proposed solar PV plant (part of this application) will be sold by the Authorisation Holder to a second party, as part of a PPA. The purchased electricity will ultimately be sold directly to commercial and light industrial consumers within the Maquassi Hills Local Municipality.

The BA process for the proposed development has been conducted in accordance with the EIA Regulations, 2014 (as amended), promulgated in terms of Chapter 5 of NEMA.

**No design or layout alternatives for the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been considered or assessed as part of the current BA process**. Design and layout alternatives were considered and assessed as part of a previous BA process that was never completed (see **section 1.2**), and as such the PV development area, on-site switching substation, permanent guard house and temporary building zone (and all other associated infrastructure) have been placed to avoid site sensitivities identified as part of a previous BA process as well as the current BA process. The results of the specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or 'no-go' areas). **Various feasible power line corridor route alternatives were however identified and assessed as part of the BA process** (**section 9.5** and **9.6**).

The findings of the specialist assessments undertaken as part of this BA process provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed development. The results of the specialist assessments have indicated that all alternatives (including the preferred alternative) contain no fatal flaws and therefore there are no environmental fatal flaws that should prevent the proposed project from proceeding. In addition, all applicable environmental aspects were thoroughly investigated and the specialists did not recommend any further studies and/or investigations to be undertaken, apart from the detailed Geotechnical investigation to be undertaken prior to the commencement of construction. Areas of special concern have been identified which will require site-specific mitigation measures to reduce impacts. These are included within the EMPr to ensure that these areas receive special attention.

To date the BA process has identified that the proposed development will result in limited potential negative impacts and certain positive impacts. A preferred layout has been identified which is less environmentally sensitive and will result in the least environmental impact. Further comments and concerns may still however be raised during the public participation process.

Based on the findings of the specialist assessments, the proposed buildable area that was presented in the DBAR avoids identified environmental sensitivities (where required). It should be noted that none of the specialists identified any fatal flaws with the layout being proposed for authorisation and thus confirmed that provided there are no concerns raised during the public participation process, the layout should be approved as part of the EA (should this be granted).

Detailed mitigation and management measures have been developed and have been put forward in the EMPr (**Appendix 8**). Should this proposed development receive a positive EA, the EMPr will guide the project proponent and appointed contractor(s) through the final design, construction and operational phases of the proposed development.

A detailed public participation process is being followed during the BA process which conforms to the public consultation requirements as stipulated in the EIA Regulations, 2014 (as amended) as well as the recent circular by the DFFE (dated 05 June 2020, Government Gazette 43412) (refer to **section 10**). In addition, all issues raised by I&APs and key stakeholders will be captured in the FBAR and where possible, mitigation measures provided in the EMPr to address these concerns.

As sustainable development requires all relevant factors to be considered, including the principles contained in section 2 of the NEMA, the DBAR has strived to demonstrate that where impacts were identified, these have been considered in the determination of the preferred layout.

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided below.

## 11.1 Summary of Findings

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided in **Table 30** below.

**Table 30:** Summary of environmental issues identified in Specialist Studies

<table>
<tr><th>Specialist</th><th>Key Findings</th><th>Impacts</th><th>Impact pre-mitigation</th><th>Impact post-mitigation</th></tr>
<tr><td rowspan="13">Desktop Agriculture and Soils - Appendix 6A</td><td rowspan="13">Soil information was obtained for the solar PV plant and 132kV power line proposed near the town of Leeudoringstad in the North West Province. The data source was existing 1:250 000 scale land type information and indicates that the soils are mostly shallow, with much rock.<br><br>The construction of the solar PV plant, 132kV power line and associated infrastructure at the chosen site will have minimal impact on the loss of agricultural land, due to the small percentage of high potential agricultural land indicated by the Land Type survey information.<br><br>The potential impact on the loss of agricultural land will be low, and there is not expected to be any significant soil erosion hazard, if standard mitigation measures are followed.<br><br>As far as the soils are concerned, as long as the proposed mitigation measures are adhered to, there should not be any significant cumulative impacts occurring, as any impact on agricultural potential will be contained to the specific site itself. Cumulative soil-related impacts are thus expected to be low.</td><td colspan="3">Pre-construction Phase</td></tr>
<tr><td colspan="3">N/A</td></tr>
<tr><td colspan="3">Construction Phase</td></tr>
<tr><td>Loss of agricultural land</td><td>Medium Negative</td><td>Medium Negative</td></tr>
<tr><td>Soil erosion (wind or water) caused by surface disturbance</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Operational Phase</td></tr>
<tr><td>Loss of agricultural land</td><td>Medium Negative</td><td>Medium Negative</td></tr>
<tr><td>Soil erosion (wind or water) caused by surface disturbance</td><td>High Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Decommissioning Phase</td></tr>
<tr><td>Loss of agricultural land</td><td>Medium Negative</td><td>Medium Negative</td></tr>
<tr><td>Soil erosion (wind or water) caused by surface disturbance</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Cumulative</td></tr>
<tr><td>Proposed project can contribute to overall loss of soil health and productivity</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td rowspan="4">Surface Water - Appendix 6B</td><td rowspan="4">Ultimately, it was found that there are two (2) Artificial Depression Wetlands, one (1) Drainage Line and one (1) Natural Depression Wetland within the study site and the proposed power line corridors.<br><br>A present ecological status (PES) determination was undertaken for Natural Depression Wetland 1. Accordingly, the PES of Natural</td><td colspan="3">Pre-Construction Phase</td></tr>
<tr><td>Impacts associated with the Temporary Building Zone within 55m to Artificial Wetland 1</td><td>Low Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Construction Phase</td></tr>
<tr><td>Vehicle and machinery degradation - Natural Depression Wetland 1,</td><td>Medium Negative</td><td>Medium Negative</td></tr>
</table>

<table>
<tr><th>Specialist</th><th>Key Findings</th><th>Impacts</th><th>Impact pre-mitigation</th><th>Impact post-mitigation</th></tr>
<tr><td rowspan="9"></td><td rowspan="9">Depression Wetland 1 was categorised to have an overall PES – D (Largely Modified).<br><br>The wetland ecosystem services and environmental sensitivity and importance were assessed and provided for Artificial Depression Wetlands 1 and 2 as well as Natural Depression Wetland 1. These assessments were undertaken to determine their functionality and sensitivity. With regards to the potential wetland ecosystems services provided by each wetland, Artificial Depression Wetland 1 scored highest was in terms of sediment trapping followed closely by phosphate trapping, erosion control and flood attenuation. Artificial Depression Wetland 2 scored highest in terms of erosion control, with other potential wetland ecosystem services provided at a slightly lower degree including sediment trapping, phosphate trapping, flood attenuation, maintenance of biodiversity and toxicant removal. For Natural Depression Wetland 1, the potential wetland ecosystem service provided which scored highest includes sediment trapping. The sediment trapping function of this wetland can be said to be one of the primary functions of an endorheic wetland. Other potential wetland ecosystem services provided at a slightly lower degree include phosphate trapping and erosion control. This is closely followed by toxicant control and nitrate removal. Other potential wetland ecosystem services which could potentially be provided, which scored to a lesser degree, include flood attenuation, education and research, tourism and recreation, natural resources and maintenance of biodiversity.<br><br>The EISC for the surface water resources were determined. The results were as follows:<br>▪ Natural Depression Wetland 1 was categorised as a Class C (Moderate);<br>▪ Artificial Depression Wetland 1 was categorised as a Class C (Moderate); and<br>▪ Artificial Depression Wetland 2 was categorised as a Class B (High).</td><td>Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td></td><td></td></tr>
<tr><td>Human degradation to fauna and flora associated with the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Low Negative</td><td>Low Negative</td></tr>
<tr><td>Degradation and removal of soils and vegetation associated with the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td>Increased storm water run-off, erosion and increased sedimentation impacting on the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Operational Phase</td></tr>
<tr><td>Vehicle damage to the surface water resources - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td>Impermeable and hardened surfaces creating accelerated run-off, consequent erosion and sedimentation - Natural Depression Wetland 1, Artificial Depression Wetlands 1 & 2 and Drainage Line 1</td><td>Medium Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Decommissioning Phase</td></tr>
<tr><td colspan="3">Should the proposed development need to be decommissioned, the same impacts as identified for the construction phase of the proposed development can be anticipated. Similar potential impacts are therefore expected to occur and the stipulated mitigation measures (where relevant) must be employed as appropriate to minimise impacts.</td></tr>
</table>

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | The Department of Water Affairs (DWA) (2014) database shows that the nearby Leeudoringspruit is classified as having a PES: B (Largely natural), EI: Moderate and ES: Moderate. This watercourse will not be directly impacted by the proposed development as is it located approximately 150m from the study site.<br><br>The functional assessments undertaken were used to inform a 50m buffer zone that was applied to the identified surface water resources.<br><br>In terms of potentially applicable environmental and water related legislation, several listed activities and water uses have been identified that are likely to be applicable to the proposed development. Accordingly, in terms of National Environmental Management Act (1998) and the EIA Regulations (2014), Activities 12 and 19 of Government Notice 983, and Activity 14 of Government Notice 985 have been identified as being applicable based on the scenarios presented in the sub-section. With respect to the National Water Act (1998), water uses (c) and (i) are also applicable where stipulated. The aforementioned identified environmental listed activities and water uses should however be confirmed in consultation with the relevant government departments.<br><br>Foreseen potential negative impacts in terms of the pre-construction, construction, operation and decommissioning phases of the proposed development were identified and assessed. Mitigation measures have been stipulated and must be included and implemented as part of the respective Environmental Management Programme (EMPr) for the proposed development.<br><br>It is not anticipated that the proposed development will need to be decommissioned. However, should this need to take place, all relevant identified potential construction impacts will be applicable | **Cumulative**<br><br>No impact assessment has been undertaken, as no cumulative impact is likely. Direct and indirect surface water impacts will be negligible. No wetlands will be lost as a result of the renewable energy projects proposed. The cumulative loss of wetlands is therefore negligible. It is not expected that the cumulative impacts will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost. | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
| --- | --- | --- | --- | --- |
| | and the relevant mitigation measures must be implemented as far as practically possible and where applicable.<br><br>For cumulative potential impacts, surrounding renewable energy projects are located a relatively considerable distance from the proposed developments' study site and direct and indirect surface water impacts will be negligible. In consideration of the nearby Leeuwbosch 1 Solar PV Plant and Leeuwbosch 2 Solar PV Plant (part of separate respective BA processes), indirect impacts in terms of increased run-off, sedimentation and erosion may potentially be expected. However, none of the surface water resources appear to be hydrologically connected. Downstream impacts are therefore unlikely. Additionally, aside from the distance (approximately 1km) which separates the two renewable energy developments, the R502 and existing railway line acts as a barrier between the two project sites. In light of the above, it is not expected that the cumulative impacts will be significant in so far as the mitigation measures are implemented, and the surface water resources are not affected, degraded or lost.<br><br>Finally, in terms of final specialist recommendations, it is strongly recommended that the preferred power line option (namely Option 1) is presented as the preferred alternatives for the environmental authorization process. Where this is not possible, the more intensive mitigation measures stipulated will need to be implemented where the necessary environmental authorization and water use license is obtained.<br><br>The existing site access roads currently routes through Drainage Line 1 and is in the buffer zone of Artificial Depression Wetland 1 on the study site. It is highly recommended that the access route is re-aligned outside of all the delineated surface water resources as well as the associated buffer zones where possible. Should this not be possible, the more intensive mitigation measures stipulated will need to be implemented where the necessary environmental | | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | authorization and water use license are obtained. Please note that the crossing of the wetland by the road is not a fatal flaw.<br><br>The risk assessment matrix is attached as Appendix D of the Surface Water Impact Assessment Report (**Appendix 6B**), and notes that all risks are considered Low, and appropriate mitigation measures have been proposed.<br><br>Finally, all the identified triggered activities and water uses identified should be confirmed with the relevant government authoritative departments.<br><br>Based on the findings above, with the implementation of the control and mitigation measures stipulated herein, it is the opinion of the specialist that the proposed development may proceed. | | | |
| **Avifauna (including pre-construction monitoring) - Appendix 6C** | The proposed Wildebeestkuil 2 Solar PV Plant and 132kV Power Line will have a medium negative impact on priority avifauna, which can be reduced to low with appropriate mitigation. The development is supported provide the mitigation measures listed in this report is strictly implemented. No fatal flaws were discovered in the course of the investigations.<br><br>The cumulative impact of the facility on priority avifauna within a 50km radius around the proposed development (considering all current impacts on avifauna) is assessed to be low, mainly due to the small size of the proposed development | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure | Medium Negative | Medium Negative |
| | | **Operational Phase** | | |
| | | Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure | Medium Negative | Low Negative |
| | | Entrapment of large-bodied birds in the double perimeter fence | Low Negative | Low Negative |
| | | Mortality of priority species due to collisions with the 132kV grid connection | Low Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Displacement of priority species due to disturbance associated with de- | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
| --- | --- | --- | --- | --- |
| | | commissioning of the PV plant and associated infrastructure | | |
| | | **Cumulative** | | |
| | | Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and grid connection and entrapment in fences | Medium Negative | Low Negative |
| **Heritage (including Palaeontology, Archaeology & Cultural Landscape) – Appendix 6D** | The fieldwork completed for the HIA in September 2016 and updated in April 2021, identified seven (7) heritage resources, a recent wind pump and a cement dam.<br><br>The design process and methodology followed by the developer for these projects enabled the heritage assessment to provide input into the proposed layouts before the impact assessment. This resulted in cognisance being taken of the positions of the heritage sites and thus the reduction of impacts at an early design phase. Analysis of the impact matrix tables will reflect this.<br><br>The comparative assessment of the alternatives has shown that an overall low impact on heritage is foreseen, as all the heritage resources identified are of a low to medium significance. None of the heritage resources will be impacted by any of the proposed layouts.<br><br>***Grid corridor***<br>An assessment of the aerial photographs and historical imagery has revealed possible heritage features. A field survey identified no heritage features in the alignments. There is no preference to any of the OHL corridor alternatives.<br><br>***Mitigation measures***<br>The following mitigation is suggested to reduce impacts on heritage resources: | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | N/A | | |
| | | **Decommissioning Phase** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |
| | | **Cumulative** | | |
| | | Impact on heritage resources as a result of site clearance and vegetation stripping | Low Negative | Low Negative |

<table>
<tr><th>Specialist</th><th>Key Findings</th><th>Impacts</th><th>Impact pre-mitigation</th><th>Impact post-mitigation</th></tr>
<tr><td></td><td>▪ Features WB02-WB08 must be considered no-go areas with a 30-meter buffer for the burial ground at WB08 and a 20-meter buffer for the other sites.<br>▪ If heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.<br><br>Impact Statement<br>The overall impact of the Wildebeestkuil 2 Solar PV Plant and 132kV Power Line, on the heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.<br><br>Based on the comparative assessment of alternatives undertaken, it is the specialist's opinion that no preference for either of the power line corridor route alternatives exist as all three (3) will have the same low impact on heritage resources.</td><td></td><td></td><td></td></tr>
<tr><td rowspan="10">Palaeontology – Appendix 6D</td><td rowspan="10">The development footprint is underlain by the Allanridge Formation (Ventersdorp Supergroup). The Ventersdorp Supergroup characterise a major occurrence of igneous extrusion that is associated with fracturing of the Kaapvaal Craton approximately 2.7 Ga (billion years) ago. The Late Archaean Allanridge succession is almost fully composed of resistant-weathering, dark green lavas and associated pyroclastic rocks.<br><br>Impact Statement<br>The ancient basement rocks, including the Allanridge Formation, are not known to be fossiliferous and thus there is no possibility that the rocks of the Allanridge Formation will contain any fossils. Thus, the construction and operation of the Wildebeestkuil 2 Solar PV Plant & 132kV Power Line may be authorized as the whole extent of the development footprint is not considered as sensitive in terms of palaeontological resources.</td><td colspan="3">Pre-construction Phase</td></tr>
<tr><td colspan="3">N/A</td></tr>
<tr><td colspan="3">Construction Phase</td></tr>
<tr><td>Impact on palaeontological resources as a result of site clearance and excavations</td><td>Low Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Operational Phase</td></tr>
<tr><td colspan="3">N/A</td></tr>
<tr><td colspan="3">Decommissioning Phase</td></tr>
<tr><td>Impact on palaeontological resources as a result of site clearance and excavations</td><td>Low Negative</td><td>Low Negative</td></tr>
<tr><td colspan="3">Cumulative</td></tr>
<tr><td>Impact on palaeontological resources as a result of site clearance and vegetation stripping</td><td>Low Negative</td><td>Low Negative</td></tr>
</table>

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | As mentioned, three (3) power line corridor route alternatives for the proposed 132kV power line were identified and assessed. These alternatives essentially provide for different power line route alignments contained within an assessment corridor. The three (3) power line corridor route alternatives were considered during the site visit and impact assessment. Based on the comparative assessment of alternatives undertaken, the alternatives will result in an equal impact and none if preferred above the other. | | | |
| **Desktop Social – Appendix 6E** | A recognition of the potential of renewable energy projects to stimulate the local economy, create new jobs, and contribute to sustainable development, is evident.<br><br>The policy review indicates that from national and local levels, renewable energy projects are key to sustainable development of the national economy. In fact, one renewable project has been approved for the development and will be located 10km from the proposed project site.<br><br>The economy and communities of Maquassi Hills need economic injection, particularly considering the decline and stagnation of the economy since 2009, the poor access to basic services, and heavy reliance of the entire economic base of the municipality on the purchasing power of its households. It is clear that the economy of Maquassi Hills needs to be diversified and the installation of the solar PV plant in the area will offer such an opportunity.<br><br>Furthermore, this project could inspire and stimulate the development of similar projects in the area, contributing to the growth of the utilities sector as well as stimulating economic development further. The project will also have the potential to improve the standard of living of the local communities and slightly decrease unemployment in the area. | **Pre-construction Phase** | | |
| | | Availability of sufficient local construction materials of PV Plant | High Negative | Low Positive |
| | | **Construction Phase** | | |
| | | Increase in production of the national and local economies due to project capital expenditure | Low Positive | Low Positive |
| | | The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar PV plant and facilities (including 132kV power line and associated infrastructure) | Low Positive | Low Positive |
| | | **Operational Phase** | | |
| | | The solar PV plant and 132kV power line will increase the size of the local utility sector and stimulate economic production through multiplier effects | Low Positive | Low Positive |
| | | Creation of jobs to support operation and maintenance of the plant | Low Positive | Low Positive |
| | | Generated electricity will improve the security of electricity in the local municipality and increase government's revenue and service delivery | Low Positive | Low Positive |
| | | **Decommissioning Phase** | | |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | During the site visit and interviews with the potentially affected land owners, directly or indirectly, no concerns were raised with respect to the project. The proposed solar PV plant will sterilise some agricultural land currently used for commercial livestock farming, but it will not impact on the production of the farm; therefore, no negative effects on the current economic activities in the area are envisaged.<br><br>Overall, the project will require an investment of about R135 million and create between 10 to 60 temporary jobs during various stages of the construction period. Thirty to 200 people will be working on site at different stages during the construction phase. Many of these jobs will be filled by labourers from the local communities, which will be highly beneficial considering the high unemployment rate observed in the local municipality.<br><br>During operations, the project will employ only six people. Although these jobs will increase the overall employment in the municipality they will not make a notable positive effect on the high unemployment rate in the area. The major benefit of the project though will be in the improved electricity security that the municipality will gain as the electricity generated by the plant will be supplied directly to the municipality and then to its customers.<br><br>The local government will also experience an increase in its earnings through the collection of taxes and rates from the operating plant, which in turn will be spent on providing services to the residents and business. Furthermore, the project will contribute to the increase in the size of the local utilities industry.<br><br>With respect to the site layout of the PV plant, there are no alternative site layouts proposed therefore the proposed layout is the preferred layout. All potential impacts considered had no differential results for the layout. No fatal flaws have been identified for the layout across all potential impacts considered. Three (3) | Land demarcated for the solar PV plant and 132kV power line will be sterilised and all current activities taking place on said land will be discontinued | Low Negative | Low Negative |
| | | **Cumulative** | | |
| | | The proposed project will result in several positive cumulative effects on the socio-economic environment, namely:<br>▪ Stimulation of the economy and increased production<br>▪ Creation of employment and business opportunities<br>▪ Increased household income and standard of living<br>▪ Adoption of clean, renewable energy and benefits in terms of global warming and climate change | Low Positive | Low Positive |

<table>
<tr><th>Specialist</th><th>Key Findings</th><th>Impacts</th><th>Impact pre-mitigation</th><th>Impact post-mitigation</th></tr>
<tr><td></td><td>alternative power line layouts are considered, namely Option 1 and Option 2A, which are above-ground power lines either side of the R502 road, and Option 2B, which is an underground power line on the southern side of the R502 road. With respect to the alternative power line site layout, all potential impacts considered had no differential results for the layout, except for the minimal loss of agricultural land of the underground power line, while no fatal flaws have been identified for the alternative layouts across all potential impacts considered. Option 2B is the preferred site layout.</td><td></td><td></td><td></td></tr>
<tr><td rowspan="8">Desktop Geotechnical – Appendix 6F</td><td rowspan="8">The study area receives a relatively low mean annual precipitation of 588mm, with the warmest month being January. Various tributaries of the Leeudoringspruit River drain the study area. The study area is underlain by the Ventersdorp Supergroup, which comprises amygaloidal lava, agglomerate and tuff. The Ventersdorp Supergroup is predominantly an accumulation of andesitic to basaltic lavas with related pyroclastic rocks. Competent founding conditions can be anticipated in the residual soil profile and in weathered bedrock conditions, which will have to be assessed during the detailed investigation. Typical boreholes indicate moderate yields estimated in the range of 0.50-2.0 l/s. Regional groundwater quality test results indicate a conductivity value of 0.70 mS/m, indicating relatively non-corrosive groundwater attributes. The desktop study indicates no fatal flaws from a preliminary and geological and geotechnical assessment. The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock. The impact assessment matrix impact of the 9.9MW Wildebeestkuil 2 Solar PV Plant, 132kV Power Line and Associated Infrastructure was found to be ‘Negative low impact - The anticipated impact will have negligible negative effects and will require little to no mitigation.’ The site, from a desktop level geotechnical study is considered suitable for the proposed 9.9MW Wildebeestkuil 2 Solar PV Plant, 132kV Power Line and Associated Infrastructure.</td><td colspan="3">Pre-construction Phase</td></tr>
<tr><td colspan="3">N/A</td></tr>
<tr><td colspan="3">Construction Phase</td></tr>
<tr><td>Displacement of natural earth material and overlying vegetation:<br>1) Increase in soil and wind erosion due to clearing of vegetation.<br>2) Construction and earthmoving vehicles may displace soil during operations.<br>3) Creation of drainage paths along access tracks.<br>4) Potential oil spillages from heavy plant.<br>5) Excessive dust</td><td>Negative Low</td><td>Negative Low</td></tr>
<tr><td colspan="3">Operational Phase</td></tr>
<tr><td>Displacement of natural earth material:<br>1) Increase in soil erosion due to concentrated flow received off PV Panels<br>2) Potential oil spillages from maintenance vehicles<br>3) Sedimentation of non-perennial features caused by soil erosion</td><td>Negative Low</td><td>Negative Low</td></tr>
<tr><td colspan="3">Decommissioning Phase</td></tr>
</table>

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | It recommended that a detailed geotechnical investigation be undertaken during the detailed design phase of the project. The detailed geotechnical investigation must entail the following:<br>▪ Profiling and sampling exploratory trial pits to determine founding conditions for the PV modules, substation and pylons. Also to determine the subgrade conditions for internal roads and a materials investigation (if required);<br>▪ Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements;<br>▪ Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes; and<br>▪ Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures. | Decommissioning of the structure will disturb the geological environment:<br>1) Increase in soil and wind erosion due to clearance of structures<br>2) Construction and earthmoving vehicles will displace the soil<br>3) Creation of drainage paths<br>4) Potential oil spillages from vehicles<br>5) Excessive sediments in non-perennial features | Negative Low | Negative Low |
| | | **Cumulative** | | |
| | | None | | |
| **Terrestrial Ecology – Appendix 6G** | The project study area consists of a mixture of natural and secondary grassland, along with other localised modifications to the landscape, within a largely agricultural area close to a small town. The natural vegetation is grassland but within an area in which large proportions of the landscape were previously cultivated. The original natural vegetation has therefore been modified to a large degree by these historical agricultural activities. As a result, the regional vegetation type, Vaal-Vet Sandy Grassland has undergone a high degree of overall transformation and is listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004). Any remaining natural habitat on site therefore has to be considered to possibly have biodiversity value, although only some parts of the Leeuwbosch site are mapped as Ecological Support Areas in the Provincial Conservation Plan.<br><br>There are no plant species occurring on site or likely to occur there that are protected according to the National Environmental | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing for construction of infrastructure for solar PV plant | High Negative | Medium Negative |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing for construction of infrastructure for power line | Low Negative | Low Negative |
| | | Loss of protected trees due to clearing for construction of infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Loss of fauna habitat due to clearing for construction of infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Direct fauna mortality due to machinery, construction and | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | Management: Biodiversity Act. There are also no species found on site that are protected according to the North West Biodiversity Management Act. In addition, there a small number of the protected tree, *Vachellia erioloba*, in the general area, but none within the footprint of proposed infrastructure (all options). There is therefore no flora of concern for the project or for any of the grid / power line options.<br><br>There are a small number of fauna of possible conservation concern that were assessed as having a possibility of occurring on site. This includes the Near Threatened South African Hedgehog and Brown Hyaena, and a number of protected species, including the Cape Fox, Honey Badger, and Giant Bullfrog. Some of them (Cape Fox, Brown Hyena, Honey Badger) are **highly mobile species that are unlikely to be affected by any activities on site, but others are more restricted or territorial and could be more significantly affected**. Of those that are more likely to be affected, are the South African Hedgehog and the Giant Bullfrog, neither of which are confirmed to occur on site.<br><br>The vegetation on site consists largely of a mixture of grassland and secondary grassland. Due to the length of time since last cultivation, in combination with possible degradation of natural areas due to other factors, there is little difference in species composition across all areas assessed, except for the possible dominance of *Aristida congesta* in some areas that may be due to historical degradation. The overall species diversity is not high and there are no specific habitats within the proposed footprints that are unique. Some localised depressions have been identified, some of which are secondary, in which wetland vegetation occurs. These areas have all been omitted from the proposed project footprint areas.<br><br>The project involves construction of arrays of solar panels with access roads, a sub-station, and power line to take the power to the | increased traffic for solar PV plant and power line | | |
| | | Displacement and disturbance of fauna due to increased activity and noise levels for solar PV plant and power line | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | Direct mortality of fauna through traffic, illegal collecting, poaching and collisions and/or entanglement with infrastructure for solar PV plant and power line | Low Negative | Low Negative |
| | | Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors – solar PV plant and power line | Medium Negative | Low Negative |
| | | Runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape – solar PV plant and power line | Medium Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites – solar PV plant and power line | Low Negative | Low Negative |
| | | Direct mortality of fauna due to machinery, construction and increased traffic - solar PV plant and power line | Low Negative | Low Negative |
| | | Displacement and/or disturbance of fauna due to increased activity and noise levels - solar PV plant and power line | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | grid. The plains are relatively flat and accessible from existing roads. It is therefore expected that impacts can be contained within footprint areas. All project components are adjacent to an existing regional road and railway line, as well as within proximity to a small town. There will therefore be limited overall habitat fragmentation and no necessity to build extensive access roads.<br><br>An impact assessment identified various impacts, all typical of projects of this nature, most of which can be minimised with mitigation measures. As with any greenfields development, it is difficult to mitigate loss of habitat, but in the case of the current projects, few sensitivities have been identified for the remaining areas of natural habitat.<br><br>***Conclusions***<br>At the site-specific scale, some sensitivities have been identified, primarily related to natural habitat. However, it is possible that these can be minimised or avoided with the application of appropriate mitigation or management measures. There will be residual impacts, primarily on natural habitat. **The amount of habitat that will be lost to the project is insignificant compared to the area in hectares of the regional vegetation type that occurs on site**. From this perspective it is unlikely that the proposed project will have an unacceptable impact on the natural environment. The view is that they should be authorised. | Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors - solar PV plant and power line | Medium Negative | Low Negative |
| | | Continued runoff and erosion due to the presence of hard surfaces that change the infiltration and runoff properties of the landscape - solar PV plant and power line | Medium Negative | Low Negative |
| | | **Cumulative** | | |
| | | Loss and/or fragmentation of indigenous natural vegetation due to clearing | Low Negative | Low Negative |
| | | Loss of individual plant species of concern and protected plants and trees | Low Negative | Low Negative |
| | | Changes to ecological processes at a landscape level | Low Negative | Low Negative |
| | | Mortality, displacement and/or disturbance of fauna | Low Negative | Low Negative |
| | | General increase in the spread and invasion of new habitats by alien invasive plant species | Medium Negative | Low Negative |
| | | Reduction in the opportunity to undertake or plan conservation, including effects on CBAs and ESAs, as well as on the opportunity to conserve any part of the landscape | Low Negative | Low Negative |
| **Visual – Appendix 6H** | The Visual Impact Assessment (VIA) conducted for the proposed Wildebeestkuil 2 Solar PV Energy facility (SPEF), associated on-site infrastructure and 132kV power line found that much of the study area has a partly natural visual character with some rural or pastoral elements. As such, a solar PV facility, power line and associated infrastructure would alter the visual character and | **Pre-construction Phase** | | |
| | | N/A | | |
| | | **Construction Phase** | | |
| | | Large construction vehicles and equipment will alter the natural character of the study area and | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | contrast significantly with the typical land use and/or pattern and form of human elements present across the broader study area. However, areas in close proximity to the Wildebeestkuil 2 Solar PV Plant application site exhibit high levels of human transformation resulting from urban and infrastructural development such as the Kgakala township, R502 and R504 regional roads, high voltage power lines, Leeubos TR 132kV Traction Substation and the existing railway line. These elements have resulted in a significant degree of landscape degradation, and thus the introduction of a solar PV facility and associated power line into this setting would be considered to be less visually intrusive than if there was no existing built infrastructure visible.<br><br>A broad-scale assessment of landscape sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a low visual sensitivity. However, an important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.<br><br>No visually sensitive receptors were identified within the study area. This is most likely due to the fact that the study area is not typically valued or utilised for its tourism significance. Additionally, the R502 and R504 regional roads, which traverse the visual assessment zone, are used almost exclusively as local access roads and do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.<br><br>A total of sixty-five (65) potentially sensitive receptors were however identified within the study area, many of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the | expose visual receptors to impacts associated with construction – solar PV plant and power line | | |
| | | Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings – solar PV plant and power line | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers - solar PV plant and power line | Low Negative | Low Negative |
| | | Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment - solar PV plant and power line | Low Negative | Low Negative |
| | | Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact - solar PV plant and power line | Low Negative | Low Negative |
| | | **Operational Phase** | | |
| | | The PV arrays may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings | Medium Negative | Medium Negative |
| | | The proposed solar PV facility will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. | Medium Negative | Medium Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | residents' sentiments toward the proposed development are unknown.<br><br>The receptor impact rating conducted in respect of these potentially sensitive receptors found that none of these potentially sensitive receptors are expected to experience high levels of visual impact from the proposed SPEF or the 132kV power line. Thirty-one (31) of the potentially sensitive visual receptors identified within the study area, will experience moderate levels of visual impact as a result of the proposed Wildebeestkuil Solar PV Plant project and twenty-five (25) potentially sensitive receptors will experience moderate levels of impact as a result of the proposed 132kV power line. Twenty-seven (27) potentially sensitive visual receptors will be subjected to low levels of visual impact as a result of the proposed SPEF while seventeen (17) will experience low levels of impact as a result of the 132kV power line.<br><br>The overall impact rating revealed that the Wildebeestkuil 2 SPEF and 132kV power line is expected to have a (negative) low visual impact rating during both construction and decommissioning phases. During operation, visual impacts from the solar PV facility arrays would be of (negative) medium significance with relatively few mitigation measures available to reduce the visual impact. Impacts from the associated infrastructure and 132kV power line would however be of (negative) low significance during operation.<br><br>Several renewable energy developments are being proposed within a 50 km radius of the Wildebeestkuil 2 SPEF application site and power line corridors. These renewable energy developments have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. It was determined that only three (3) of these would have any significant impact on the landscape within the visual assessment zone, namely the 9.9MW Leeuwbosch 1 Solar PV | Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers | Medium Negative | Medium Negative |
| | | The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility | Medium Negative | Medium Negative |
| | | The on-site infrastructure and proposed power line may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings | Low Negative | Low Negative |
| | | The on-site infrastructure and proposed power line will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from maintenance vehicles accessing the site and power line servitude via gravel roads may evoke negative sentiments from surrounding viewers | Low Negative | Low Negative |
| | | The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility – associated on-site infrastructure | Low Negative | Low Negative |
| | | **Decommissioning Phase** | | |
| | | Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual | Low Negative | Low Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | Plant, 9.9MW Leeuwbosch 2 Solar PV Plant and Bokamoso Solar Energy Facility (SEF). These projects, in conjunction with the proposed Leeudoringstad Solar Plant Substation (part of separate BA process), located on the Leeuwbosch 1 and Leeuwbosch 2 Solar PV Plant application site, will alter the inherent sense of place and introduce an increasingly industrial character into a largely natural, pastoral landscape, thus giving rise to significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommendations and mitigation measures stipulated for each of these developments by the visual specialists. In light of this and the significant degree of human transformation and landscape degradation evident in close proximity to the proposed development, cumulative impacts have been rated as medium.<br><br>No design and layout alternatives for the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) were considered and assessed as part of this VIA as these were considered as part of a previous BA process that was never completed. As such the PV development area, Switching Substation, Guard house and Temporary Building Zone (and all other associated infrastructure) have been placed to avoid site sensitivities previously identified. Specialist studies were originally undertaken in 2016 and all current layouts and/or positions being proposed were selected based on the environmental sensitivities identified as part of these studies in 2016. All specialist studies which were undertaken in 2016 were however updated in 2020 (including ground-truthing, where required) to focus on the impacts of the layout being proposed as part of the current project. The results of the updated specialist assessments have informed the layout being proposed as part of the current BA process. The proposed layout has therefore been informed by the identified environmental sensitive and/or "no-go" areas. | impacts - solar PV plant and power line | | |
| | | Decommissioning activities may be perceived as an unwelcome visual intrusion - solar PV plant and power line | Low Negative | Low Negative |
| | | Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers - solar PV plant and power line | Low Negative | Low Negative |
| | | Surface disturbance during decommissioning would expose bare soil (scarring) which could visually contrast with the surrounding environment - solar PV plant and power line | Low Negative | Low Negative |
| | | Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact - solar PV plant and power line | Low Negative | Low Negative |
| | | **Cumulative Impacts** | | |
| | | Additional renewable energy developments and associated grid connection infrastructure in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts | Medium Negative | Medium Negative |
| | | Visual intrusion of multiple renewable energy developments and associated | Medium Negative | Medium Negative |

| Specialist | Key Findings | Impacts | Impact pre-mitigation | Impact post-mitigation |
|---|---|---|---|---|
| | Three (3) proposed power line corridor alternatives have however been comparatively assessed in this VIA and no fatal flaws were identified in respect of any of the alternatives. Options 1 and 2A were found to be favourable, but Option 2B was found to be the preferred alternative due to fact that this alternative will be located underground thus minimising any visual impacts.<br><br>From a visual perspective therefore, the proposed Wildebeestkuil 2 SPEF and 132kV Power Line project is deemed acceptable and the Environmental Authorizations (EA) should be granted. SiVEST is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented. | grid connection infrastructure may be exacerbated, particularly in more natural undisturbed settings | | |
| | | Additional renewable energy facilities and associated grid connection infrastructure in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes | Medium Negative | Medium Negative |
| | | The night time visual environment could be altered as a result of operational and security lighting at multiple renewable energy facilities in the broader area | Medium Negative | Medium Negative |

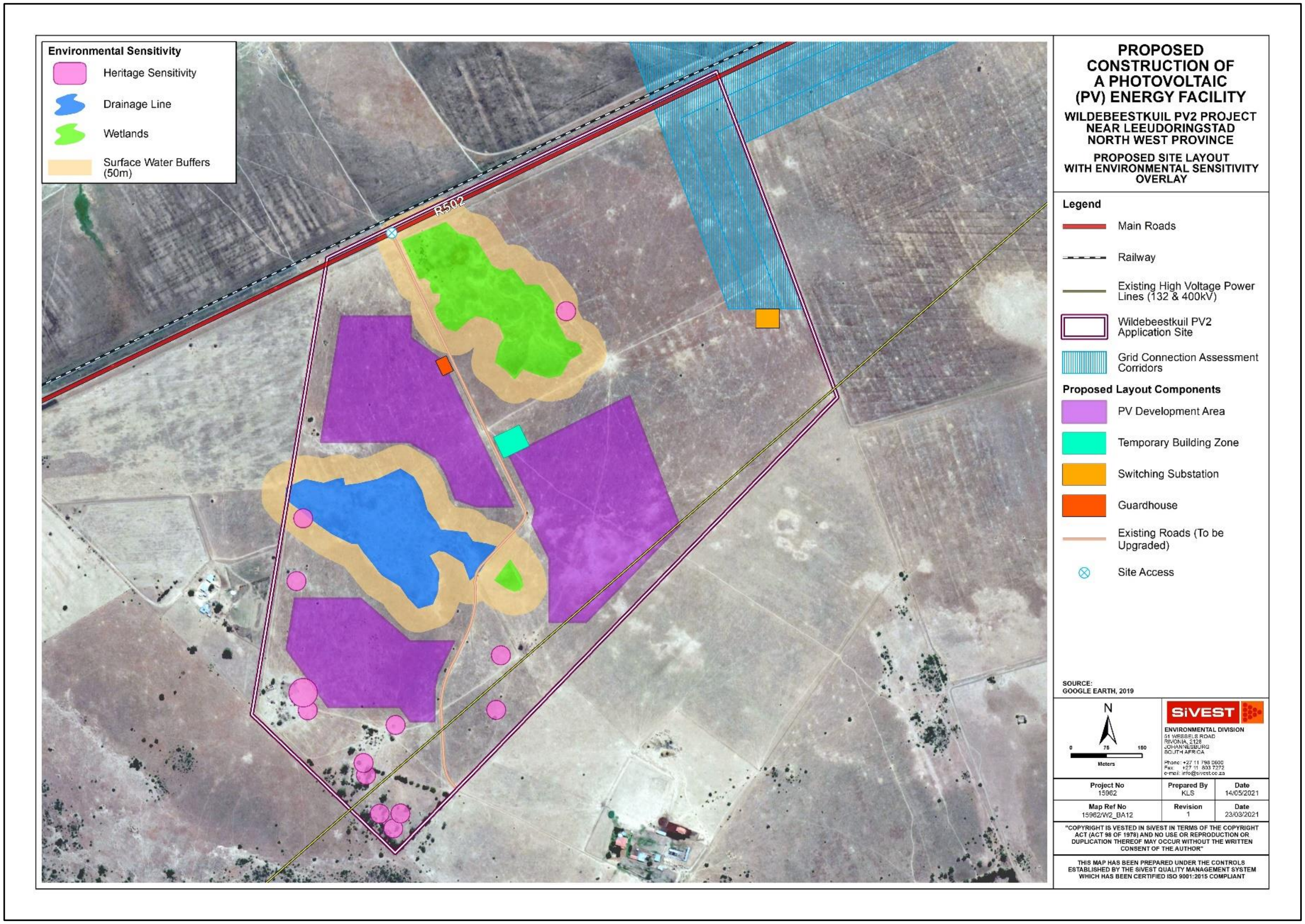


**Figure 65:** Proposed PV array area and associated infrastructure in relation to environmental sensitive / 'no-go' areas

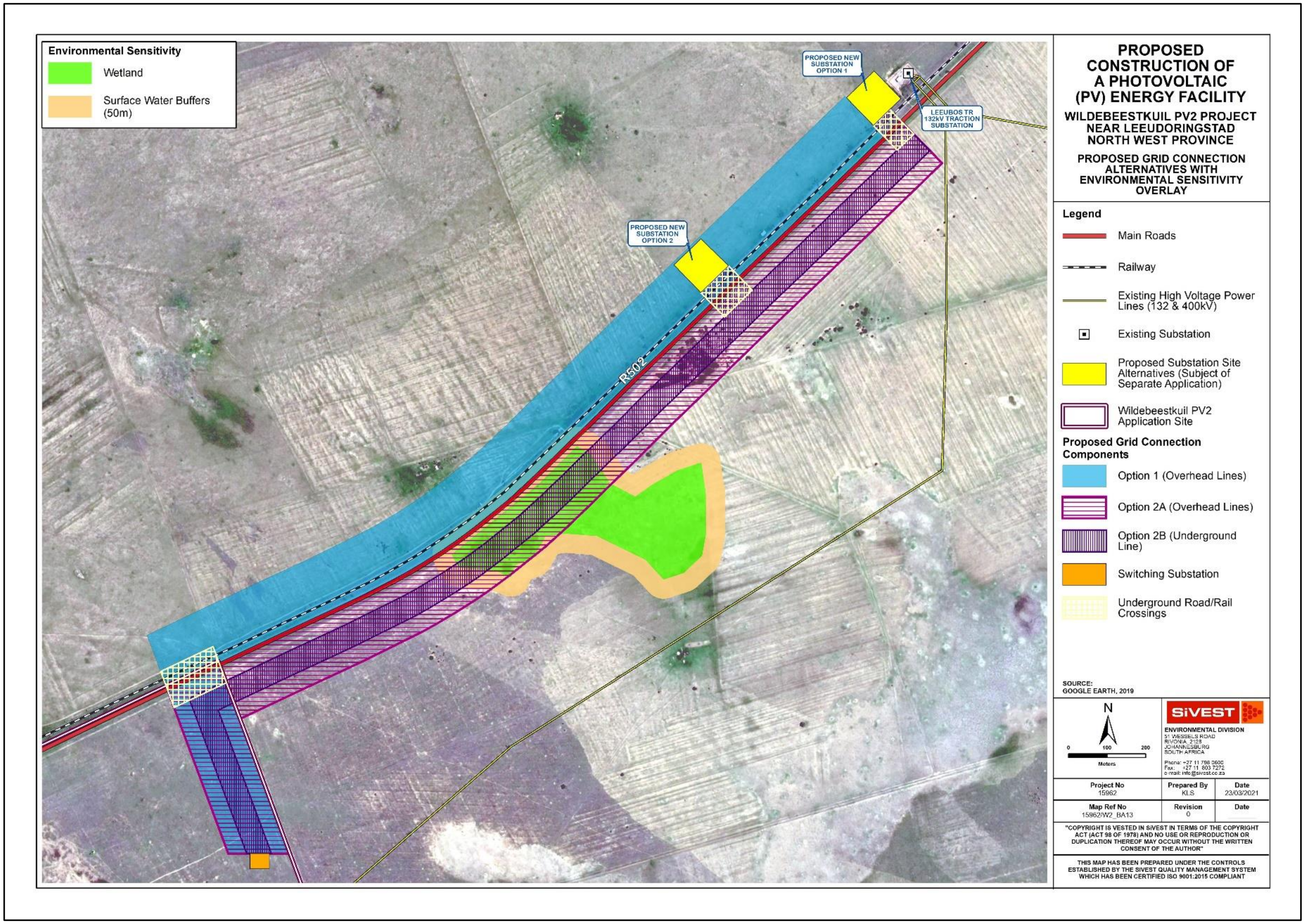


**Figure 66:** Proposed power line corridor route alternatives in relation to environmental sensitive / 'no-go' areas

The results of the comparative assessment of alternatives are summarised in **Table 31** below. In addition, the preferred site layout in relation to the sensitive areas identified by the specialists is indicated in **Figure 67** and **Figure 68** below.

**Key**

| | |
|---|---|
| **PREFERRED** | The alternative will result in a low impact / reduce the impact |
| **FAVOURABLE** | The impact will be relatively insignificant |
| **NOT PREFERRED** | The alternative will result in a high impact / increase the impact |
| **NO PREFERENCE** | The alternative will result in equal impacts |

**Table 31:** Summary of comparative assessment of power line corridor alternatives for 9.9MW Wildebeestkuil 2 Solar PV Plant and 132kV Power Line

| **ALTERNATIVE** | **ENVIRONMENTAL ASPECT** | | | | | | | | | **FATAL FLAW (YES / NO)** | **PREFERRED (YES / NO)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Terrestrial Ecology** | **Surface Water** | **Visual** | **Geotech** | **Avifauna** | **Social** | **Palaeo** | **Agric. and Soils** | **Heritage** | | |
| **POWER LINE CORRIDOR ROUTE ALTERNATIVES** | | | | | | | | | | | |
| **Option 1** | Favourable | Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **YES** |
| **Option 2A** | Favourable | Not Preferred | Favourable | No Preference | Favourable | No Preference | No preference | No preference | No preference | **NO** | **NO** |
| **Option 2B** | Favourable | Not Preferred | Preferred | No Preference | Preferred | Preferred | No preference | No preference | No preference | **NO** | **NO** |

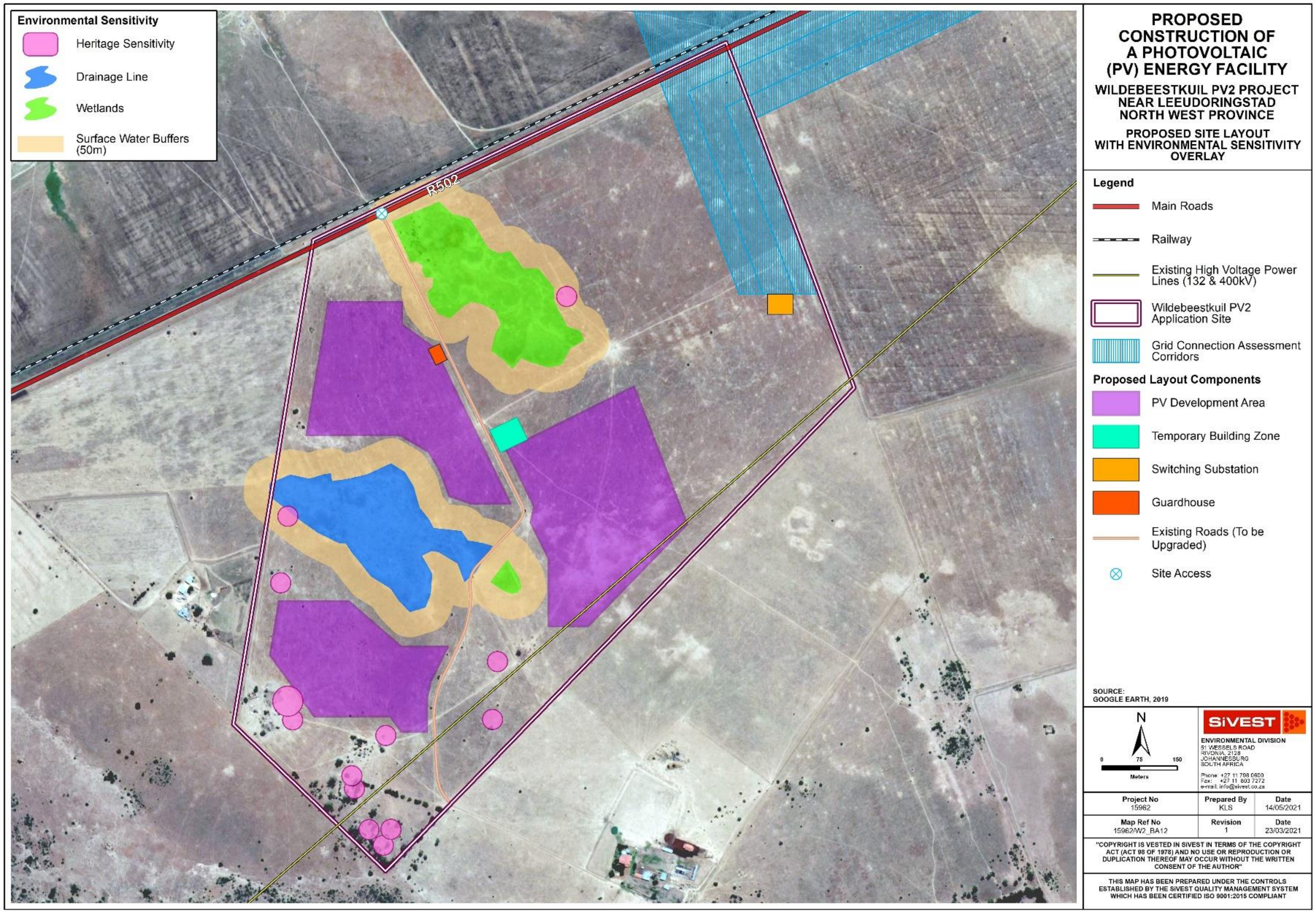


**Figure 67:** Preferred site layout in relation to identified environmental sensitive areas – Solar PV Plant

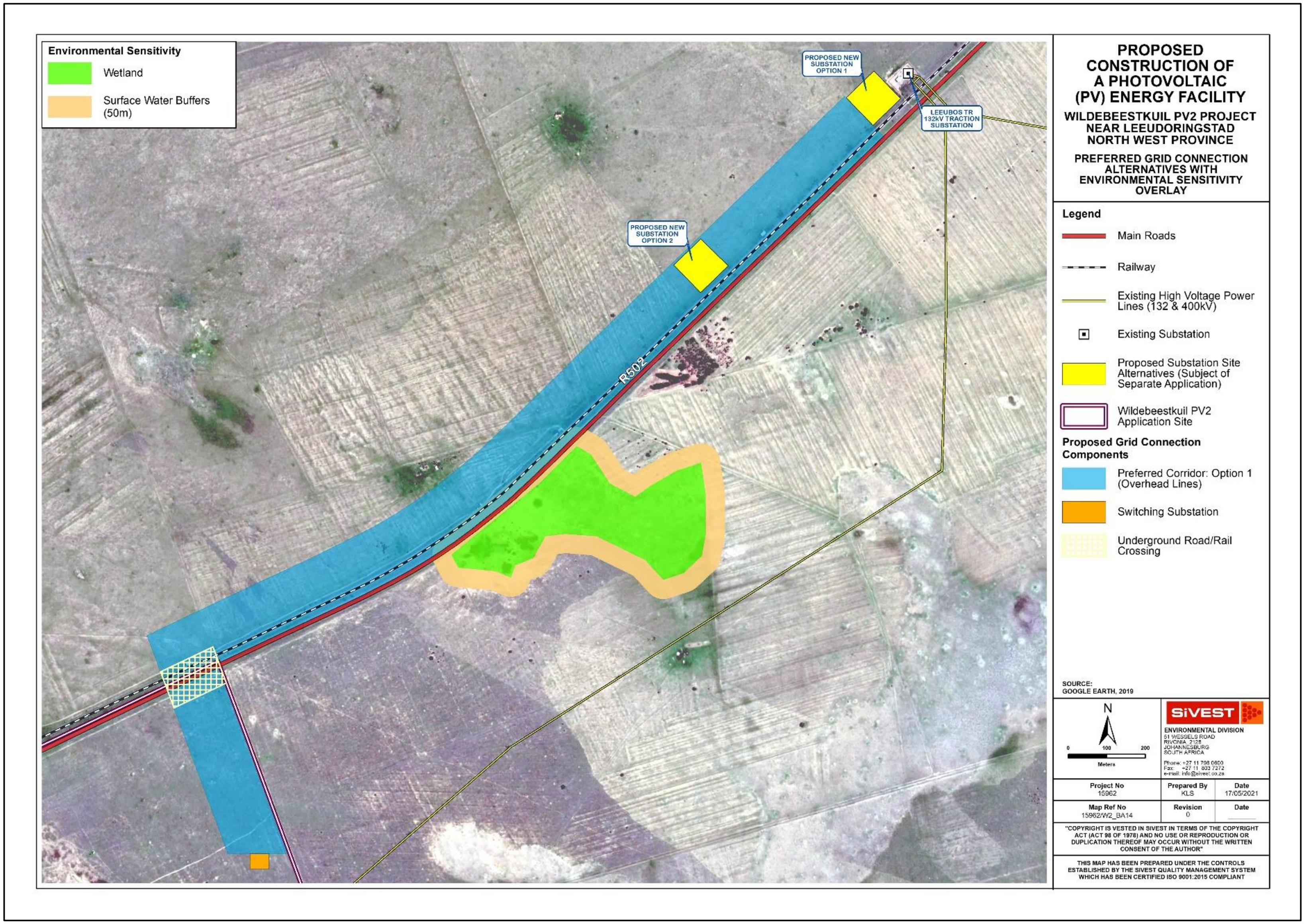


**Figure 68:** Preferred site layout in relation to identified environmental sensitive areas – 132kV Power Line

Micro-siting may be required within the authorised power line corridor during the detailed design phase. In addition, the alignment of the power line within the authorised power line corridor will be determined and confirmed during the detailed design phase, taking the identified sensitive and/or ‘no-go’ areas into account. This is to enable the avoidance of any unidentified features on-site, or any design constraints when the proposed development reaches construction. As mentioned, **the preferred layout provided is not the final layout for the proposed development. A final layout will be submitted to the Department for review and approval, along with a Final EMPr, prior to construction commencing**. The specialist sensitivities and/or ‘no-go areas’ will be incorporated into the layout design when completing the final layout.

Additionally, routing the power line within the authorised corridor would not be regarded as a change to the scope of work or the findings of the impact assessments undertaken during the BA process. This is based on the understanding that the specialists have assessed the larger area / corridor in detail, and all identified sensitive / ‘no-go’ areas have been excluded from this area, if possible. Therefore, moving the components within the assessed corridor would not change the impact significance. Any changes to the power line route within the boundaries of the authorised corridor following the issuing of the EA (should it be granted) will therefore be considered to be non-substantive.

## 11.2 Environmental Impact Statement

The specialist assessments were conducted to address the potential impacts relating to the proposed development in order to ascertain the level of each identified impact, as well as mitigation measures which may be required. The results of the specialist assessments have indicated that all alternatives (including the preferred alternative) contain no fatal flaws that should prevent the proposed project from proceeding. In light of this, it is the EAP’s reasoned opinion that authorisation be granted and that the layout being proposed as part of this BA process also be authorised (provided there are no concerns raised during the public participation process).

Furthermore, SiVEST, as the independent EAP, is therefore of the view that:

- The site location and project description can be authorised based on the findings of the suite of specialist assessments;
- A **preferred power line corridor route alternative (Power Line Corridor Alternative Option 1)** has been identified which is environmentally acceptable and will not result in significant impacts (**Figure 67** and **Figure 68**), provided that the recommended mitigation measures are implemented and the routing of the power line within the chosen corridor avoids tower placement within the identified sensitive and ‘no-go’ areas;
- One (1) power line corridor alternative (namely **Power Line Corridor Alternative Option 1**) is being recommended to be authorised;
- A cumulative impact assessment of similar developments in the area was undertaken by the respective specialists. Based on their findings, majority of the cumulative impacts associated with the proposed development can be kept either low or medium after the implementation of mitigation measures. In addition, the Social specialist found that the project will result in several positive cumulative effects on the socio-economic environment and that these cumulative impacts will be **positive** low, before and after the implementation of mitigation measures; and
- Through the implementation of mitigation measures, together with adequate compliance monitoring, auditing and enforcement thereof by the appointed Environmental Control Officer (ECO) as well as the competent authority, the potential detrimental impacts associated with the proposed development can be mitigated to acceptable levels.

The date on which the activity will commence (i.e. enter construction) cannot be determined at this stage. The construction of the proposed solar PV plant and associated 132kV overhead power line is dependent on an agreement with a second party being in place, who will be purchasing the generated electricity from Wildebeestkuil PV Generation as part of a PPA. The proposed development will therefore require an EA of at least five (5) years.

It is therefore the opinion of the EAP that provided further comments and concerns are not raised during the pending public participation process, that the information and data provided in this DBAR is sufficient to enable the Competent Authority to consider all identified potentially significant impacts and to make an informed decision on the application. Furthermore, it is the opinion of the EAP that based on the findings of the BA and the specialist studies, the proposed development should be granted an EA and allowed to proceed, provided further comments and concerns are addressed during the pending public participation process and provided the following conditions are adhered to:

- Final routing of the proposed power line within the corridor should avoid tower placement within the identified sensitive / 'no-go' areas (as shown in **Figure 68**) located within the power line corridor, and no construction activities should take place within these areas;
- All feasible and practical mitigation measures recommended by the various specialists must be incorporated into the Final Environmental Management Programme (EMPr) and implemented, where applicable;
- Where applicable, monitoring should be undertaken to evaluate the success of the mitigation measures recommended by the various specialists; and
- The final layout should be submitted to the Competent Authority (namely the NW DEDECT) for approval prior to commencing with the activity.

It is trusted that the DBAR provides adequate information to the I&APs / stakeholders to provide input and for the competent authority to make an informed decision regarding the proposed development.

It should be noted that this section (and namely the Environmental Impact Statement) is deemed to be in line with the requirements of Appendix 1 of the EIA Regulations 2014, as amended, and contains a summary of the key findings of the environmental impact assessment, a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers (**Figure 67** and **Figure 68**) and a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives.

## 11.3 Environmental Management Programme (EMPr)

In accordance with Appendix 4 of the EIA Regulations, 2014 (as amended), an EMPr has been included within the DBAR (**Appendix 8**). The EMPr includes the mitigation measures formulated by the various specialists and all information as required in Appendix 4 of the EIA Regulations, 2014 (as amended).

The EMPr provides suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored. The relevant management plans have also been incorporated into the EMPr (where required), which will assist in this regard.

## 12 WAY FORWARD

The DBAR is currently being circulated for public participation for a period of 30 days (excluding public holidays) **from 11 June 2021 until 12 July 2021**.

All I&APs and key stakeholders who are registered on the project database will be notified of the availability of the DBAR and the above-mentioned 30-day public review and comment period accordingly. In addition, all OoS / authorities will be sent electronic copies (via email) of the DBAR. All comments received will be responded to in a C&RR (included as **Appendix 7E**), which will be included prior to submission of the FBAR to the decision-making authority, namely the NW DEDECT. Comments received on the DBAR will be taken into consideration, incorporated into the report (where applicable) and will be used when compiling the FBAR. Once the FBAR has been submitted and the NW DEDECT have acknowledged receipt thereof, a decision to either grant or refuse the EA for the proposed development will be made by the NW DEDECT. In addition, once a decision regarding the EA has been received from the NW DEDECT, it will be made available to the public and all registered I&APs, stakeholders and OoS / authorities will be notified accordingly and provided details regarding the appeal process. The BA process will thus come to an end once appeals (if any) have been dealt with adequately and the appeal process closes.

All I&APs and key stakeholders are invited to register as I&APs in order to be kept informed throughout the process. To register as an I&AP / stakeholder and/or to obtain additional information, please submit your name, contact details (telephone number, postal address and email address) and the interest which you have in the application to SiVEST Environmental Division, as per the details below:

Contact: Hlengiwe Ntuli or Stephan Jacobs
PO Box 2921, RIVONIA, 2128
☎ Phone: (011) 798 0600
E-mail: sivest_ppp@sivest.co.za
Fax: (011) 803 7272
Website: www.sivest.com

Please reference '*Wildebeestkuil 2 Solar PV and Power Line*' in your correspondence, should your comments be project specific. SiVEST shall keep all registered I&APs / key stakeholders informed of the BA process.

# 13 REFERENCES


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