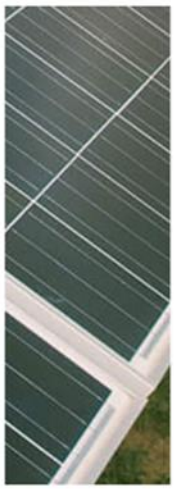
# ENVIRONMENTAL IMPACT REPORT

**Draft – 14 September 2023**

## THE PROPOSED ANGUS SOLAR POWER PLANT NEAR CARLETONVILLE, GAUTENG PROVINCE



ENVIRONAMICS

# PROJECT DETAIL

| | | |
|---|---|---|
| **DFFE Reference No.** | : | 14/12/16/3/3/2/2351 |
| **Project Title** | : | Proposed Angus Solar Power Plant near Carletonville, Gauteng Province |
| **Authors** | : | Mr. Herman Alberts<br>Ms. Christia van Dyk |
| **Reviewed** | : | Mrs. Carli van Niekerk |
| **Client** | : | Angus Solar Power Plant (RF) (Pty) Ltd. |
| **Report Status** | : | Draft Environmental Impact Report |
| **Submission date** | : | 14 September 2023 |

**When used as a reference this report should be cited as:** Environamics (2023) Draft EIR: Proposed Angus Solar Power Plant near Carletonville, Gauteng Province

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# GLOSSARY OF TERMS AND ACRONYMS

| | |
|---|---|
| BA | Basic Assessment |
| BAR | Basic Assessment Report |
| CEA | Cumulative Effects Assessment |
| DFFE | Department of Forestry, Fisheries and Environmental Affairs |
| DM | District Municipality |
| DMRE | Department of Mineral Resources and Energy |
| DWS | Department of Water and Sanitation |
| EA | Environmental Authorisation |
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| EP | Equator Principles |
| EPFI | Equator Principles Financial Institutions |
| Environmental impact | Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects. |
| GNR | Government Notice Regulation |
| I&AP | Interested and Affected Party |
| IDP | Integrated Development Plan |
| IFC | International Finance Corporation |
| IPP | Independent Power Producer |
| kV | Kilo Volt |
| LM | Local Municipality |
| Mitigate | Activities designed to compensate for unavoidable environmental damage. |
| MW | Megawatt |

| | |
|---|---|
| NEMA | National Environmental Management Act No. 107 of 1998 |
| NERSA | National Energy Regulator of South Africa |
| NWA | National Water Act No. 36 of 1998 |
| PAOI | Project Area of Influence |
| PPP | Public Participation Process |
| PV | Photovoltaic |
| REIPPPP | Renewable Energy IPP Procurement Process |
| SAHRA | South African Heritage Resources Agency |
| SDF | Spatial Development Framework |
| SPP | Solar Power Plant |
| VU | Vegetation Unit |

## CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) long-term strategic planning and research process.

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DMRE (Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000 MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other programmes/opportunities to generate power in South Africa. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

In response to the above, Angus Solar Power Plant (RF) (Pty) Ltd is proposing the development of a photovoltaic solar facility and associated infrastructure (including grid connection infrastructure) for the purpose of commercial electricity generation on an identified site located on the Farm Leeuwpan No. 697, Registration Division IQ, Gauteng Province situated within the Merafong Local Municipality area of jurisdiction (refer to Figure A for the locality map). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2118 kwh/$m^2$.

The project entails the generation of up to 250 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will be 500 hectares (including supporting infrastructure on site) within the 4272 hectares assessed as part of the Environmental Impact Assessment process. Based on the environmental constraints identified on the project site, the development footprint for the PV facility has been reconfigured to allow for the avoidance of sensitive environmental features.

The Angus Solar Power Plant (14/12/16/3/3/2/2352) forms a part of the Pluto PV cluster comprising a total of four (04) proposed PV facilities located on the same property, which includes the Bonsmara Solar Power Plant (14/12/16/3/3/2/2352), Tuli Solar Power Plant (14/12/16/3/3/2/2353) and the Simbra Solar Power Plant (14/12/16/3/3/2/2354). Each solar PV facility is concurrently undergoing individual S&EIR processes.

# EXECUTIVE SUMMARY

Like many other developing municipalities in the country, the Merafong City Local Municipality faces a number of challenges in addressing the needs of sustainable growth and providing quality services (IDP, 2020-2021). The Merafong City Local Municipality, IDP (2020/2021), has identified specific issues that require special attention including but not limited to poverty; job creation; unemployment; and inequalities.

The Merafong City Local Municipality does not regard the development of an IDP as the only requirement prevailing legislation. Therefore, there are specific reasons why the municipality should prepare the IDP. One of the main reasons is that developmental responsibilities have been prescribed by the Constitution, which is aimed at ensuring quality for the life of the municipality's residents. The responsibility does not only relate to the provision of basic services, but also include job creation as well as the promotion of accountability and eradication of poverty within the municipality (IDP, 2020/21). The IDP considers the economic structure and performance and how the municipality relies heavily on the agricultural and mining sector and the general decline of the sector. It indicates that alternative sectors to the declining sectors of the area needs to be explored, which includes the renewable energy sector.

Angus Solar Power Plant (RF) (Pty) Ltd intends to develop a 250 MW photovoltaic solar facility and associated infrastructure on the Farm Leeuwpan No. 697, Registration Division IQ, Gauteng Province situated within the Merafong City Local Municipality and West Rand District Municipality area of jurisdiction. The town of Carletonville is located approximately 20 km south of the proposed development (refer to Figure A and B for the locality and regional map). The total development footprint of the project will be 500 hectares (including supporting infrastructure on site) within the 4272 hectares assessed as part of the Environmental Impact Assessment process. The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e., in terms of slope), environmental conditions (i.e., low agricultural potential, low ecological sensitivity and archaeology), proximity to a grid connection point (i.e., for the purpose of electricity evacuation), as well as site access via a main road (i.e., to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for the Angus Solar Power Plant. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*

- Activity 24 (ii) (GN.R. 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*
- Activity 4 (c)(iv) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*
- Activity 10 (c)(iv) (GN.R 324): *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*
- Activity 12 (c)(ii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (c) in the Gauteng Province, (ii) within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans."*
- Activity 14(ii)(c)(c)(iv) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, c) within the Gauteng Province, within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*
- Activity 18 (c)(iv) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (c) in the Gauteng Province within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*

Activities required for the development of the solar facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the development could potentially have an impact on the environment that will require mitigation. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. Environamics has been appointed as the independent consultant

to undertake the Environmental Impact Assessment (EIA) on behalf of Angus Solar Power Plant (RF) (Pty) Ltd.

Regulation 21 of the EIA Regulations requires that an Environmental Impact Report (EIR) must contain the information set out in Appendix 3 of the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 3 of GNR326 requires a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred site, the scope of the assessment, and the consultation process undertaken be set out in the EIR report.

It has been determined through the EIA process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarised below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18 – 24 months. The potentially most significant impacts relate to habitat destruction caused by clearance of vegetation and socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services and temporary increase in traffic disruptions and movement patterns.

Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, collision and electrocutions of avifauna and visual impact of sensitive visual receptors located within a 500m radius of the proposed power line. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the creation of employment opportunities and skills development, development of non-polluting, renewable energy infrastructure and contribution to economic development and social upliftment.

Impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include: habitat destruction caused by clearance of vegetation, increased soil erosion and sedimentation, spread and establishment of alien invasive species, continued loss of indigenous vegetation owing to poor recovery of vegetation, contamination of soil by leaving rubble/waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation and the loss of permanent

employment. However, skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department of forestry, Fisheries and Environment database eight (8) other solar plants have been proposed in relatively close proximity to the proposed activity.

The potential for cumulative impacts may therefore exist. The draft EIA Report includes an assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: habitat destruction and fragmentation, impact on the characteristics of the watercourse, displacement of priority avian species from important habitats, loss of important avian habitats, impacts of employment opportunities, business opportunities and skills development and impact associated with large-scale in-migration of people. Cumulative impacts during the operational phase relate to: habitat destruction and fragmentation, impacts on the characteristics of the watercourse and visual intrusion. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

Regulation 23 of the EIA Regulations determine that an EIA report must be prepared and submitted for the proposed activity after the competent authority accepts the final Scoping Report, including the Plan of Study for the EIA phase. The EIA report will evaluate and rate each identified impact and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Appendix 3 of the EIA Regulations. This is the Draft EIA Report submitted to the competent authority (Department of Forestry, Fisheries and the Environment (DFFE)) for review and commenting on the Application for Environmental Authorisation.

# 1 INTRODUCTION

This section aims to introduce the Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

> **Appendix 3.** (3) An environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-(a) details of:
>
> (i) the EAP who prepared the report; and
>
> (ii) the expertise of the EAP, including a curriculum vitae.

## 1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324, 325 and 327 outline the activities that may be triggered and therefore require EA. The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 3 of Regulation 326 the objective of the Environmental Impact Report (EIR) is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—
    - nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment; identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

This report is the Draft Environmental Impact Report (EIR) that has been submitted to the Department of Environment, Forestry and Fisheries for a 30-day review and comment period. According to Regulation 326 all registered I&APs and relevant State Departments must also be allowed the opportunity to review the report. The Draft EIR has been made available to registered I&APs and all relevant State Departments for a 30-day review period from **14 September to 16 October 2023**. These stakeholders and individuals have been requested to provide written comments on the Draft EIR within the allocated timeframe. All issues identified during this review period will be documented and compiled into a Comments and Response Report as part of the Final EIR (**Appendix C7**). All comments received during the Scoping Phase of the project are available in the Comments and Response Report as referred to above, as well as Appendix C5 and C6 of this Draft EIR.

### 1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. All correspondence to the EAP can be directed to:


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| Contact person: | Mr. Herman Alberts |
| EAPASA Registration: | 2019/1328 |
| Postal Address: | 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531 |
| Telephone: | 063 685 2093 (Cell) |
| Electronic Mail: | herman@solis-environmental.co.za |

And/or

| | |
|---|---|
| Contact person: | Ms. Christia van Dyk |
| Postal Address: | 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531 |
| Telephone: | 078 470 5252 (Cell) |
| Electronic Mail: | christia@solis-environmental.co.za |


Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration is attached

as Appendix A to this draft report. The expertise of the EAP responsible for conducting the EIA is also summarized in the curriculum vitae included as part of Appendix A.

### 1.3 DETAILS OF SPECIALISTS

Table 1.1 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix H to this report. The expertise of the specialists is also summarised in their respective reports.

**Table 1.1:** Details of specialists

| Study | Report Date | Prepared by | Contact Person | Postal Address | Tel | e-mail |
|---|---|---|---|---|---|---|
| Avifaunal Impact Assessment | August 2023 | The Biodiversity Company | Andrew Husted | - | Cell: 081 319 1225 | info@thebiodiversitycompany.com |
| Terrestrial Biodiversity, and Wetland Impact Assessments | August 2023 | The Biodiversity Company | Marnus Erasmus / Andrew Husted | - | Cell: 081 319 1225 | info@thebiodiversitycompany.com |
| Heritage Impact Assessment | August 2023 | CTS Heritage | Jenna Lavin | 34 Harries Street, Plumstead, Cape Town, 7800 | Cell: 083 619 0854 | jenna.lavin@ctsheritage.com |
| Paleontological Impact Assessment | August 2023 | Banzai Environmental (Pty) Ltd | Elize Butler | - | Cell: 084 447 8759 | elizebutler002@gmail.com |
| Soil and Agricultural Impact Assessment | August 2023 | The Biodiversity Company | Andrew Husted | - | Cell: 081 319 1225 | info@thebiodiversitycompany.com |
| Visual Impact Assessment | August 2023 | Donaway Environmental Consultants | Johan Botha | 30 Fouche Street Steynsrus, 9515 | Tel: 082 316 7749 | johan@donnaway.co.za |
| Social Impact Assessment | August 2023 | Donaway Environmental Consultants | Johan Botha | 30 Fouche Street Steynsrus, 9515 | Cell: 082 493 5166 | johan@donnaway.co.za |
| Transport Impact Assessment Study | August 2023 | BVI consulting engineers | AJ Tarrant | Edison Square c/o Edison Way & Century Avenue Century City 7441 | | adriant@bviwc.co.za |

## 1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.2 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request was submitted to DFFE on 19 May 2023.
- It was then confirmed that a pre-application meeting is not required via email dated 21 May 2023.
- A newspaper advertisement was placed in the Carletonville Herald on 19 March 2023, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 28 February 2023.
- Site notices were erected on site on 28 February 2023 informing the public of the commencement of the EIA process.
- The Background Information Document (BID) was circulated to all I&APs and surrounding landowners on 13 March 2023.
- An application form and the draft Scoping Report were submitted to DFFE on 22 May 2023.
- The draft Scoping Report was made available for a 30-day review and comment period from 22 May 2023 – 22 June 2023.
- The final Scoping Report was submitted to the DFFE on 30 June 2023 for decision-making and approval of the Plan of Study for the EIA.
- The DFFE accepted the Final Scoping Report (FSR) on 28 July 2023.
- The Draft EIR Report was submitted to the DFFE (and registered I&APs) on 14 September 2023 for the 30-day review and comment period which will be from 14 September 2023 – 16 October 2023.

It is envisaged that the EIA process should be completed within approximately four months of submission of the Final EIR, i.e. by April 2024 – see Table 1.2.

**Table 1.2:** Estimated timeframe for completion of the 'scoping and EIA process'

| Activity | Prescribed timeframe | Timeframe |
|---|---|---|
| Site visit | | 28 February 2023 |
| Public participation (BID) | 30 Days | 13 March – 17 April 2023 |
| Submit application form and DSR | - | 22 May 2023 |

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| Public participation (DSR) | 30 Days | 22 May – 22 June 2023 |
| Submit FSR | 44 Days | 30 June 2023 |
| Department acknowledges receipt | 10 Days | July 2023 |
| Department approves/reject | 43 Days | 28 July 2023 |
| Public participation (DEIR) | 30 Days | 14 Sept. – 16 Oct. 2023 |
| Submission of FEIR & EMPr | - | October 2023 |
| Department acknowledges receipt | 10 Days | October 2023 |
| Decision | 107 Days | March 2024 |
| Department notifies of decision | 5 Days | March 2024 |
| Registered I&APs notified of decision | 14 Days | March 2024 |
| Appeal | 20 Days | April 2024 |

### 1.5 SPECIALIST STUDIES IDENTIFIED IN THE DFFE SCREENING TOOL REPORT

Table 1.3 included below provides an indication of the specialist studies identified by the DFFE Screening Tool Report (Appendix B), an indication of whether the studies were undertaken or not and a motivation or confirmation of the studies being included or not.

**Table 1.3:** Specialist studies identified by the DFFE Screening tool and specialist studies *conducted.*

| Study identified in the DFFE Screening Tool and sensitivity | Study included? | Appendix |
|---|---|---|
| Agricultural Impact Assessment<br><br>Sensitivity: High<br><br>Feature(s): Old field, potential crop cultivation Land capability | Yes | An Agriculture Potential Assessment is included in Appendix E5. The high sensitivity is disputed by the report. |
| Animal Species Assessment<br><br>Sensitivity: High | Yes | Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment Report also includes the relevant Animal Species Assessment. |

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| Feature(s): Presence of sensitive animal species i.e., Aves-*Circusranivorus* | | This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report. |
| Archaeological and Cultural Heritage Impact Assessment<br><br>Sensitivity: Low | Yes | A Heritage Assessment is included in Appendix E6 of the EIA Report, as per the requirements of the National Heritage Resources Act. |
| Aquatic Biodiversity Impact Assessment<br><br>Sensitivity: Very High<br><br>Feature(s): The project area lies within a Wetlands - Dry Highveld Grassland Bioregion (Depression) or (Seep) | Yes | A Wetland Baseline & Risk Assessment Report is included in Appendix E2.<br><br>This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report. |
| Avian Impact Assessment<br><br>Sensitivity: Very High<br><br>Feature(s): The project area lies within 50 km of Colonies | Yes | Avifauna Impact Assessment Report is included as Appendix E3 of the EIA Report.<br><br>This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report. |
| Civil Aviation Assessment<br><br>Sensitivity: Low | No | The identification of the site as low sensitivity considering civil aviation is agreed to by the EAP. This is based on the current land use of the site being used for agricultural purposes.<br><br>The Civil Aviation Authority (CAA) has been identified as an I&AP, and has received the Draft Scoping report for review and commenting. No comments from the CAA have been received as part of the public participation process. |
| Defence Theme | No | The site verification report confirms the low sensitivity of the |

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| Sensitivity: Low | | site as no military operations are located close to the development.<br><br>The project is therefore not expected to have an impact on Defence Installations. |
| Landscape / Visual Impact Assessment<br><br>Sensitivity: High<br><br>Feature(s): The project area lies at a Mountain tops and high ridges | Yes | A Visual Impact Assessment is included in Appendix E4 of the Scoping Report. |
| Palaeontological Impact Assessment<br><br>Sensitivity: Very High<br><br>Feature(s): Features with a Very High paleontological sensitivity | Yes | A Palaeontological Impact Assessment is included in Appendix E6 of the EIA report, as per the requirements of the National Heritage Resources Act. |
| Plant species Assessment<br><br>Sensitivity: Medium<br><br>Feature(s): Presence of Sensitive species 1147 and 1248. | Yes | Refer to Appendix E1. The Terrestrial Biodiversity Impact Assessment Report also includes the relevant Plant Species Assessment.<br><br>This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report. |
| RFI Assessment<br><br>Sensitivity: Low | No | The site verification is inconclusive as no desktop information could be sought; however on-site evidence of the low sensitivity was available during the site inspection since no potential RFI could be identified.<br><br>The South African Radio Astronomy Observatory (SARAO) have been consulted regarding the development of the project and the Scoping Report has been circulated to SARAO for review and |

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|---|---|---|
| | | commenting. No comment has been received from SARAO to date. |
| Terrestrial Biodiversity Impact Assessment<br><br>Sensitivity: Very High<br><br>Feature(s): The presence of Critical Biodiversity area 2, an Ecological Support area and Protected Areas Expansion Strategy | Yes | A Terrestrial Biodiversity Impact Assessment is included in Appendix E1 of the Scoping Report.<br><br>This assessment has been undertaken in terms of the Protocols of GNR320 – refer to the content of the report. |
| Geotechnical Assessment<br><br>Sensitivity: Not indicated | No | The Geotechnical Assessment will be conducted before construction begins as part of the micro-siting of the facility layout.<br><br>The consideration of geotechnical aspects is considered to be of a technical concern rather than an environmental concern. |
| Socio-Economic Impact Assessment<br><br>Sensitivity: Not indicated | Yes | A Social Impact Assessment is included in Appendix E7 of the EIA Report. |

## 1.6 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 of Regulation No.326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

**Table 1.4:** Structure of the report

| Requirements for the contents of an EIR as specified in the Regulations | | Section in report |
|---|---|---|
| Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include- | | |
| (a) | details of - | 1 |
| | (i) the EAP who prepared the report; and | |
| | ii) the expertise of the EAP, including a curriculum vitae. | |
| (b) | the location of the activity, including- | 2 |

| | | |
|---|---|---|
| | (i) the 21-digit Surveyor General code of each cadastral land parcel; | |
| | (ii) where available, the physical address and farm name; | |
| | (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; | |
| (c) | a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is- | |
| | (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or | |
| | (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken; | |
| (d) | a description of the scope of the proposed activity, including- | |
| | (i) all listed and specified activities triggered and being applied for; and | |
| | (ii) a description of the associated structures and infrastructure related to the development. | |
| (e) | a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context. | 3 |
| (f) | 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; | 4 |
| (g) | A motivation for the preferred development footprint within the approved site. | |
| (h) | a full description of the process followed to reach the proposed development footprint within the approved site, including – | |
| | (i) details of all the development footprint alternatives considered; | |
| | (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; | |
| | (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. | 5 |
| | (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; | |
| | (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and | |
| | (x) a concluding statement indicating the preferred alternative development location within the approved site. | |
| | (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including 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; | |
| | (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; | 6 |
| | (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; | |

| | | |
|---|---|---|
| | (viii) the possible mitigation measures that could be applied and level of residual risk; | |
| (i) | a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including- | |
| | (i) a description of all environmental issues and risks that were identified during the EIA process; and | |
| | (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. | |
| (j) | an assessment of each identified potentially significant impact and risk, including- | |
| | (i) cumulative impacts; | |
| | (ii) the nature, significance and consequences of the impact and risk; | |
| | (iii) the extent and duration of the impact and risk; | |
| | (iv) the probability of the impact and risk occurring; | |
| | (v) the degree to which the impact and risk can be reversed; | |
| | (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and | |
| | (vii) the degree to which the impact and risk can be mitigated; | |
| (k) | where applicable, a summary of the findings and recommendations of 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 assessment report; | 6 |
| (l) | an environmental impact statement which contains- | 8 |
| | (i) a summary of the key findings of the environmental impact assessment: | |
| | (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 | |
| | (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; | |
| (m) | based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation; | |
| (n) | the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment; | Not applicable |
| (o) | 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 | Not applicable |
| (p) | a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed; | 8 |
| (q) | a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation; | |

| | | |
|---|---|---|
| (r) | where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised; | 8 |
| (s) | an undertaking under oath or affirmation by the EAP in relation to- | Appendix A to the report |
| | (i) the correctness of the information provided in the report; | |
| | (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs); | |
| | (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and | |
| | (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; | |
| (t) | where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts; | Not applicable |
| (u) | an indication of any deviation from the approved scoping report, including the plan of study, including- | Not applicable |
| | (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and | |
| | (ii) a motivation for the deviation; | |
| (v) | any specific information that may be required by the CA; and | Not applicable |
| (w) | any other matters required in terms of section 24(4)(a) and (b) of the Act. | Not applicable |

# 2 ACTIVITY DESCRIPTION

This section aims to address the following requirements of the regulations:

**Appendix 3.** (3) An EIR (...) must include-

(b) the location of the activity, including-

(i) the 21-digit Surveyor General code of each cadastral land parcel;

(ii) where available, the physical address and farm name;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered and being applied for;

(ii) a description of the associated structures and infrastructure related to the development.

## 2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The project entails the development of a photovoltaic solar facility and associated infrastructure on The Farm Leeuwpan No. 697, Registration Division IQ, Gauteng Province situated within the Merafong City Local Municipality area of jurisdiction. The proposed development is located in the Gauteng Province in the northern interior of South-Africa (refer to Figure B for the regional map). The town of Carletonville is located approximately 20 km South of the proposed development (refer to Figure B for the locality map).

The project entails the generation of up to 250 MW electrical power through the installation and operation of photovoltaic (PV) panels. The total development footprint of the project will approximately be 500 hectares (including supporting infrastructure on site) within the 4272 hectares assessed as part of the Environmental Impact Assessment process. The full extent of the development and EIA Footprint was considered during the scoping phase with the aim of confirming the suitability from an environmental and social perspective. A development footprint has been defined based on the outcomes of the scoping phase and is further assessed in the EIA phase. The property on which the facility is to be constructed will be leased by Angus Solar Power Plant (RF) (Pty) Ltd from the property owner for the life span of the project (minimum of 20 years).

The Angus Solar Power Plant (14/12/16/3/3/2/2352) forms a part of the Pluto PV cluster comprising a total of four (04) proposed PV facilities located on the same property, which includes the Angus Solar Power Plant (14/12/16/3/3/2/2351), Tuli Solar Power Plant (14/12/16/3/3/2/2353) and the Simbra Solar Power Plant (14/12/16/3/3/2/2354). Refer to Figure 2.1 below.

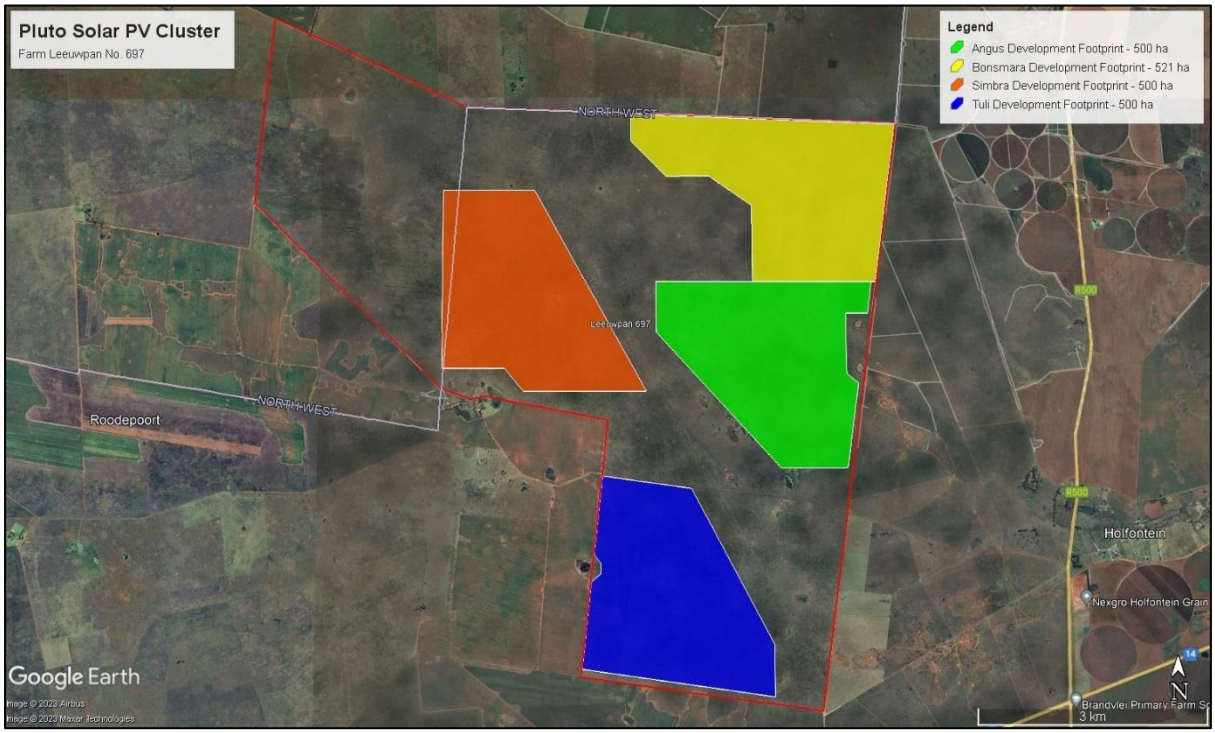


**Figure 2.1:** Illustration of the proposed Pluto Solar PV Cluster on the farm Leeuwpan No. 697, indication the Bonsmara SPP (yellow), Angus SPP (green), Simbra SPP (orange) and the Tuli SPP (blue).

It is expected that generation from the facility will connect to the on-site step up and switching substation that will be connected to a newly proposed collector substation, the collector substation will be connected to a newly proposed MTS to be connected to the national grid vie the existing Eskom Pluto 400/275/22kV MTS. The connection power line will be constructed within the limits of the identified grid connection corridor.

**Table 2.1:** General site information

| | |
|---|---|
| Description of affected farm portion | <u>Solar Power Plant:</u><br>Farm Leeuwpan No. 697<br><br><u>Grid Connection Corridor:</u><br>Portion 87 of the Farm De Pan 51;<br>Portion 88 of the Farm De Pan 51;<br>The Remaining Extent of the Farm De Pan 51;<br>Portion 5 of the Farm De Pan 5;<br>Portion 90 of the Farm De Pan 51 ; |

| | |
|---|---|
| | Portion 1 of the Farm De Pan 51;<br>Portion 100 of the Farm Wildfontein No. 52 ;<br>Portion 34 of the Farm Holfontein No. 49 ; |
| Province | Gauteng |
| District Municipality | West Rand District Municipality |
| Local Municipality | Merafong City Local Municipality |
| Ward numbers | 1 |
| Closest towns | Carletonville is located approximately 17km south of the proposed development. |
| 21 Digit Surveyor General codes | <u>Solar Power Plant:</u><br>Farm Leeuwpan No. 697<br>T0IQ00000000069700000<br><br><u>Grid Connection Corridor:</u><br>Portion 87 of the Farm De Pan 51<br>T0IQ00000000005100087<br>Portion 88 of the Farm De Pan 51<br>T0IQ00000000005100088<br>The Remaining Extent of the Farm De Pan 51<br>T0IQ00000000005100000<br>Portion 5 of the Farm De Pan 5<br>T0IQ00000000005100005<br>Portion 90 of the Farm De Pan 51<br>T0IQ00000000005100090<br>Portion 1 of the Farm De Pan 51<br>T0IQ00000000005100001<br>Portion 100 of the Farm Wildfontein No. 52<br>T0IQ00000000005200100<br>Portion 34 of the Farm Holfontein No. 49<br>T0IQ00000000004900034 |
| Type of technology | Photovoltaic solar facility |

| | |
|---|---|
| Structure Height | Panels ~ 6m;<br>Buildings ~ 6m;<br>Power line ~ 32m; and<br>Battery storage facility ~ 8m. |
| Battery storage | Within a 4-hectare area of the infrastructure and ancillary complex |
| Surface area to be covered (Development footprint) | Approximately 500 ha |
| EIA footprint | Assessed 4272 ha |
| Structure orientation | The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is in order to capture the most sun. |
| Generation capacity | Up to 250MW |

The site is located outside urban areas and is bordered by agricultural (mainly cattle grazing) land uses. The site survey revealed that the affected property currently consists of agricultural activities – refer to plates 1-8 for photographs of the affected property and proposed development footprint area.

## 2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

**Table 2.2:** Listed activities[1]

| **Relevant notice:** | **Activity No (s)** | **Description of each listed activity as per project description**: |
|---|---|---|
| GNR. 327 (as amended in 2017) | Activity 11(ii) | • *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*<br>• Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132kV), a collector substation and |

[1] Please refer to Table 6.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

| | | |
|---|---|---|
| | | an on-site HV/MV substation and switching station (132kV). |
| GNR. 327 (as amended in 2017) | Activity 12(ii)(c) | • "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse or (c) within 32 meters of a watercourse measured from the edge of a watercourse."*<br>• Activity 12(ii)(c) is triggered as depression and seep wetlands have been identified on the site. A depression and seep wetland are located within 32 meters of the power line corridor. |
| GNR. 327 (as amended in 2017) | Activity 24(ii) | • *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*<br>• Activity 24(ii) is triggered as the proposed access roads to Angus Solar Power Plant will be up to 10m wide. |
| GNR. 327 (as amended in 2017) | Activity 28(ii) | • *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*<br>• Activity 28(ii) is triggered as portions of the affected farm has been previously used for grazing and the property will be re-zoned to "special" use. The development footprint of the solar power plant will be 500 hectares. |
| GNR. 327 (as amended in 2017) | Activity 56(ii) | • *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*<br>• Activity 56(ii) is triggered as the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres. |
| GNR. 325 (as amended in 2017) | Activity 1 | • *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*<br>• Activity 1 is triggered since the proposed photovoltaic solar energy facility will generate up to 250 megawatts electricity through the use of a renewable resource. |
| GNR. 325 (as amended in 2017) | Activity 15 | • *"The clearance of an area of 20 hectares or more of indigenous vegetation."*<br>• In terms of vegetation type the site falls within the Carletonville Dolomite Grassland which is described by Mucina and Rutherford (2006) as 'vulnerable'. Activity 15 is triggered since portions of the site has not been |

| | | |
|---|---|---|
| | | lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 500ha in extent. |
| GNR. 324 (as amended in 2017) | Activity 4 (c)(iv) | • "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br>• Activity 4 (c)(iv) is triggered as internal, perimeter and access roads with a width of between 4 and 10 meters will be constructed. Parts of the site are within a Critical Biodiversity Area 2. |
| GNR. 324 (as amended in 2017) | Activity 10 (c)(iv) | • *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br>• Activity 10(c)(iv) is triggered since the proposed development will require infrastructure for the storage and handling of dangerous goods (diesel and/or oils) in containers with a capacity exceeding 30 but not exceeding 80 cubic metres. Parts of the site are within a Critical Biodiversity Area 2. |
| GNR. 324 (as amended in 2017) | Activity 12 (c)(ii) | • *"The clearance of an area of 300 square metres or more of indigenous vegetation (c) in the Gauteng Province, (ii) within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans."*<br>• Activity 12 (c)(ii) is triggered since the proposed development is located in the Gauteng province and portions of the site has not been lawfully disturbed during the preceding ten years and therefore indigenous vegetation is present on the site. Parts of the site are within a Critical Biodiversity Area 2. |
| GNR. 324 (as amended in 2017) | Activity 14(ii)(c)(c)(iv) | • "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse or (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (c) within the Gauteng Province, within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."* |

| | | |
|---|---|---|
| | | • Activity 14(ii)(c)(c)(iv) is triggered as the project is located within the Gauteng Province. A depression and seep wetland have been identified on the site. A depression and seep wetland are located within 32 meters of the power line corridor. Parts of the site are within a Critical Biodiversity Area 2. |
| GNR. 324 (as amended in 2017) | Activity 18 (c)(iv) | • *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (c) in the Gauteng Province within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br>• Activity 18 (c)(iv) is triggered since the existing main access road to the site will need to be widened by more than 4 metres. The project is located within the Gauteng Province. Parts of the site are within a Critical Biodiversity Area 2. |

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.

- Civil works to be conducted:

    - Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
    - Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
    - Construction of access and internal roads/paths – existing paths will be used where reasonably possible. Access will be obtained via a public gravel road of the R500 regional road to the east of the site. Additionally, the turning circle for trucks will also be taken into consideration.
    - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

## 2.3 PHOTOVOLTAIC TECHNOLOGY

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e. semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 250MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the Yield.

- Wiring to Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV and higher. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into the step-up transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into a new proposed collector substation to step the voltage up from 132KV to 275/400KV in order to evacuate the power into the national grid at the same voltage level as the MTS via the proposed 132/275/400KV power line. Whilst Angus Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with a newly proposed collector substation. Generation from the facility will tie in with the on-site step up and switching substation that will be connected to a newly proposed collector substation, the collector substation will be connected to a newly proposed MTS to be connected to the existing Eskom Pluto 400/275/22kV MTS. The connection power line will be constructed within the limits of the grid connection corridor. The project will generate up to 250MW of electricity.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

- Supporting Infrastructure – All associated infrastructure will be constructed within the limits of the infrastructure and ancillary complex which will include an on-site substation, Battery Energy Storage System, Operations and Maintenance buildings etc.

- Battery storage – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 $m^3$ of batteries and associated operational, safety and control infrastructure.

- Roads – Access will be obtained via a public gravel road off of the R500 regional road to the east of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

## 2.4 LAYOUT DESCRIPTION

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be considered – refer to Figure I and Figure L. The total surface area proposed include the PV panel arrays spaced to avoid shadowing, access and

maintenance roads and associated infrastructure (buildings, power inverters, transmission lines and perimeter fences). Limited features of environmental significance exist on site, with the main features of significance being wetland and riparian features, as well as cultural and heritage resources. These features have been avoided by the layout of the facility. A final layout plan is included as Figure L3, and Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE specifications.

**Table 2.3:** Technical details for the proposed facility

| Component | Description / dimensions |
|---|---|
| **Height of PV panels** | 6 meters |
| **Area of PV Array** | 500 Hectares (Development footprint) |
| **Number of inverters required** | Minimum 50 |
| **Area occupied by inverter / transformer stations / substations / BESS** | All associated infrastructure will be constructed within the limits of the infrastructure and ancillary complex.<br>On site Substation: 2.4 ha<br>Collector Substation: 4 ha<br>BESS: 8 ha<br>Central inverters + LV/MV trafo: 750 $m^2$ |
| **Capacity of on-site substation** | On-site substation: 33/132 kV<br>Collector substation: 132KV<br>MTS: 132/275/400KV |
| **Capacity of the power line** | 132/275/400 KV |
| **Area occupied by both permanent and construction laydown areas** | Permanent project area: 500 Hectares<br>Construction laydown area: ~20 ha |
| **Area occupied by buildings** | Infrastructure & Ancillary Complex: 19.3 ha |
| **Battery storage facility** | Maximum height: 8m<br>Maximum volume: 1740 $m^3$<br>Capacity ~up to 500MWh |
| **Length of access roads** | 3 km |
| **Width of access roads** | 8 m – 10 m |
| **Length of internal roads** | 18.01 km |
| **Width of internal roads** | 4 m – 6 m |
| **Length of perimeter roads** | 9.65 km |
| **Width of perimeter roads** | 6 m – 8 m |
| **Grid connection corridor width** | 102 m up to 1.4 km |
| **Grid connection corridor length** | Approximately 10 km |
| **Power line servitude width** | 132KV line – 31 m<br>275KV line – 47 m<br>400KV line – 55 m |
| **Height of power line** | 132KV line – 32 m<br>275KV line – 32 m<br>400KV line – 40 m |
| **Height of fencing** | Approximately 2.5 m |

Table 2.4 and Figures 2.2 – 2.6 provide and illustrate the corner coordinate points for the proposed development site as well as the coordinates for the grid connection corridor, access roads and associated infrastructure.

**Table 2.4:** Coordinates

| **Coordinates** | | | |
|---|---|---|---|
| **Component** | | Latitude | Longitude |
| **EIA Footprint**<br><br>**(Refer to Figure 2.2)** | A | 26° 6'16.85"S | 27°20'8.60"E |
| | B | 26° 6'56.39"S | 27°21'42.20"E |
| | C | 26° 7'2.97"S | 27°25'9.97"E |
| | D | 26°11'13.44"S | 27°24'30.89"E |
| | E | 26°10'59.54"S | 27°22'37.79"E |
| | F | 26° 9'12.17"S | 27°22'50.28"E |
| | G | 26° 9'1.92"S | 27°21'52.49"E |
| | H | 26° 9'3.20"S | 27°21'45.27"E |
| | I | 26° 8'58.70"S | 27°21'31.49"E |
| | J | 26° 7'38.64"S | 27°20'0.68"E |
| **Development Footprint**<br><br>**(Refer to Figure 2.2)** | A | 26° 9'32.52"S | 27°24'12.60"E |
| | B | 26° 8'34.39"S | 27°23'13.44"E |
| | C | 26° 8'12.41"S | 27°23'13.38"E |
| | D | 26° 8'12.41"S | 27°24'57.06"E |
| | E | 26° 8'26.24"S | 27°24'55.00"E |
| | F | 26° 8'26.26"S | 27°24'44.52"E |
| | G | 26° 8'52.07"S | 27°24'44.59"E |
| | H | 26° 8'56.21"S | 27°24'50.16"E |
| | I | 26° 9'32.43"S | 27°24'44.43"E |
| **Proposed access road from R500 (existing)**<br><br>**(Refer to Figure 2.3)** | A | 26°10'14.15"S | 27°26'27.64"E |
| | B | 26°10'7.34"S | 27°26'1.55"E |
| | C | 26°10'9.15"S | 27°25'43.72"E |
| | D | 26° 9'51.07"S | 27°24'43.81"E |
| | E | 26° 9'46.82"S | 27°24'28.73"E |
| | F | 26° 9'34.75"S | 27°22'47.72"E |
| **Proposed site access road 1**<br><br>**(Refer to Figure 2.3)** | A | 26° 9'45.98"S | 27°24'26.15"E |
| | B | 26° 9'39.12"S | 27°24'27.37"E |
| | C | 26° 9'32.27"S | 27°24'28.52"E |
| **Proposed site access road 2**<br><br>**(Refer to Figure 2.3)** | A | 26° 9'50.88"S | 27°24'43.60"E |
| | B | 26° 9'39.20"S | 27°24'45.38"E |
| | C | 26° 9'32.41"S | 27°24'44.71"E |
| | D | 26° 9'26.84"S | 27°24'45.56"E |
| **Infrastructure and Ancillary Complex**<br>**(Includes BESS, laydown areas and onsite substation)**<br>**(Refer to Figure 2.4)** | A | 26° 9'32.15"S | 27°24'25.97"E |
| | B | 26° 9'20.44"S | 27°24'25.91"E |
| | C | 26° 9'20.40"S | 27°24'46.06"E |
| | D | 26° 9'32.11"S | 27°24'44.25"E |

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| **Collector Substation**<br><br>**(Refer to Figure 2.4)** | A | 26° 9'37.80"S | 26° 9'38.84"S |
| | B | 26° 9'38.84"S | 27°24'42.43"E |
| | C | 26° 9'44.46"S | 27°24'41.60"E |
| | D | 26° 9'43.47"S | 27°24'33.41"E |
| **MTS Substation**<br><br>**(Refer to Figure 2.4)** | A | 26° 9'58.08"S | 27°24'29.37"E |
| | B | 26° 9'59.11"S | 27°24'38.10"E |
| | C | 26°10'5.77"S | 27°24'37.13"E |
| | D | 26°10'4.72"S | 27°24'28.39"E |
| **Internal connection corridor (from onsite substation towards collector substation)** | A | 26° 9'32.35"S | 27°24'29.46"E |
| | B | 26° 9'32.31"S | 27°24'46.61"E |
| | C | 26°10'23.10"S | 27°24'38.82"E |
| | D | 26°10'14.01"S | 27°24'21.91"E |
| **National grid connection corridor (from collector substation/MTS towards the Eskom Pluto 400/275/22kV MTS)**<br><br>**(Refer to Figure 2.6)** | A | 26° 9'32.66"S | 27°24'29.46"E |
| | B | 26°10'14.17"S | 27°24'21.90"E |
| | C | 26°10'20.29"S | 27°24'32.90"E |
| | D | 26°10'51.98"S | 27°24'27.61"E |
| | E | 26°10'56.30"S | 27°24'11.21"E |
| | F | 26°11'10.62"S | 27°24'8.26"E |
| | G | 26°11'25.05"S | 27°24'15.06"E |
| | H | 26°11'53.73"S | 27°24'46.98"E |
| | I | 26°11'57.94"S | 27°25'16.23"E |
| | J | 26°12'36.79"S | 27°25'42.58"E |
| | K | 26°12'55.48"S | 27°25'36.98"E |
| | L | 26°13'24.45"S | 27°26'33.44"E |
| | M | 26°13'28.46"S | 27°27'10.79"E |
| | N | 26°13'17.62"S | 27°27'24.24"E |
| | O | 26°13'16.48"S | 27°27'37.55"E |
| | P | 26°12'53.46"S | 27°27'35.39"E |
| | Q | 26°12'42.66"S | 27°27'9.86"E |
| | R | 26°12'44.60"S | 27°27'4.17"E |
| | S | 26°13'1.33"S | 27°26'51.32"E |
| | T | 26°13'4.54"S | 27°26'41.19"E |
| | U | 26°12'45.53"S | 27°26'13.13"E |
| | V | 26°12'45.53"S | 27°25'53.85"E |
| | W | 26°11'47.05"S | 27°25'14.16"E |
| | X | 26°11'34.70"S | 27°25'19.41"E |
| | Y | 26°11'30.72"S | 27°24'57.29"E |
| | Z | 26°10'53.65"S | 27°24'34.03"E |
| | AA | 26° 9'32.36"S | 27°24'46.62"E |


**Figure 2.2:** Map illustrating coordinate points of the EIA footprint and development footprint for the proposed Angus Solar Power Plant.

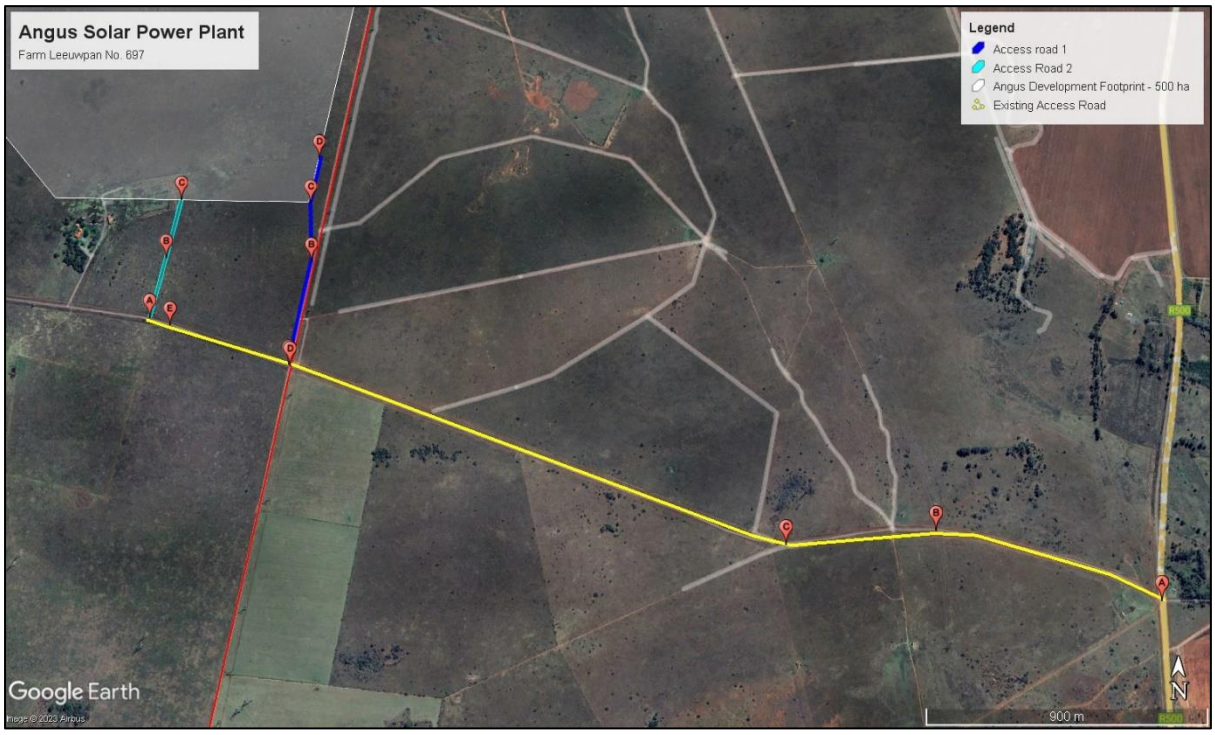


**Figure 2.3:** Map illustrating coordinate points of the proposed access road 1, access road 2 and the existing access road from the R500 for the Angus Solar Power Plant.


**Figure 2.4:** Map illustrating coordinate points of the proposed collector substation, MTS substation and the auxiliary infrastructure complex (incl. BESS, Laydown areas and on-site substation) for the Angus Solar Power Plant.

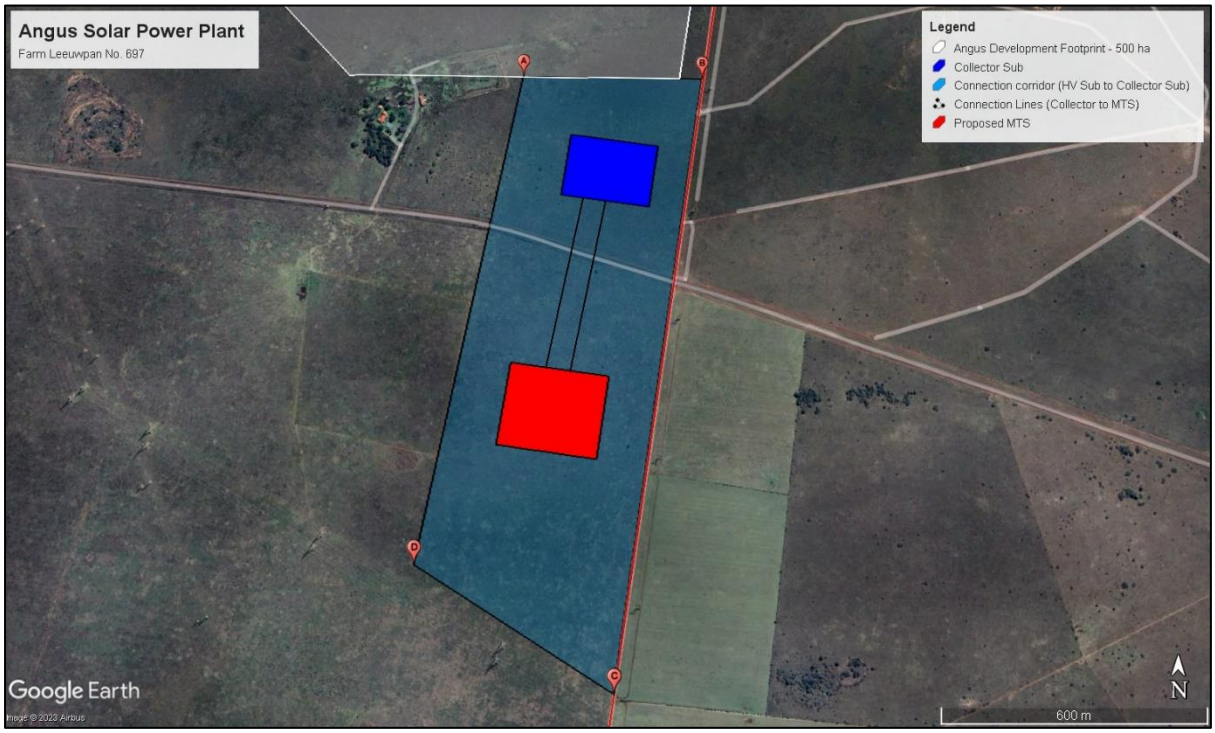


**Figure 2.5:** Map illustrating coordinate points of the proposed internal connection corridor from the on-site substation towards the collector/MTS substation for the Angus Solar Power Plant.

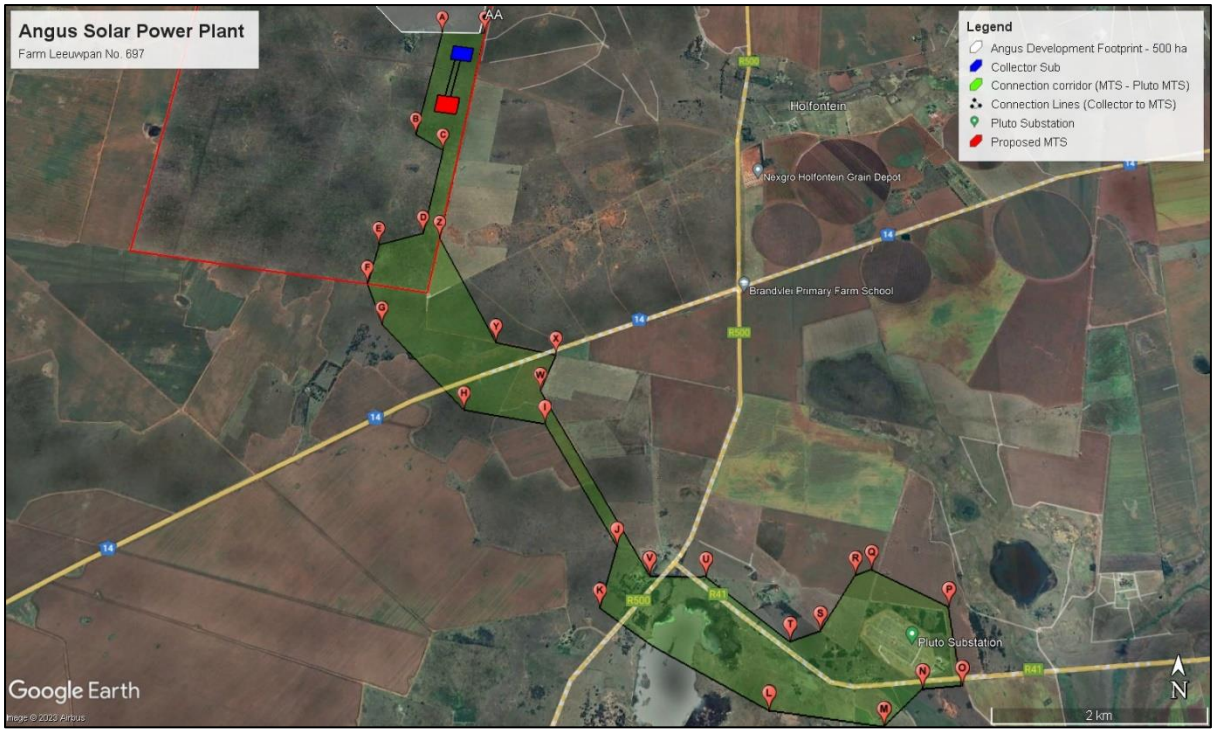


**Figure 2.6:** Map illustrating coordinate points of the proposed grid connection corridor from the collector/MTS substation towards the existing Eskom Pluto 400/275/22kV MTS for the Angus Solar Power Plant.

## 2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g., water, sewage, refuse removal, and electricity.

### 2.5.1 Water

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources or alternatively collected with water trucks from an authorized water service provider and stored on site. A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has obtained preferred bidder status by the Department of Mineral Resources and Energy.

The estimated maximum amount of water required during construction is 45 000 m³ annually during the 18 - 24 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 7000m³ per annum. Much of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September).

Drinking water supplied will comply with the SANS:241 quality requirements. Water quality from the borehole will be tested to confirm SANS:214 quality, if water quality is not sufficient for drinking, bottled water will be supplied to staff during construction and operational phases of the project.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of stormwater, the capture and use of rainwater from gutters and roofs will be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

### 2.5.2 Stormwater

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design stormwater canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Stormwater management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F1.

### 2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. The relevant Local Municipality(s) have been contacted, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years). The Developer still awaits confirmation.

### 2.5.4 Electricity

During the construction phase of the development, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the affected property will be utilised. This will depend on the Engineering, Procurement, and Construction (EPC) contractor appointed. During operation electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sourced from the photovoltaic plant, and from the electricity connection at night.

### 2.5.5 Decommissioning of the facility

The operating period will be 20 years from the commencement date of the operation phase. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures to improve the efficiency of the facility as the technology improves. The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that are the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase.

The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible). The rehabilitation activities would include the following:

- Removal of all structures and rubble,
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil,
- The surface will be restored to the original contours and hydro seeding will take place.

# 3 LEGISLATIVE AND POLICY CONTEXT

This section aims to address the following requirements of the regulations:

> **Appendix 3.** (3) An EIR (...) must include-
>
> (e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

## 3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the DFFE as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies and their applicability to the proposed development are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The National Forests Act, 1998 (Act 84 of 1998)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Energy Plan (IEP) (2016)
- Integrated Resource Plan (IRP) for South Africa (2010-2030) (2019)
- National Development Plan of 2030 (2012)
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)

- Climate Change Bill (2021) – for public comment
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Gauteng Provincial Spatial Development Framework (PSDF) (2012)
- West Rand DM Integrated Development Plan (IDP) 2017 – 2021 (2017)
- Merafong City Local Municipality Integrated Development Plan 2020/2021 (2020)
- Merafong City Local Municipality Spatial Development Framework (2017)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Table 3.1 and Table 3.2 to provide a reference framework for the implications for the proposed activity.

### 3.2 LEGISLATIVE CONTEXT

**Table 3.1:** Legislative context for the construction of photovoltaic solar plants

| LEGISLATION | ADMINISTERING AUTHORITY | DATE | SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT |
|---|---|---|---|
| **The Constitution of South Africa (Act No. 108 of 1996)** | National Government | 1996 | The Constitution is the supreme law of the Republic, and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution, therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the country's environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.<br><br>The development of the Angus Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures. |
| **The National Environmental Management Act (Act No. 107 of 1998)** | National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and the Gauteng Province Department of | 1998 | NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.<br>The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 promulgated in terms of Section 24 of NEMA. The EIA |

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| | Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) | | Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment.<br><br>The EIA process undertaken for the Angus Solar Power Plant is in-line with the requirements of NEMA for the Application for Environmental Authorisation. |
| **The National Energy Act (Act No. 34 of 2008)** | Department of Mineral Resources and Energy | 2008 | One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble).<br><br>Considering that the Angus Solar Power Plant is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act. |
| **The National Water Act (Act No. 36 of 1998)** | Department of Water Affairs (now known as Department of Water and Sanitation) | 1998 | Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources.<br><br>As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use.<br><br>The site is located within the C23E quaternary catchment and is situated in the Upper Vaal Water Management Area. |

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| | | | Also, should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license. |
| **National Environmental Management: Waste Act (Act No. 59 of 2008)** | National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment) | 2008 | NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.<br><br>Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development as no listed activities in terms of waste management are expected to be triggered. |
| **National Environment Management: Air Quality Act (Act No. 39 of 2004)** | National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment) | 2004 | The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.<br><br>Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development. |
| **The National Heritage Resources Act (Act No. 25 of 1999)** | South African Heritage Resources Agency (SAHRA) | 1999 | The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and |

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| | | | promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.<br><br>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected.<br><br>A case file has been opened on SAHRIS for the Angus Solar Power Plant and all relevant documents have been submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix E6. |
| **Conservation of Agricultural Resources Act (Act No. 85 of 1983)** | National and Provincial Government | 1983 | The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.<br><br>Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long-term lease agreement.<br><br>A Soil and Agricultural Assessment has been undertaken for the Angus Solar Power Plant and is included as Appendix E5 of this Draft EIR. |
| **The National Forests Act, 1998 (Act 84 of 1998)** | Department of Environmental Affairs (now known as the Department of Forestry, Fisheries | 1998 | The purposes of this Act are to:<br>(a) promote the sustainable management and development of forests for the benefit of all;<br>(b) create the conditions necessary to restructure forestry in State forests;<br>(c) provide special measures for the protection of certain forests and trees: |

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| | and the Environment) | (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.<br>(e) promote community forestry;<br>(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination.<br><br>Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette.<br><br>A Terrestrial Biodiversity Impact Assessment has been undertaken for the Angus Solar Power Plant and is included in Appendix E1. |

### 3.3 POLICY CONTEXT

**Table 3.2:** Policy context for the construction of photovoltaic solar plants

| POLICY | ADMINISTERING AUTHORITY | DATE | SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT |
|---|---|---|---|
| **The White Paper on the Energy Policy of the Republic of South Africa** | Department of Mineral Resources and Energy | 1998 | The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives:<br>• Increasing access to affordable energy services<br>• Improving energy governance<br>• Stimulating economic development<br>• Managing energy-related environmental and health impacts<br>• Securing supply through diversity |

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| | | | • Energy policy priorities<br><br>The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive, and many appropriate applications exist.<br><br>The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:<br>• Minimal environmental impacts in operation in comparison with traditional supply technologies; and<br>• Generally lower running costs, and high labour intensities.<br><br>Disadvantages include:<br>• Higher capital costs in some cases;<br>• Lower energy densities; and<br>• Lower levels of availability, depending on specific conditions, especially with sun and wind-based systems.<br><br>The Angus Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource. |
| **The White Paper on Renewable Energy** | Department of Mineral Resources and Energy | 2003 | This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.<br><br>The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing |

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| | | | modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix).<br><br>The Angus Solar Power Plant is in line with this paper as it proposes the generation of renewable energy from the solar resource. |
| **Integrated Energy Plan (IEP) (2016)** | Department of Mineral Resources and Energy | 2016 | The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.<br><br>The 8 key objectives of the integrated energy planning process, are as follows:<br>• Objective 1: Ensure security of supply.<br>• Objective 2: Minimise the cost of energy.<br>• Objective 3: Promote the creation of jobs and localisation.<br>• Objective 4: Minimise negative environmental impacts from the energy sector.<br>• Objective 5: Promote the conservation of water.<br>• Objective 6: Diversify supply sources and primary sources of energy.<br>• Objective 7: Promote energy efficiency in the economy.<br>• Objective 8: Increase access to modern energy.<br><br>The Angus Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource. |

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| **Integrated Resource Plan (IRP) for South Africa** | Department of Mineral Resources and Energy 2019 | The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.<br><br>The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.<br><br>The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas. Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018. According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.<br><br>The Angus Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan. |
| **National Development Plan of 2030** | The Presidency: - National Planning Commission | The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa needs to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely, to raise employment by a faster growing economy, |

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| | | | improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive, and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge.<br><br>The development of the Angus Solar Power Plant will contribute to the intervention strategy as identified within the plan. |
| **National Infrastructure Plan of South Africa** | Presidential Infrastructure Coordinating Commission | 2012 | In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretch over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow:<br><br>- SIP 8: Green energy in support of the South African economy;<br>- SIP 9: Electricity generation to support socio-economic development; and<br>- SIP 10: Electricity transmission and distribution for all.<br><br>SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities*". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10 aims to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20). |

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| | | | The Angus Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan. |
| **New Growth Path Framework** | Department of Economic Development | - | The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b).<br><br>This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to:<br><br>- Identify the possible areas of employment creation; and<br>- Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b).<br>This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.<br><br>Considering that the construction of and investment in renewable energy is a key are identified within the framework, the Angus Solar Power Plant is considered to be in-line with the framework. |
| **Climate Change Bill** | National Department of Environmental Affairs (now known as the Department of Forestry, | 2018 | On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill ("the Bill") for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa's sustainable transition to a climate resilient, low carbon economy and society. The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill: |

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| | Fisheries and the Environment) | | • Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance;<br>• Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response;<br>• Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner.<br><br>Angus Solar Power Plant comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation. |
| **Strategic Integrated Projects (SIPs)** | The Presidential Infrastructure Coordinating Committee | 2010 - 2030 | The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility:<br><br>• SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities.<br><br>• SIP 9: Electricity generation to support socio-economic development: The proposed Springbok Solar Power Plant is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Energy. SIP 9 |

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| | | | supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances.<br><br>Angus Solar Power Plant could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs. |
| **Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa** | National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) | 2014 | The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives.<br><br>This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs).<br><br>The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.<br><br>Even though the Angus Solar Power Plant is not located within a REDZ, it will still contribute to the overall development of renewable energy within the country. |

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| **Gauteng Provincial Spatial Development Framework (PSDF) (2012)** | Gauteng Provincial Government | 2012 | The Gauteng Spatial Development Framework has a number of aspects that need to be taken into account when developing the SDF. In particular, this framework is, "*premised on building Gauteng as a City Region that allows agriculture to provide a link between rural and urban economic development, shaped by infrastructure led investment*". The framework seeks to:<br><br>o Provide a clear future provincial spatial structure that is robust to accommodate growth and sustainability.<br>o Specify a clear set of spatial objectives for municipalities to achieve in order to ensure realisation of the future provincial spatial structure.<br>o Propose a set of plans that municipalities have to prepare in their pursuit of these objectives.<br>o Provide a common language and set of shared planning constructs for municipalities<br>o to use in their planning processes and plans.<br>o Enable and direct growth.<br><br>In the Gauteng Spatial Development Framework (GSDF), the province outlines issues of population growth with a predicted population of 28 million people in the Gauteng City Region (GCR) by 2055 and therefore Gauteng requires a serious overhaul of its planning fundamentals to address the social, environmental and economic needs of an added 16 million people in the Gauteng province. The GSDF has mentioned that there are too many inadequacies and inequalities that exist in the present Gauteng economic system, and these are in many respects deeply embedded in failings in the spatial structure of the city region.<br>In addition to the GSDF there are various policies and strategies that have been developed that provide direction to municipalities with regard to the type of developments to promote in the area. Some of these documents included the Integrated Energy Strategy, Green Economy Strategy, ICT Strategy and the Innovation Strategy. Although these strategies do not directly impact on the spatial development of the regions, it does provide some guidance with regard to the types of activities to be promoted. These strategies promote manufacturing related to the green economy, better use of broadband and fibre optic infrastructure that may facilitate developments such as BPO parks. |

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| | | | The development of the Angus Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature. |
| **West Rand District Municipality Integrated Development Plan (IDP) 2017 – 2021 (2017)** | West Rand District Municipality | 2017 | The long-term vision of the West Rand District Municipality (WRDM) is to: *"Integrating District Governance to achieve a better life for all".*<br><br>The above stated vision defines what WRDM would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: *"to provide an integrated and excellent developmental district governance system in the West Rand".*<br><br>The core values for the DM are set to be the following:<br>o Service excellence;<br>o Pride;<br>o Integrity;<br>o Responsibility;<br>o Transparency;<br>o Accountability;<br>o Innovation; and<br>o Teamwork<br><br>The West Rand District Municipality lies to the west of Johannesburg, about 50 minutes from OR Tambo International Airport. It borders the North West Province and accessibility is easy from all major Gauteng centres. This region is a great base from which to explore this fascinating and ancient part of South Africa. The West Rand Region has a rich and diverse landscape with the lovely Magaliesberg Mountains forming the backdrop. Towns in the region include Krugersdorp, Randfontein; Westonaria and Carletonville. |

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| | | | The development of the Angus Solar Power Plant will contribute to the goals of the area, albeit to a limited extent. |
| **Merafong City Local Municipality Integrated Development Plan (IDP)** | Merafong City Local Municipality | 2020/ 21 | The Vision, Mission and Values were confirmed as follows.<br><br>Vision: "A prosperous, Sustainable and Community-oriented City"<br><br>Mission: "To provide quality services to our community through accountable governance"<br><br>Values: "Integrity, Accountable, Committed, Teamwork, Proactive, Service excellence".<br><br>The Municipality towards building a South Africa that is united, non-racial, non-sexist democratic and prosperous in character. A clarion call by the National democratic revolution that dictates that we should develop concrete programmes to address poverty, to create jobs and grow an inclusive, productive economy to address the persisting problems of unemployment, poverty and inequalities through radical economic transformation.<br><br>The development of the Angus Solar Power Plant will contribute to the goals of the area, albeit to a limited extent. |
| **Merafong City Spatial Development Framework 2019/2020 (SDF) (2017)** | Merafong City SDF | 2019/ 2020 | Spatial Development Frameworks and policies at all spheres of government must address the inclusion of persons and areas that were previously excluded, with an emphasis on informal settlements, former homeland areas and areas characterised by widespread poverty and deprivation.<br><br>The Merafong City Municipal Spatial Development Framework (MSDF), forms part of a hierarchy of plans feeding into the Integrated Development Plan (IDP). The Spatial Development Framework serves as an input into the IDP and concentrates on the spatial aspects of development planning, whereas the IDP focuses on broader developmental issues. During 2013 the Spatial Planning & Land Use Management Act (Act 16 of 2013) (SPLUMA) was promulgated this legislation puts forward principles to influence spatial planning, land use management and land development. It also provides for national and regional spatial frameworks as well as provincial and municipal frameworks, meaning that a package of plans will be |

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| | undertaken from national to municipal level to direct spatial planning as well as land use management, while providing for uniform regulation of land use management. The general principles endorsed by this Act is that spatial planning, land use management and land development must promote and enhance five main Development Principles, namely Spatial Justice, Spatial Sustainability; Spatial Efficiency; Spatial Resilience, and Good Administration.<br><br>The development of the Angus Solar Power Plant will contribute to the goals of the area, albeit to a limited extent. |

### 3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

### 3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEA, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

### 3.6 CONCLUSION

The EIA was undertaken in accordance with the EIA Regulations (2017) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents and national guidelines.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development. For this reason, the proposed development

project will be assessed in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of the Angus Solar Power Plant. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e., the sun, renewable energy can increasingly contribute towards a long-term sustainable energy supply for future generations. This policy further highlights that due to the unlimited resources base of renewable energy in South Africa, renewable energy applications, like PV solar energy and associated infrastructure, are more sustainable in terms of social and environmental costs. The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generation in South Africa is allocated to renewable energy applications. On a District and Local level limited attention is given explicitly to renewable sources like PV solar energy, however the documents reviewed do make provision for increased energy supply and efficiency in improving the quality of lives in terms of efficient physical infrastructure as well as socio-economic growth. At Provincial, District and Local level the policy documents support the applications of renewables.

The review of the relevant policies and documents related to the energy sector therefore indicate that renewables, like solar energy and the establishment of solar energy facilities and associated infrastructure, are supported on all spheres of Government. The proposed Angus Solar Power Plant is therefore supported by the related policy and planning documents reviewed in this section of the report.

# 4 THE NEED AND DESIRABILITY

This section aims to address the following requirements of the regulations:

**Appendix 3.** (3) An EIR (...) must include-

(f) 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;

## 4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the Word bank estimates that these results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel $CO_2$ emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011). In August 2021 article confirmed that South Africa is the 12$^{th}$ highest greenhouse gas emitter in the world (source: https://www.news24.com/fin24/economy/eskom-will-only-able-to-meet-global-air-quality-standards-by-2050-owing-to-financial-woes-20210818).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or any other appropriate energy generation programmes / opportunities. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, the largest greenhouse gas emitter of South Africa, has committed in principle to net zero emission by 2050 and to increase its renewable capacity. During the 2022 State of the Nation Address it was indicated that during the past year the government had taken "firm steps" to bring additional generation capacity online as quickly as possible to close the shortfall in terms of electricity. As a result, it was confirmed that several new generation projects will be coming online over the next few years.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 4.1 below:

**Table 4.1:** Published Draft IRP 2018 (Approved by Cabinet for Consultation)

| | Coal | Nuclear | Hydro | Storage (Pumped Storage) | PV | Wind | CSP | Gas / Diesel | Other (CoGen, Biomass, Landfill) | Embedded Generation |
|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 39 126 | 1 860 | 2 196 | 2 912 | 1 474 | 1 980 | 300 | 3 830 | 499 | Unknown |
| 2019 | 2 155 | | | | | 244 | 300 | | | 200 |
| 2020 | 1 433 | | | | 114 | 300 | | | | 200 |
| 2021 | 1 433 | | | | 300 | 818 | | | | 200 |
| 2022 | 711 | | | | 400 | | | | | 200 |
| 2023 | 500 | | | | | | | | | 200 |
| 2024 | 500 | | | | | | | | | 200 |
| 2025 | | | | | 670 | 200 | | | | 200 |
| 2026 | | | | | 1 000 | 1 500 | | 2 250 | | 200 |
| 2027 | | | | | 1 000 | 1 600 | | 1 200 | | 200 |
| 2028 | | | | | 1 000 | 1 600 | | 1 800 | | 200 |
| 2029 | | | | | 1 000 | 1 600 | | 2 850 | | 200 |
| 2030 | | | 2 500 | | 1 000 | 1 600 | | | | 200 |
| TOTAL INSTALLED | 33 847 | 1 860 | 4 696 | 2 912 | 7 958 | 11 442 | 600 | 11 930 | 499 | 2600 |
| Installed Capacity Mix (%) | 44.6 | 2.5 | 6.2 | 3.8 | 10.5 | 15.1 | 0.9 | 15.7 | 0.7 | |

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW and 860MW from wind and solar has been rewarded as part of Bid window 5 and 6, respectively (latter announced in 2022).

## 4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

The facility's contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained, it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Gauteng Province. The project will likely encounter

widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the Merafong City Local Municipality is desirable as a large portion of households live within the poverty level (51%) which has an annual income of less than R38 200 (Merafong City IDP, 2020/2021).

- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel-based power sources. It will assist in achieving the goal to generate 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will soon be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of $CO_2$ emissions from combustion of fossil fuels at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e., a financial mechanism developed to encourage the development of renewable technologies).
- Climate change mitigation - On a global scale, the project contributes to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better-quality environment for employees and nearby communities.
- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilisation of solar power and the experience gained through the construction and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full-time basis. It is estimated that between 600 and 800 employment opportunities will be created during the construction phase and between 35 and 50 during the operational phase.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance, and catering will generate additional indirect socio-economic benefits for the local community members.
- Effective use of resources - Due to the climate limitations, the site is totally unsuitable for cultivated crops, and viable agricultural land use is limited to grazing only. The proposed development in this specific area will generate alternative land use income through rental for the energy facility, which will have a positive impact on agriculture. It will provide the landowner with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: The national electricity crises of 2010 and the resultant effects on South African residents and the economy has highlighted how highly reliant we are on electricity as a source of energy. Government has committed to developing measures to promote energy saving, reduce energy costs to the economy, and reduce the negative impact of energy use on the environment.
- Cumulative impacts of low to medium significance - No solar PV plants have been granted preferred bidder status within proximity radius of 30km to the proposed Angus SPP. This draft EIR includes a detailed assessment of the potential cumulative impacts associated with the proposed development – refer to Section 7 of the report. No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country. Therefore, considering the cumulative impacts associated with the development and the significance ratings thereof being medium and low, the project can be considered as desirable for development.

# 5 DESCRIPTION OF ENVIRONMENTAL ISSUES

This section aims to address the following requirements of the regulations:

**Appendix 3.** (3) An EIR (...) must include-

(g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;

(h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –

(i) details of all the development footprint alternatives considered;

(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(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;

(iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and

(xi) a concluding statement indicating the preferred alternative development location within the approved site.

## 5.1 CONSIDERATION OF ALTERNATIVES

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal.

An initial site assessment (refer to Appendix D) was conducted by the developer on Leeuwpan No. 697 and the farm was found favourable due to its close proximity to grid connections, solar radiation, ecology and relative flat terrain. Where specific features of environmental sensitivity were identified by the independent specialists as part of the Scoping Phase, these areas and the associated required buffers have been considered by the developer to ensure that the facility layout is appropriate considering the sensitive features present. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site within the affected property. A single alternative site on the same farm has been identified (Subsolar, 2023).

The following sections explore different types of alternatives in relation to the proposed activity in more detail.

### 5.1.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo of the affected environment. The description provided in section 5.3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for the current land uses present. The area associated with the development footprint has limited agricultural potential and is unsuitable for cultivation, with grazing considered to be the only agricultural option. The potential opportunity costs in terms of alternative land use income through rental for the energy facility and the supporting social and economic development in the area would be lost if the *status quo* persists.

### 5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Angus Solar Power Plant (RF) (Pty) Ltd in the Carletonville area to potentially establish the Angus Solar Power Plant. From a local perspective the Farm Leeuwpan No. 697 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

Within the affected property, the development footprint has been optimised to avoid sensitive features identified by the independent specialists during the Scoping phase (refer to Figure 5.1 and 5.2). No alternative areas on Farm Leeuwpan No. 697 have been considered for the development footprint, as the area identified and assessed in this Draft EIA report has been optimised to avoid sensitive environmental features.

However, provision have been made in this draft EIA report to consider the results of the specialist studies to exclude the sensitive areas present, which includes the no-go buffer areas recommended by the specialist. The sensitive areas and associated buffers have been considered by the developer for the facility layout design to optimise the layout for avoidance of the environmental sensitivities identified.

As part of the specialist studies undertaken, areas that will need to be avoided has been identified which includes the intact rocky outcrop habitat units present within the development footprint. The development footprint is however large enough to ensure the avoidance of the sensitive features and the associated buffers by the facility layout and still provide an opportunity for the successful development and operation of the Angus Solar Power Plant from a technical perspective. Therefore, a single preferred location alternative was assessed – refer to Figures 5.2.


**Figure 5.1:** Development footprint considered by the Angus Solar Power Plant during the Scoping Phase.

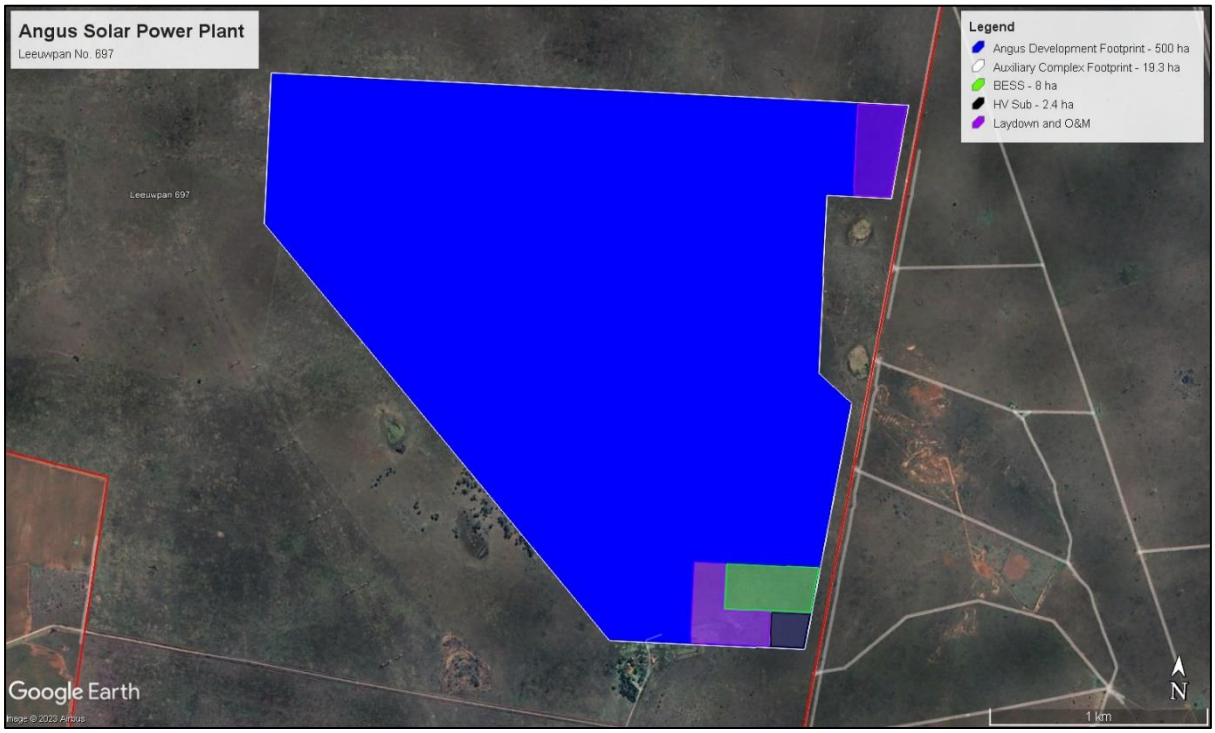



**Figure 5.2:** The optimised development footprint located within the affected property assessed following specialist input during the Scoping Phase.

### 5.1.3 Activity alternatives

The EIA process also needs to consider if the development of a solar PV facility would be the most appropriate land use for the particular site.

- Photovoltaic (PV) solar facility – Angus Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Angus Solar Power Plant (RF) (Pty) Ltd is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for of the Carletonville area – refer to Figure 5.3. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.

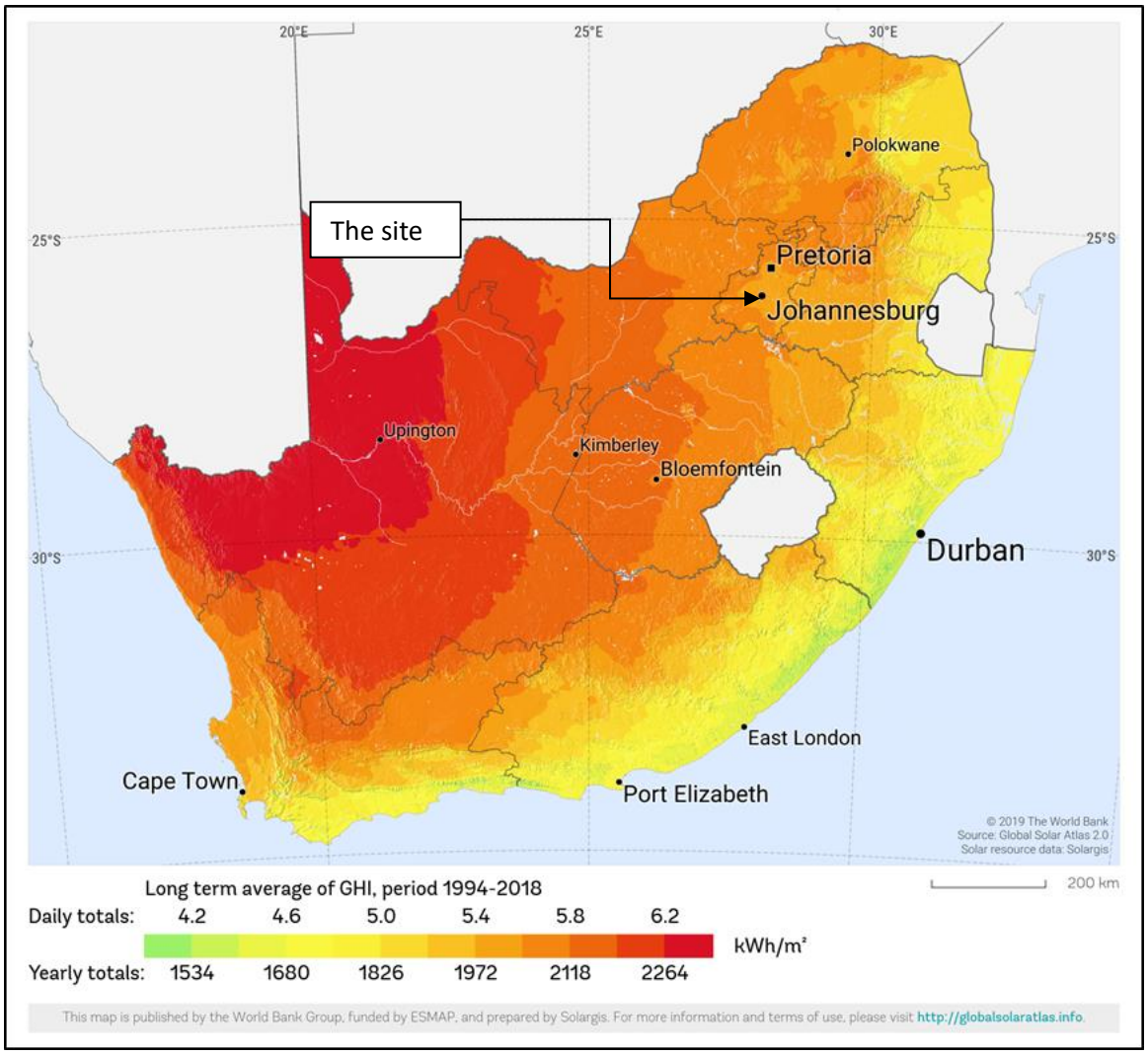



**Figure 5.3:** Global horizontal irradiation values for South Africa (SolarGIS, 2021).

- Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore, the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines based on the overall suitability of the site. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.

- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also the local area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP

as part of the energy mix of the country. Therefore, this alternative will not be considered further in this report.

### 5.1.4 Technical alternatives

Possible technical alternatives for the development of a solar PV facility needs to be considered during the EIA process.

#### 5.1.4.1 Distribution lines

Generation from the facility will tie in with the on-site step up and switching substation that will be connected to a newly proposed collector substation, the collector substation will be connected to a newly proposed MTS to be connected to the existing Pluto 400/275/22kV MTS.

The onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into a new proposed collector substation to step the voltage up from 132KV to 275/400KV in order to evacuate the power into the national grid at the same voltage level as the Existing Eskom Pluto MTS via the proposed 132/275/400KV power line. An internal connection line will be required form the on-site substation towards the on-site collector substation and between the collector substation and the onsite MTS, whereafter a connection line will be constructed towards the Pluto 400/275/22kV MTS. The connection line will be assessed within a 102 m wide (up to 1.4 km wide in the area surrounding the existing Eskom Substation) and 10 km long grid connection corridor. The connection power line will be constructed within the limits of the grid connection corridor. The project will generate up to 250MW of electricity.

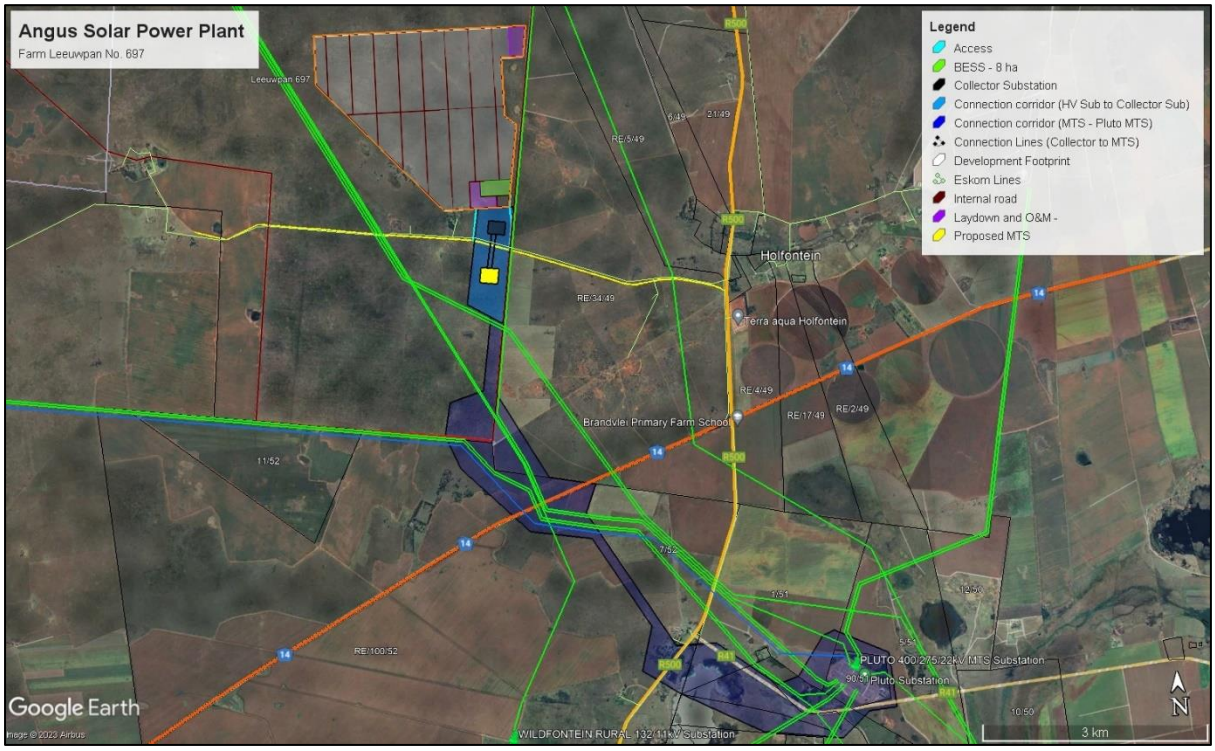



**Figure 5.4**: Grid connection corridor considered and assessed for the development of the Angus Solar Power Plant.

A 132kV overhead distribution line is the only preferred alternative for the applicant due to the following reasons:

- **Overhead Distribution Lines** - Overhead lines are less costly to construct than underground lines. Therefore, the preference for overhead lines is mainly based on cost. Overhead lines allow high voltage operations, and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler et al, 2006).

  The overall weather conditions in the Gauteng Province is unlikely to cause damage and faults on the proposed overhead distribution power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts associated with overhead distribution lines these include visual intrusion and threats to sensitive habitat (where applicable).

  Furthermore, overhead power lines also provides an opportunity for the avoidance of sensitive environmental features as the overhead lines can span on-ground environmental features to ensure conservation, therefore providing more flexibility in terms of mitigation of the associated on-ground disturbance.

  The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions of the route and decided on a suitable structure which meets the prescribed technical requirements. The choice of structures to be used will not have any adverse impacts on the environment, and the independent specialists, of various fields of study, have considered the development of the power line and recommended appropriate mitigation measures where required. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

  The following alternatives may be considered for the overhead power line:

  - Single Circuit Overhead Power Line

    The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over many years for the existing environmental conditions and terrain as specified in the Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:

    - More cost-effective installation costs;
    - Less environmental damage during installation; and
    - More effective and cheaper maintenance costs over the lifetime of the power line.

  - Double Circuit Overhead Power Line

    Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimise impacts. However, the use of double-circuiting has a number of technical disadvantages:

- Faults or problems on one power line may mean that the other power line is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines.

The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

- **Underground Distribution Lines** - Underground cables have generally been used where it is impossible to use overhead lines (for example due to space constraints). Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines and will result in more disturbance to the environment based on the need for more invasive and intense construction activities into the ground.

### 5.1.5 Battery Energy Storage Facility (BESS)

It is proposed that a nominal up to 500 MWh Battery Energy Storage Facility for grid storage would be housed in stacked containers, or a multi-storey building, with a maximum height of 8m and a maximum volume of 1,740m$^3$ of batteries and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, the preferred alternative is the utility-scale Lithium-ion (Li-ion) battery energy storage. Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009).

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

### 5.1.6 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. A draft layout plan is included as Figures L1 – L3.

The layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The developer has

considered the environmental sensitivities as identified during the Scoping Phase and have accordingly optimised the layout of the SPP facility to ensure avoidance of the sensitive areas (Figure J1). This optimised layout is considered to be the draft layout plan as assessed within this draft EIR.

The total surface area proposed include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, power lines, BESS and perimeter fences). With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.

The choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological and heritage impacts of erecting a power line. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The 132kV line must be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

Steel lattice towers:

The steel lattice towers provide the following advantages over the other tower types available:

- Enables multipath earthing which enhances the overall electrical performance of the power line.
- Is visually less obtrusive than the mono-pole options.
- Is more practicable that other options i.e. more cost effective and more practical to construct and maintain.
- Is safer to work on than the monopole and wood pole structures.
- Is more durable than the wood pole structures.

Steel monopoles:

The steel monopole is considered less suitable than the steel lattice towers for the following reasons:

- Is visually more intrusive than the lattice towers.
- Is more expensive than the lattice towers.
- Requires more steel than the lattice towers.
- Is more difficult to erect.
- Is not as safe to work on as the lattice towers.

Wood poles:

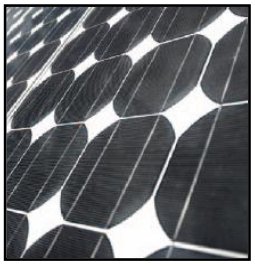
Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them less efficient and practicable. The wood pole structure is also more susceptible to having the cross arms burnt off by electrical faults as well as being susceptible to deformation with height.

### 5.1.7 Technology alternatives

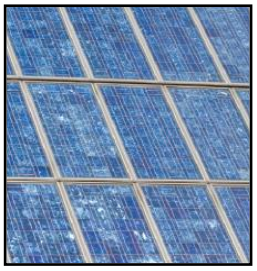
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon, thin film or bifacial PV panels. These technologies are discussed in more detail below:

Crystalline (high efficiency technology at higher cost):

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



- Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



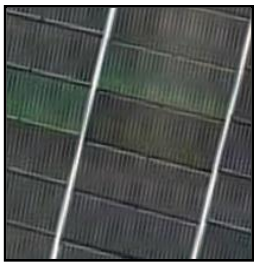
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

Thin film (low-cost technology with lower efficiency):

Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:

- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.

- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications and is considered a developing PV technology (First Solar, 2011).

Bifacial panels:

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves to be most feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

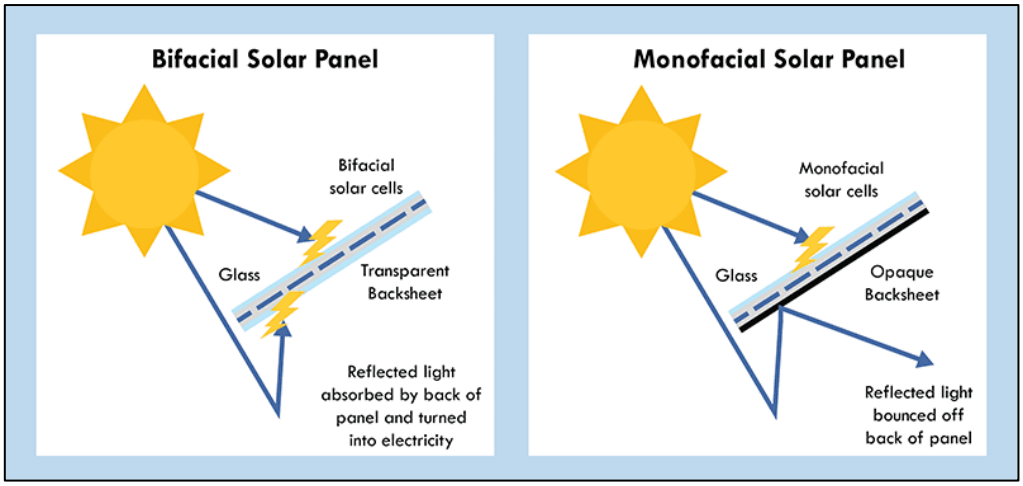



**Figure 5.5:** Bifacial vs Monofacial Solar Panel absorption.

## 5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44. The approved public participation plan is also included as Appendix J to the report.

### 5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken in line with the approved public participation plan (refer to Appendix C):

- Site notices

  Site notices (size 60 cm x 42 cm) were erected on site on 28 February 2023 informing the public of the commencement of the S&EIR process. Photographic evidence of the site notices is included in Appendix C3.

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in the Carletonville Herald on 19 March 2023 (see Appendix C2) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to

register with and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement.

- Background Information Document (BID)

  A BID was released to all I&APs including the adjacent landowners, key stakeholders and relevant organs of state on 13 March 2023. The BID provided information on the proposed development, the S&EIA process. I&APs were invited to register onto the project I&AP database.

- Direct notification of identified I&APs

  Identified I&APs, including key stakeholders representing various sectors, have been directly informed of the EIA process via registered post, telephone calls, WhatsApp's and emails (as relevant). The BID was distributed with the notification. For a complete list of I&APs with their contact details see Appendix C4 to this report.

- Direct notification of surrounding landowners and occupiers

  Written notices were also provided via registered post, WhatsApp or email (as relevant) to all surrounding landowners and occupiers.

- Circulation of Draft Scoping Report

  Copies of the Draft Scoping Report (DSR) were provided to all I&APs via courier, Dropbox and/or email (as relevant). Hard copies of the report were made available on request and where an I&AP does not have the resources to view the report on an online platform.

- Circulation of the Draft Environmental Impact Assessment Report

  All registered I&APs and State Department have been informed of the availability of the Draft EIR on 14 September and requested to provide their comments within 30 days (refer to Appendix C). The 30-day review and comment period are from 14 September 2023 to 16 October 2023. All comments received during this period will be included in the final EIR. All comments received prior to the release of the Draft EIR have been included in Appendix C. The Comments and Responses report are included as Appendix C7 of this draft EIR.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decision taken by the DFFE on the Application for EA. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. In accordance with the provisions of Regulation 4(1) of Government Notice No. 993, an appellant must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered I&APs and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.


**Figure 5.6:** Surrounding Landowners

### 5.2.2 Consultation process

Regulation 41 requires that the municipality, relevant ward councillor and any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices D and E.

### 5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) *"A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application."*

This report is the Draft Environmental Impact Report. The Draft Environmental Impact Report has been made available to all potential and/or registered I&APs and State Departments. They were provided with a copy of the Draft EIR and were requested to provide written comments on the report within 30 days. All issues identified during this review period, and previous review periods (i.e. Scoping Phase), will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR (Appendix C7).

All comments received during the Scoping Phase, and prior to the release of the Draft EIR for the 30-day review and comment period have also been included in this Draft report as Appendix C which provided I&APs an opportunity to confirm that their comments raised during the Scoping Phase have been included and considered as part of the EIA Phase.

### 5.2.4 Issues raised by I&APs and consultation bodies

Comments have been received from some consultation bodies and is summarised in the Comments and Response Report included in Appendix C7. All comments received during the circulation of the Draft EIR will be addressed accordingly in the Final EIR. The full wording and original correspondence are included in Appendix C5 and Appendix C6 of the Draft EIR.

## 5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative.

The biophysical environment is described with specific reference to geology, soils, agricultural potential, vegetation and landscape features, climate, biodiversity, heritage features (in terms of archaeology and palaeontology), the visual landscape and the social environment to be affected. A number of specialists were consulted to assist with the compilation of this chapter of the report – refer to the Table 1.2.

However, due to the fact that the area proposed for development (i.e. the development footprint) exclusively consists of land used for grazing, limited sensitive areas from an ecological or conservation point have been identified. Sensitive areas include the rocky outcrop habitats and some wetland features within the grid connection corridor. These features are described in more detail below.

### 5.3.1 Climate

This vegetation type experiences summer rainfall with very dry winters. It is characterised by a Mean Annual Precipitation (MAP) of approximately 500 - 650 mm. Temperatures are high in summer and severe frosts infrequently occurs during the winter months.

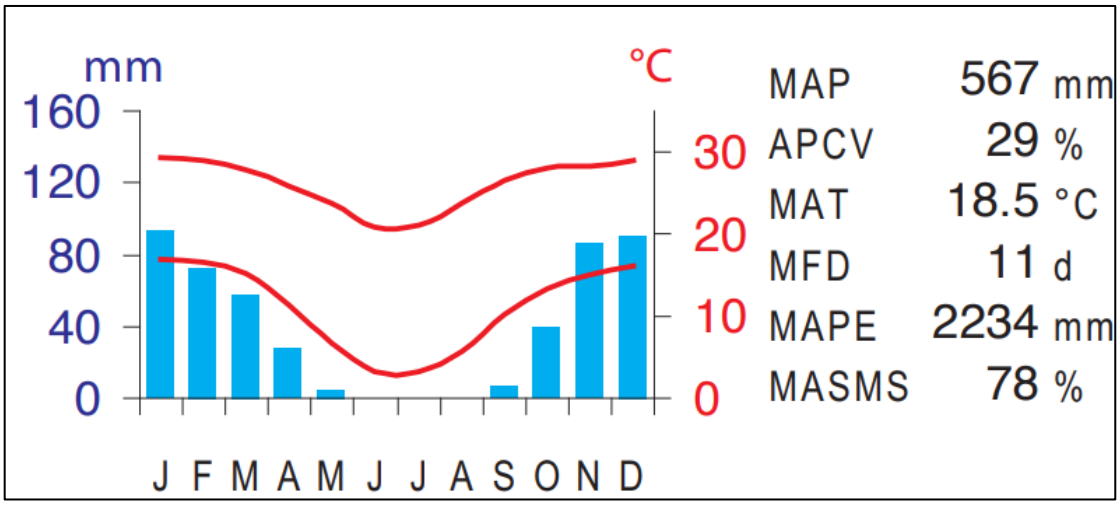



**Figure 5.7:** Summarised climate for the region (Mucina & Rutherford, 2006)

### 5.3.2 Geology

According to the Heritage and Palaeontological Impact Assessment (Appendix E6), the site is underlain by Precambrian dolomites and associated marine sedimentary rocks that are allocated to the Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). The Malmani Subgroup in this area is undifferentiated. The geology in the area is characterised with deep, acid, tertiary sands, commonly grey regic sands, sometimes pale yellow to reddish brown.

### 5.3.3 Soils and Agricultural Potential

According to the Soil and Agricultural Assessment (attached in Appendix E5), the project area is characterised by the Ab 4, Ba 36 and Fa 17 land types. The Ab 4 and Fa 17 land types are characterised with Hutton and Glenrosa soil forms according to the Soil classification working group, (1991), with other associated soil forms and rocky areas also occurring in the terrains. The Ba 36 land types are commonly dominated with Glencoe, Glenrosa and Mispah soil forms within the terrain landscapes also associated to other soils being found in the landscapes. The Ab land types are characterized by red and yellow apedal horizons which are freely drained. These soils have a dystrophic and or mesotrophic base status. The Ba land types are associated to plinthic catena, usually duplex and margalitic soils are rare upslope. These soils mainly have red soils with a dystrophic and or mesotrophic base status. The Fa land types commonly has shallow profiles. Lime is rare or absent in the entire landscape.

Agricultural potential is determined by a combination of soil, terrain and climate features. Land capability classes reflect the most intensive long-term use of land under rain-fed conditions.

The land capability is determined by the physical features of the landscape including the soils present. The land potential or agricultural potential is determined by combining the land capability results and the climate capability for the region. The climatic capability has been determined by means of the Smith (2006) methodology, of which the first step includes determining the climate capability of the region by means of the Mean Annual Precipitation (MAP) and annual Class A pan (potential evaporation). According to Smith (2006), the climatic capability of a region is only refined past the first step if the climatic capability is determined to be between climatic capability 1 and 6. The climate capability for the project site has been determined to be "C8" which indicates that the site is very severely restricted to choice of crops due to high levels of heat and moisture stress. Suitable crops can be planted with a high risk of yield loss.

The land capability was determined by using the guidelines described in "The farming handbook" (Smith, 2006). The delineated soil forms were clipped into the four different slope classes (0-3%, 3-7%, 7-12% and >12%) to determine the land capability of each soil form. Accordingly, the most sensitive soil forms associated with the project area are restricted to land capability 2 and 4 classes. From the two land capability classes, the land potential levels have been determined by means of the Guy and Smith (1998) methodology. Land capability II and IV have been reduced to a land potential level L5 and L6 due to climatic limitations.

**Table 5.1:** Land Capability of the soils for the Angus SPP

| Land Capability Class | Definition of Class | Conservation Need | Use-Suitability | Land Capability Group | Sensitivity |
|---|---|---|---|---|---|
| **2** | Moderate limitations. Some erosion hazard | Special conservation practice and tillage methods | Rotation crops and ley (50%) | Arable | High |
| **4** | Severe limitations. Low arable potential. | Intensive conservation practice | Long term leys (75%) | Arable | Moderate |

The following land potential level have been determined;

- Land potential level 5 (this land potential level is characterised by restricted potential. Regular and/or moderate to severe limitations due to soil, slope, temperatures or rainfall).

Fifteen land capabilities have been digitised by (DALRRD, 2017) across South Africa, of which ten potential land capability classes are located within the proposed footprint area's assessment area, including;

- Land Capability 6 to 8 (Low to Moderate Sensitivity); and
- Land Capability 9 to 10 (Low to Moderate Sensitivity).

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area. The proposed project area falls within the "Low - Moderate" to "Moderate High" sensitivities (Figure 5.8). The baseline soil findings and the DFFE (2023) agricultural theme concur for most areas with "Low Moderate" to "Moderate High" sensitivities. Crop field areas with a high agricultural land capability were identified within the project development footprint. The dominant soil forms within the project area are Hutton and Mispah soil forms. The dominant Hutton soil form is associated with "Moderate to Moderate High" land capability sensitivity. The land capability sensitivity for other soil form found within the project area includes the Avalon is classified as "Moderate to Moderate High". However, the other areas with the dominant Mispah soil form are characterised with "Low to Moderate" land capability sensitivity, indicating a very low agricultural potential in those areas. Following the verified baseline finding the area can be categorised with "Moderately high" sensitivities. The climatic conditions of the project area will also have an impact on the land capability and land potential of moderately high sensitivity areas. Areas with active cultivated fields or high potential lands can be treated as no-go areas. The stakeholders can also obtain consent for use of those areas or engage with the landowners for appropriate compensation for use of these areas for the for the project.

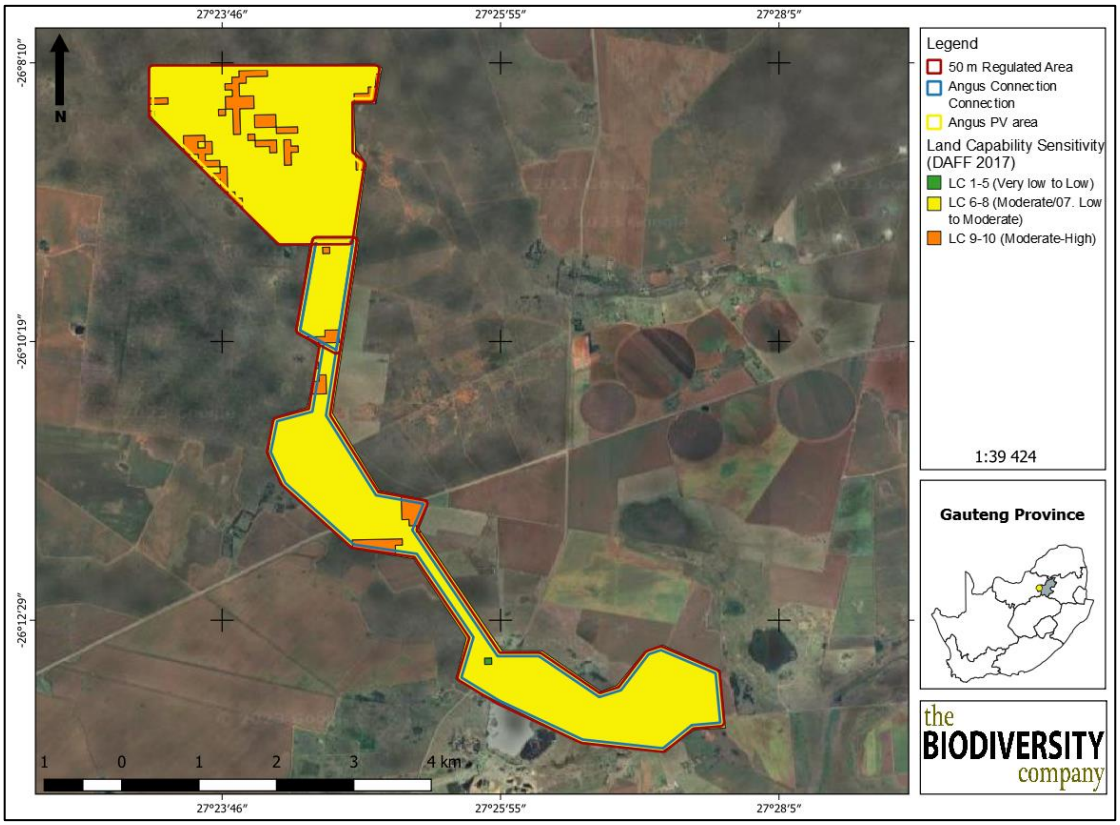



**Figure 5.8**: Land capability of the proposed Angus SPP

The baseline soil findings and the DFFE (2023) agricultural theme concur with each other on most areas. The Hutton and Avalon soil forms are categorised with "Moderate to Moderate High" land capability sensitivity. Other soil forms found within the project area, including Mispah, are categorised with a "Low – Moderate" land capability sensitivity. Therefore, following the verified baseline findings, the proposed project area can be categorised with "Medium" land potential. In addition, factors such as topography and the harsh climatic conditions will also reduce the area's agricultural potential.

### 5.3.4 Terrestrial Biodiversity

The Terrestrial Ecology Assessment (attached in Appendix E1) collected and analysed the spatial data as provided by various sources such as the national and provincial environmental authorities and SANBI).

#### 5.3.4.1 Ecologically Important Landscapes

Table 5.2 presents a summative breakdown of the ecological boundaries considered and the associated relevance that each has to the region or Project Area of Influence (PAOI). Where a feature is regarded as relevant it is considered an ecologically important landscape feature and discussed further as part of the sub-sections that follow.

**Table 5.2:** Summary of the spatial relevance of the PAOI to local ecologically important landscape features

| Desktop Information Considered | Relevant? | Reasoning |
|---|---|---|
| Provincial Conservation Plan | Yes | The PAOI intercepts with terrestrial CBA and ESA areas |
| Gauteng Ridges | Yes | A single class 2 ridge overlaps with the PAOI |
| NBA 2018: Ecosystem Threat Status | Yes | The PAOI overlaps mostly with a 'Least Concern' ecosystem, and partially with a 'Vulnerable' ecosystem |
| NBA 2018: Ecosystem Protection Level | Yes | The PAOI overlaps mostly with a 'Poorly Protected' ecosystem, and partially with a 'Not Protected' ecosystem |
| National Protected Areas Expansion Strategy (NPAES) | Yes | Several priority areas for protected area expansion overlap with the PAOI |
| South African Inventory of Inland Aquatic Ecosystems (SAIIAE) | Yes | The PAOI intercepts multiple 'Critically Endangered' and 'Least Concern' wetlands |
| National Freshwater Ecosystem Priority Areas | Yes | The NFEPA database lists several FEPA wetlands that intercept the PAOI |
| Protected and Conservation Areas (SAPAD & SACAD) | No | According to the latest datasets no SAPAD or SACAD areas occur nearby to the PAOI |
| Strategic Water Source Areas | No | No Strategic Water Source Areas occur nearby, according to the 2021 dataset |
| Important Bird and Biodiversity Areas (IBA) | No | The closest IBA is the Magaliesberg, over 10 km north of the PAOI |

***Critical Biodiversity Areas (CBAs)***

According to the Gauteng CBA and ESA map dataset, parts of the PAOI overlap with both CBA and ESA areas (Figure 5.9). The relevant CBA areas are classified by the dataset as 'Important CBA areas', and according to GDARD (2014) these are 'best design' areas where alternative options exist, but where the identified network meets the biodiversity pattern targets in a spatially efficient and ecologically robust way that avoids conflict with other land uses where possible. All CBAs need to be maintained in a natural or near-natural state to ensure the continued existence and healthy functioning of important species and ecosystems (SANBI, 2017).

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017).

Ecological Support Areas (ESAs) are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017). Other Natural Areas (ONAs) consist of all those areas in a good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

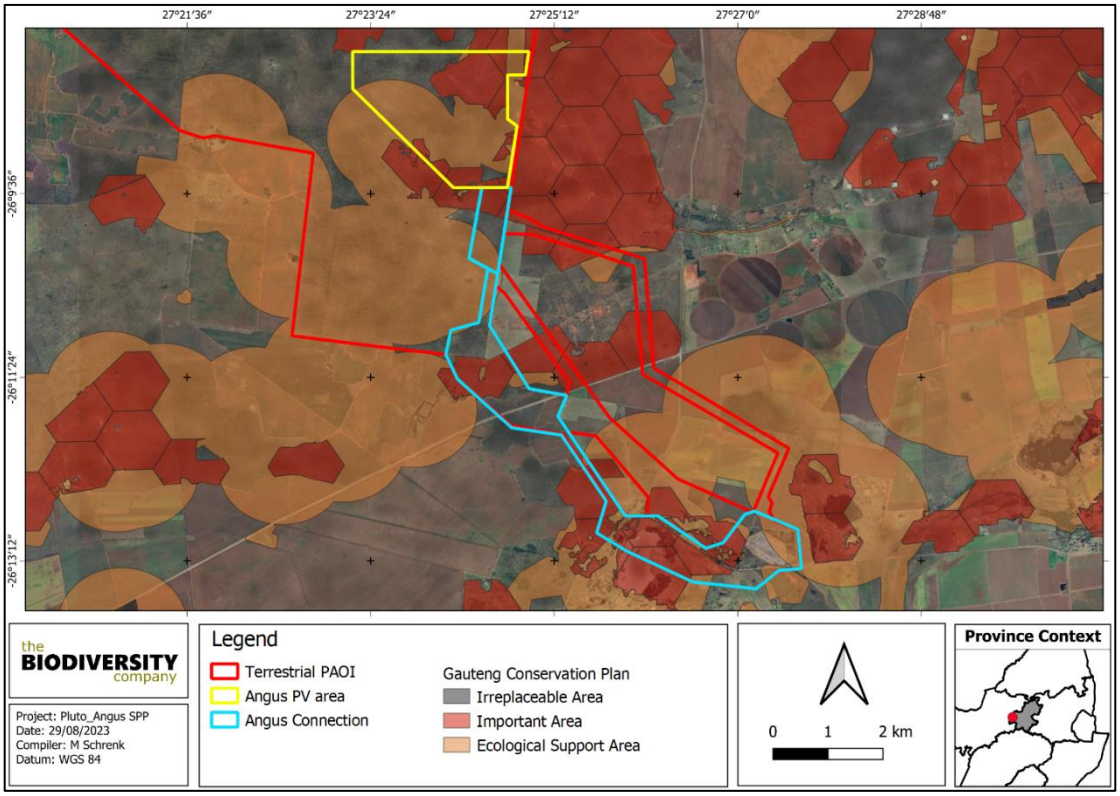



**Figure 5.9:** Map illustrating the Gauteng Terrestrial CBA and ESA map dataset relevance.

***National Biodiversity Assessment***

According to the 2018 NBA spatial dataset the PAOI overlaps with 'Least Concern' and 'Vulnerable' ecosystems (Figure 5.10). A 'Least Concern' ecosystem type is one that has experienced little or no loss of natural habitat or deterioration in condition, and 'Poorly Protected' ecosystems are those which only have between five per cent and 50% of their biodiversity target included in one or more protected areas (SANBI, 2019). A 'Vulnerable' ecosystem type is one which is considered to be at a high risk of collapse, and 'Not Protected' ecosystems have less than 5% of their biodiversity target included in one or more protected areas. (SANBI, 2019).

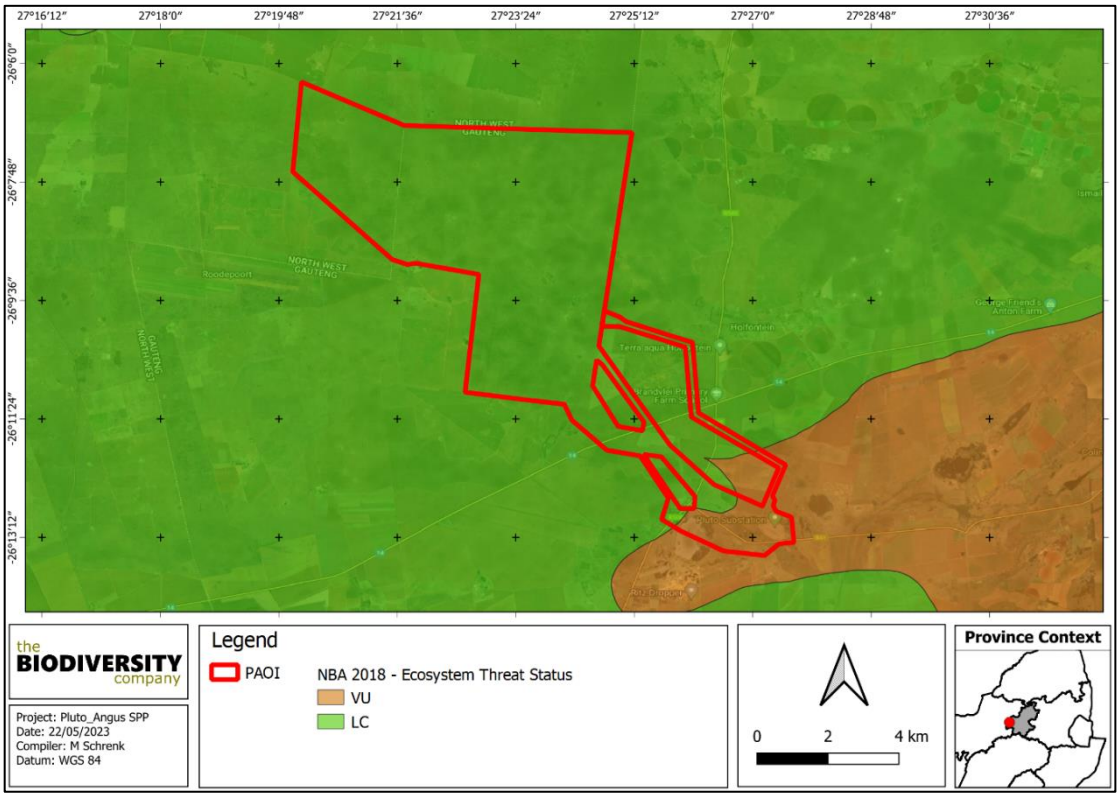



**Figure 5.10:** Map illustrating the Ecosystem Threat Status associated with the PAOI.

***National Protected Areas Expansion Strategy (NPAES)***

Portions of the PAOI overlap with NPAES priority areas for protected area expansion, as illustrated in Figure 5 11.

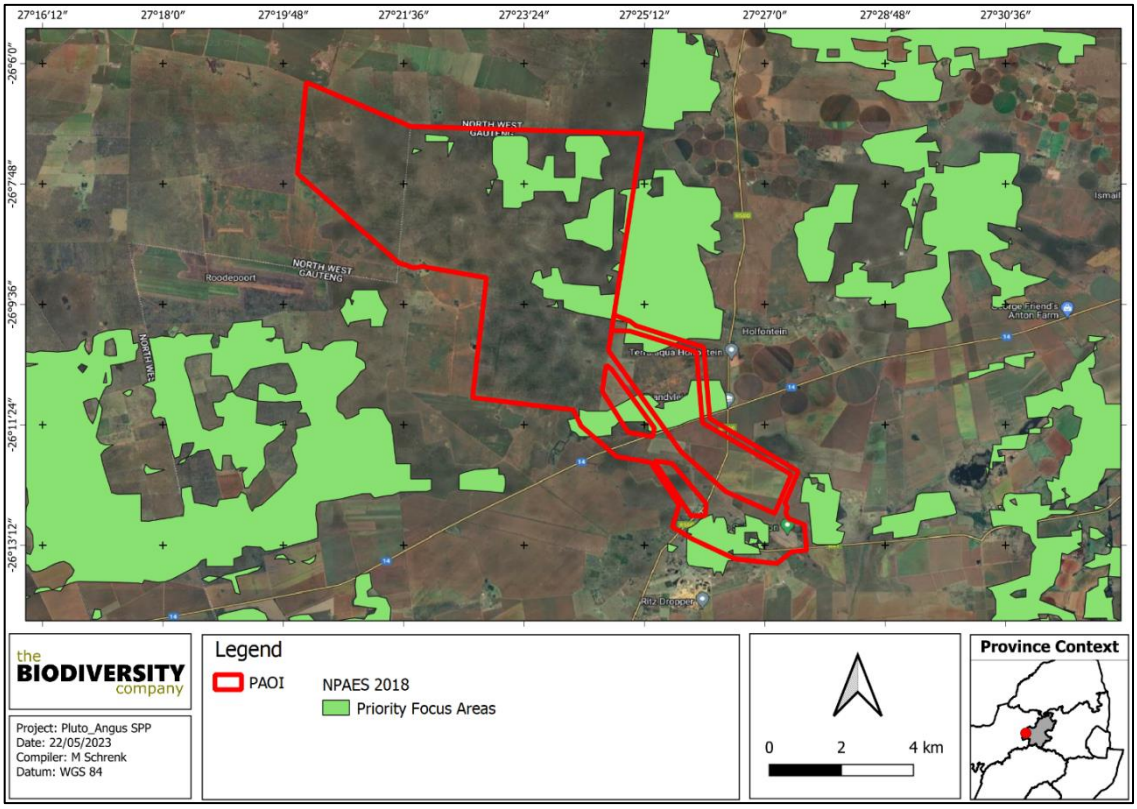



**Figure 5.11:** Map illustrating the PAOI location in relation to the NPAES dataset.

These areas are typically important for regional conservation due to their status as important habitat or biodiversity areas and their proximity to formally protected areas or CBA's. Priority focus areas are often large portions of undeveloped natural land occurring within important ecosystem types.

***Flora Assessment***

The Terrestrial Biodiversity Assessment (Appendix E1) indicates that the PAOI is situated within the Grassland Biome. The Grassland Biome in South Africa occurs mainly on the Highveld, the inland areas of the eastern seaboard, the mountainous areas of KwaZulu-Natal and the central parts of the Eastern Cape. The topography is mainly flat to rolling, but also includes mountainous regions and the Escarpment. The PAOI is situated within both the Carletonville Dolomite Grassland and the Soweto Highveld Grassland (Figure 5.12).

Carletonville Dolomite Grassland is restricted to the North-West (mainly) and Gauteng, and marginally extends into the Free State Province: In the region of Potchefstroom, Ventersdorp and Carletonville, extending westwards to the vicinity of Ottoshoop, but also occurring as far east as Centurion and Bapsfontein in Gauteng Province. Its main vegetation and landscape features include slightly undulating plains dissected by prominent rocky chert ridges. These are a species-rich grasslands, forming a complex mosaic pattern dominated by many species.

The Carletonville Dolomite Grassland is classified as Vulnerable. Although the target for conservation is 24%, only a small extent is conserved statutorily in the Sterkfontein Caves, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, and Groenkloof protected areas, and in at least six private conservation areas. Almost a quarter is already transformed for cultivation, by urban sprawl or by mining activity as well as the building of the Boskop and Klerkskraal Dams.

The Soweto Highveld Grassland vegetation type is found in Mpumalanga, Gauteng and to a little extent also in neighbouring Free State and North-West Provinces. This vegetation type typically comprises of an undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra* and accompanied by a variety of other grasses such as *Elionurus muticus, Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix.* Scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops interrupt the continuous grassland cover.

The Soweto Highveld Grassland vegetation type is classified as Endangered. The national target for conservation protection is 24%, but only a few patches are statutorily conserved in Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand, Rolfe's Pan Nature Reserves or privately conserved in Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon Nature Reserves and the Heidelberg Natural Heritage Site.

By 2006 nearly half of the area of occupancy of this vegetation type had already been transformed by cultivation, urban sprawl, mining and building of road infrastructure. The amount of area transformed has most likely increased substantially. Some Soweto Grassland areas have been flooded by dams including Grootdraai, Leeukuil, Trichardtsfontein, Vaal and Willem Brummer

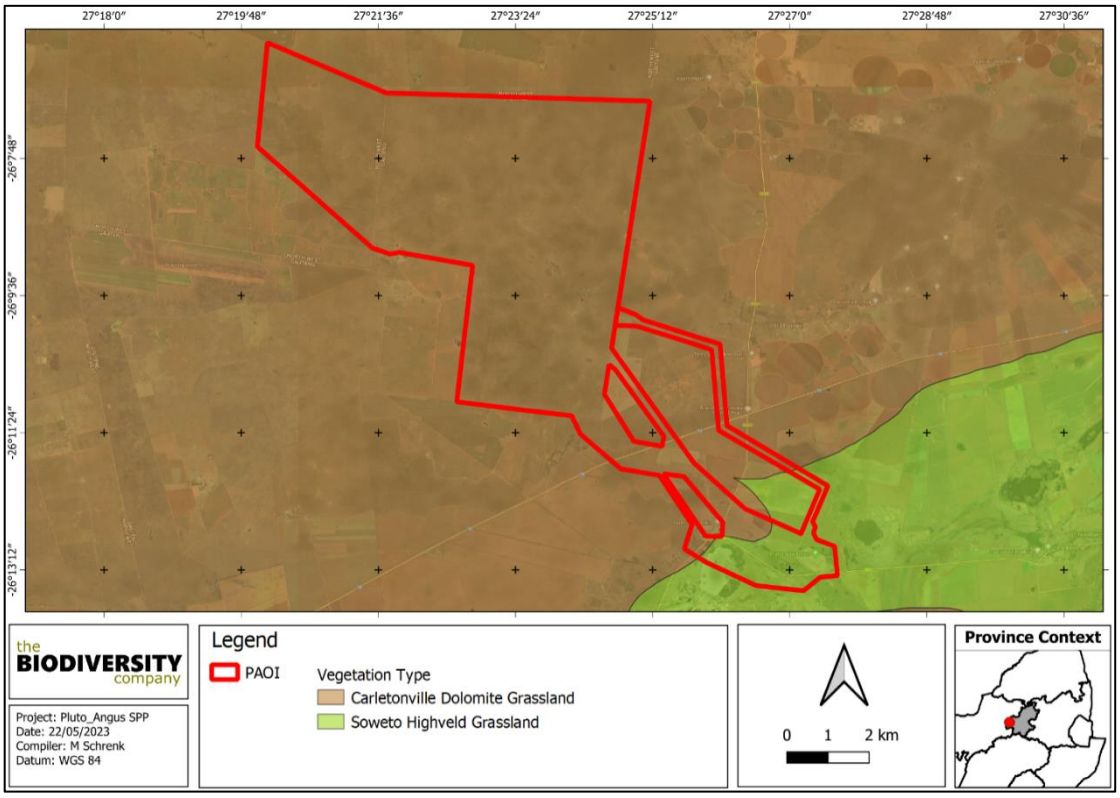



**Figure 5.12:** Map illustrating the vegetation types associated with the area.

***Expected Flora Species***

The POSA database indicates that over 700 species of plants could be expected to occur within and around the PAOI. Seven (7) of the expected species are classified as SCC, based on their conservation statuses (Table 5.3). The screening tool report indicates that four (4) sensitive plant species may occur, triggering a medium plant species theme sensitivity for the area.

**Table 5.3:** SCC flora species that may occur within the Project Area of Influence.

| Family | Species | SANBI Red-List Status | Ecology |
|---|---|---|---|
| **Crassulaceae** | *Adromischus umbraticola subsp. umbraticola* | NT | Indigenous; Endemic |
| **Aizoaceae** | *Delosperma leendertziae* | NT | Indigenous; Endemic |
| **Orchidaceae** | *Habenaria mossii* | EN | Indigenous; Endemic |
| **Aizoaceae** | *Khadia beswickii* | VU | Indigenous; Endemic |
| **Fabaceae** | *Lessertia phillipsiana* | DD | Indigenous; Endemic |
| **Fabaceae** | *Melolobium subspicatum* | VU | Indigenous; Endemic |
| **Fabaceae** | *Pearsonia bracteata* | NT | Indigenous; Endemic |

***Fauna Assessment***

The Terrestrial Biodiversity Assessment Report (Appendix E1) indicated that the IUCN Red List spatial database, in addition to the MammalMap database, lists over 130 mammal species that could be expected to occur within and around the PAOI. Thirteen (13) of these expected species are regarded as SCC (Table 5.4), and of these SCC ten (10) have a moderate-high likelihood of occurrence based on the presence of suitable habitat and food sources in the area. Mammals that are typically limited to formally protected areas are not included in the SCC count, and bat species are also excluded. The screening tool report listed four (4) sensitive animal species that may occur, triggering a medium and high sensitivity rating.

**Table 5.4:** SCC mammal species that may occur within the Project Area of Influence.

| Species | Common Name | Conservation Status | | Likelihood of Occurrence |
|---|---|---|---|---|
| | | SANBI (2022) | IUCN (2021) | |
| ***Aonyx capensis*** | Cape Clawless Otter | NT | NT | Moderate |
| ***Atelerix frontalis*** | South Africa Hedgehog | NT | LC | High |
| ***Crocidura maquassiensis*** | Makwassie musk shrew | VU | LC | Moderate |
| ***Crocidura mariquensis*** | Swamp Musk Shrew | NT | LC | Moderate |
| ***Felis nigripes*** | Black-footed Cat | VU | VU | Low |
| ***Hydrictis maculicollis*** | Spotted-necked Otter | VU | NT | Moderate |
| ***Leptailurus serval*** | Serval | NT | LC | Low |
| ***Mystromys albicaudatus*** | White-tailed Rat | VU | EN | Moderate |
| ***Otomys auratus*** | Vlei Rat (Grassland type) | NT | NT | Moderate |
| ***Panthera pardus*** | Leopard | VU | VU | Moderate |
| ***Parahyaena brunnea*** | Brown Hyaena | NT | NT | Moderate |
| ***Poecilogale albinucha*** | African Striped Weasel | NT | LC | Moderate |
| ***Redunca fulvorufula*** | Mountain Reedbuck | EN | EN | Low |

### 5.3.4.2 Field Survey

During the field survey undertaken in April 2023, the Terrestrial Biodiversity Assessment (Appendix E1), identified a variety of graminoid species, with a number of other herb and low shrub species found scattered across the landscape. Some of the most prolific species noted were *Aristida congesta, Hyparrhenia hirta, Pogonarthria squarrosa and Eragrostis spp. Grasses, and Asparagus laricinus, Seriphium plumosum, Nidorella resedifolia, and Helichrysum spp*. were also noted as prominent. Overall, forty-three (43) species of indigenous plants were noted as being common/important in the landscape. A number of exotic species were found to be invading certain portions of land.

***Flora Survey***

No SCC flora were recorded; however, one (1) provincially protected plant species was observed, *the Hyacinthaceae - Eucomis autumnalis*. The plant is protected as per Schedule 11 of the Transvaal Nature Conservation Ordinance No. 12 of 1983. Note: it is recommended that a plant search and rescue plan be developed and implemented prior to the commencement of site clearing – and this must include an application for the appropriate permit.

**Figure 5.13:** Photograph of the provincially protected *Eucomis autumnalis*.

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004, (NEM:BA) is the national legislation that incorporates the mandatory regulation of Invasive Alien Plant (IAP) species, and in September 2020 the most current lists of IAP Species were published in terms of NEM:BA (in Government Gazette No. 43726 of 114 September 2020). The Alien and Invasive Species Regulations serve to define and regulate the various categories of Alien and Invasive Species and were recently updated and published in terms of NEM:BA in the Government Gazette No. 43735 of 25 September 2020. The 2020 Alien and Invasive Species Regulations and Lists were recently extended as published in the Government Gazette No. 44182, 24th of February 2021.

The legislation calls for the removal and/or control of IAP species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEM:BA:

- **Category 1a:** Invasive species requiring compulsory eradication. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- **Category 1b:** Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- **Category 2:** Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones. Species existing outside of a regulated area shall be classified as category 1b.
- **Category 3:** Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities: import, possess, grow, breed, move, sell, buy or accept as a gift - involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones as these will be classified as category 1b species.

Note that according to the regulations, any person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing;
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the NEM:BA;
    - The relevant local invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

Eleven (11) IAP and other exotic species were recorded during the field survey, six (6) of which are Category 1b species which must be controlled through the implementation of an IAP Management Programme. The priority species for control are noted in red below, due to their level of potential invasiveness and current footprint across the PAOI.

The list of recorded exotic and IAP species is presented in Table 5.5 below.

**Table 5.5:** Invasive and exotic flora species recorded in the Project Area of Influence

| Family | Species | Ecology | Note |
|---|---|---|---|
| **Amaranthaceae** | *Achyranthes aspera* | Naturalised exotic | |
| **Asteraceae** | *Bidens pilosa* | Naturalised exotic | |
| **Asteraceae** | *Cirsium vulgare* | Naturalised exotic | Invasive, 1b |
| **Asteraceae** | *Cosmos bipinnatus* | Naturalised exotic | |
| **Asteraceae** | *Erigeron bonariensis* | Naturalised exotic | Invasive, not listed |
| **Myrtaceae** | *Eucalyptus camaldulensis* | Naturalised exotic | Invasive, 1b |

| | | | |
|---|---|---|---|
| **Asteraceae** | ***Eupatorium macrocephalum*** | **Naturalised exotic** | **Invasive, 1b** |
| **Phytolaccaceae** | ***Phytolacca octandra*** | **Naturalised exotic** | **Invasive, 1b** |
| **Solanaceae** | *Solanum sisymbriifolium* | Naturalised exotic | Invasive, 1b |
| **Asteraceae** | *Tagetes minuta* | Naturalised exotic | Invasive, not listed |
| **Verbenaceae** | ***Verbena bonariensis*** | **Naturalised exotic** | **Invasive, 1b** |

***Fauna Field Survey***

Fauna activity during the survey was low, however numerous species were noted as being historically present in the area - after consultation with local residents. Two (2) mammal species were recorded during the survey - *Canis mesomelas* (Black-backed Jackal) and *Hystrix africaeaustralis* (Cape Porcupine) (Figure 5.14), and a further thirteen (13) were noted by residents as being previously observed (Table 5.6).

**Figure 5.14:** Fauna species recorded during the survey – Left: Hystrix africaeaustralis (Cape Porcupine) and Right: Canis mesomelas (Black-backed Jackal).

Seven (7) herpetofauna species were also noted by residents as being historically present in the area (Table 5.7).

No fauna SCC were recorded during the survey, however three (3) have been reportedly observed in the area – listed in green below. It is noted that although *Panthera pardus* (Leopard) and *Parahyaena brunnea* (Brown Hyena) are listed here, the local habitat is not considered suitable to sustain these predators for long periods of time and as such they are not expected to occur frequently in the PAOI.

Many of the species listed below are provincially protected according to Schedules 2, 4 and 5 of the Transvaal Nature Conservation Ordinance No. 12 of 1983, and as such they may not be harmed without the appropriate permit being in place. Four (4) of the listed species are also nationally protected according to the 2007 Threatened or Protected Species (TOPS) List, published in terms of the National Environmental Management: Biodiversity Act, 2004 (Act 10

of 2004). These TOPS species may not be harmed in any way without the appropriate national TOPS permit in place.

**Table 5.6:** The mammal species recorded during the field survey, including species historically observed in the area.

| Species | Common Name | Conservation Status | | Protection |
|---|---|---|---|---|
| | | SANBI (2022) | IUCN (2021) | |
| ***Canis mesomelas*** | Black-backed Jackal | LC | LC | |
| ***Cryptomys sp.*** | Mole-rat | LC | LC | |
| ***Cynictis penicillata*** | Yellow Mongoose | LC | LC | |
| ***Geosciurus inauris*** | Cape Ground Squirrel | LC | LC | |
| ***Herpestes sanguineus*** | Slender Mongoose | LC | LC | |
| ***Hystrix africaeaustralis*** | Cape Porcupine | LC | LC | |
| ***Ichneumia albicauda*** | White-tailed Mongoose | LC | LC | |
| ***Lepus saxatilis*** | Scrub Hare | LC | LC | |
| ***Mellivora capensis*** | Honey Badger | LC | LC | TOPS Protection |
| ***Orycteropus afer*** | Aardvark | LC | LC | Provincial Protection |
| ***Panthera pardus*** | **Leopard** | **VU** | **VU** | Provincial and TOPS Protection |
| ***Parahyaena brunnea*** | **Brown Hyena** | **NT** | **NT** | Provincial and TOPS Protection |
| ***Phacochoerus africanus*** | Wharthog | LC | LC | |
| ***Potamochoerus larvatus*** | Bushpig | LC | LC | |
| ***Proteles cristatus*** | Aardwolf | LC | LC | Provincial Protection |

**Table 5.7:** The herpetofauna species recorded during the field survey, including species historically observed in the area.

| Species | Common Name | Conservation Status | | Protection |
|---|---|---|---|---|
| | | SANBI (2022) | IUCN (2021) | |
| ***Bitis arietans*** | Pufaddder | LC | LC | Provincial Protection |
| ***Boaedon capensis*** | Brown House Snake | LC | LC | Provincial Protection |
| ***Causus rhombeatus*** | Common Night Adder | LC | LC | Provincial Protection |
| ***Crotaphopeltis hotamboeia*** | Red Lipped Herald | LC | LC | Provincial Protection |
| ***Dasypeltis scabra*** | Common Egg-eater | LC | LC | Provincial Protection |
| ***Psammophylax rhombeatus*** | Rhombic Skaapsteker | LC | LC | Provincial Protection |

| | | | | |
|---|---|---|---|---|
| *Pyxicephalus adspersus* | Giant Bullfrog | NT | LC | Provincial and TOPS Protection |

***Habitat Assessment***

The main habitat types identified across the Project Area of Influence were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Four (4) habitats were delineated in total, and these are mapped over the entire PAOI (with a particular focus on the proposed Angus PV and Grid footprints) in **Error! Reference source not found.** below.

**Figure 5.15:** Map illustrating the habitats identified in the Project Area of Influence.

Three of the terrestrial habitat unit and SEI delineations cover the entire PAOI, but it is important to note that the watercourse delineations (as provided by the freshwater/wetland specialist) are only relevant to the PV footprint areas and the Grid footprint areas, with the associated 500 m buffer on each. This means that there are likely to be additional watercourses within the overall PAOI which are not mapped, as they did not fall within the 500 m buffer area of either the PV or Grid footprints**.**

Emphasis was placed on limiting timed meander searches to within the most functional habitats, and therefore habitats with a higher potential of hosting SCC. A summary of the habitat types delineated within the Project Area of Influence can be seen in Table 5.8.

**Table 5.8:** Summary of habitat types delineated within the Project Area of Influence.

| Habitat Type | Description | Dominant Flora | Habitat Sensitivity |
|---|---|---|---|
| **Rocky Outcrops** | Expansive to isolated sections of rocky outcrops that serve as important micro-habitat for unique flora and fauna. Many outcrop areas overlap with provincial CBAs. | Same species found in the Dolomite Grassland habitat, as well as some habitat specialists such as *Pellaea calomelanos, Psammotropha myriantha,* and *Cheilanthes hirta var. hirta.* | High |
| **Water Resources** | Permanently to seasonally wet portions of land as delineated by the wetland specialist. Important foraging resource for local fauna. | Diversity of common sedge species such as *Cyperus* and *Schoenoplectus* spp. Some graminoids. | High |
| **Degraded Dolomite Grassland** | Gently undulating open grassland habitat with some functionality and a good diversity and density of flora species. Impacted by overgrazing and some invasions. Some vast portions of this habitat overlap with provincial CBA and ESA areas. | *Hyparrhenia hirta, Aristida congesta, Pogonarthria squarrosa* and *Eragrostis spp.* grasses with some dominant populations of several indigenous shrublets and herbs such as *Seriphium plumosum*, *Helichrysum kraussii* and *Felicia muricata*. | Medium |
| **Developed** | Portions of land with very little to no indigenous vegetation remaining, such as roads and cultivated land. | Exotic weeds and invasives such as *Bidens pilosa* and *Tagetes minuta*. | Low |

#### 5.3.4.3 Site ecological importance (SEI)

The four delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 5.9 below.

**Table 5.9:** Sensitivity summary of the habitat types delineated within the Project Area of Influence.

| Habitat | Conservation Importance | Functional Integrity | Biodiversity Importance | Receptor Resilience | Site Ecological Importance |
|---|---|---|---|---|---|
| **Rocky Outcrops** | High | Medium | Medium | Low | High |
| **Water Resources** | High | Medium | Medium | Low | High |
| **Degraded Dolomite Grassland** | Medium | Medium | Medium | Medium | Medium |
| **Developed** | Medium | Medium | Medium | High | Low |

In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the PAOI are mapped in Figure 5.16 below. It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

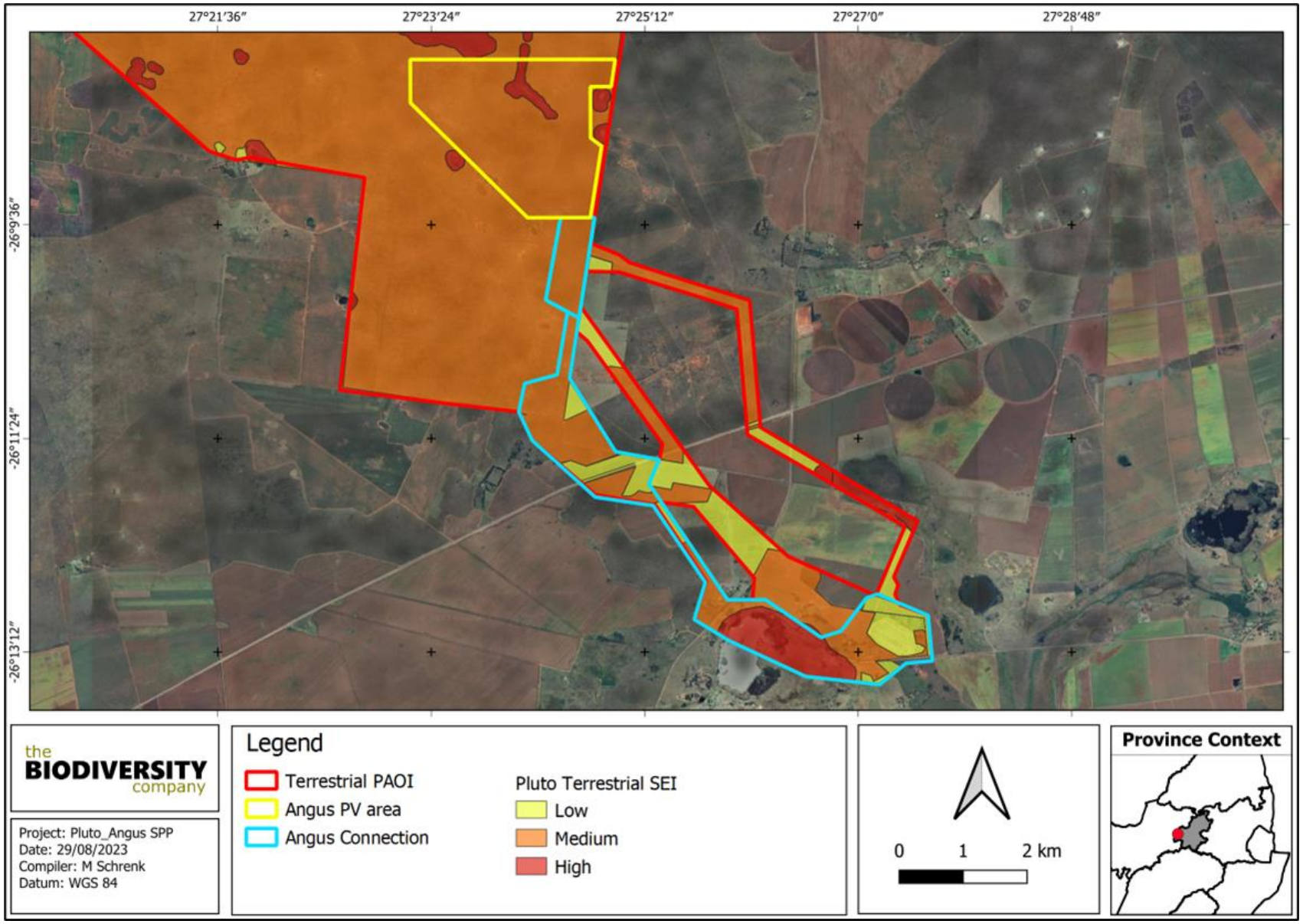



**Figure 5.16:** Map illustrating the sensitivities of the habitats delineated within the overall Project Area of Influence.

### 5.3.5 Aquatic Biodiversity

According to the Wetland Baseline and Risk Assessment (Appendix E2), the proposed area overlaps within the Grassland Biome (Mucina & Rutherford, 2006). Biomes are further divided into bioregions, which are spatial terrestrial units possessing similar biotic and physical features, and processes at a regional scale. The study site overlaps with the Dry Highveld Grassland Bioregion. The vegetation type associated with the study site is the Carletonville Dolomite Grassland (Gh 15) vegetation type.

The following species are important in the Carletonville Dolomite Grassland vegetation type:

**Graminoids:** *Aristida congesta , Brachiaria serrata, Cynodon dactylon, Digitaria tricholaenoides , Diheteropogon amplectens, Eragrostis chloromelas, E. racemosa, Heteropogon contortus, Loudetia simplex, Schizachyrium sanguineum, Setaria sphacelata, Themeda triandra, Alloteropsis semialata subsp. eckloniana, Andropogon schirensis, Aristida canescens, A. diffusa, Bewsia biflora, Bulbostylis burchellii, Cymbopogon caesius, C. pospischilii, Elionurus muticus, Eragrostis curvula, E. gummiflua, E. plana, Eustachys paspaloides, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Monocymbium ceresiiforme, Panicum coloratum, Pogonarthria squarrosa, Trichoneura grandiglumis, Triraphis andropogonoides, Tristachya leucothrix, T. rehmannii.*

**Herbs:** *Acalypha Angustata, Barleria macrostegia, Chamaecrista mimosoides, Chamaesyce inaequilatera, Crabbea Angustifolia, Dianthus mooiensis, Dicoma anomala, Helichrysum caespititium, H. miconiifolium, H. nudifolium var. nudifolium, Ipomoea ommaneyi, Justicia anagalloides, Kohautia amatymbica, Kyphocarpa Angustifolia, Ophrestia oblongifolia, Pollichia campestris, Senecio coronatus, Vernonia oligoceAngus.*

**Geophytic Herbs**: *Boophone disticha, Habenaria mossii.*

**Low Shrubs**: *Anthospermum rigidum subsp. pumilum, Indigofera comosa, Pygmaeothamnus zeyheri var. rogersii, Searsia magalismontana, Tylosema esculentum, Ziziphus zeyheriana.*

*Geoxylic Suffrutices: Elephantorrhiza elephantina, Parinari capensis subsp. capensis.*

***Conservation Status***

According to Mucina and Rutherford (2006), this vegetation type is classified as Vulnerable (VU). The national target for conservation protection for both these vegetation types is 24%, but only a small extent is conserved in statutory (Sterkfontein Caves — part of the Cradle of Humankind World Heritage Site, Oog Van Malmanie, Abe Bailey, Boskop Dam, Schoonspruit, Krugersdorp, Olifantsvlei, Groenkloof) and in at least six private conservation areas. Almost a quarter already transformed for cultivation, by urban sprawl or by mining activity as well as the building of the Boskop and Klerkskraal Dam

#### 5.3.5.1 South African Inventory of Inland Aquatic Ecosystems

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA) 2018. National Wetland Map 5 (NWM5) includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic

Ecosystems (SAIIAE) 2018. According to the NBA 2018 and NWM5, three wetland types are expected to overlap with the 500m regulatory area (PAOI). These are Depressions, Seeps and an Unchanneled Valley Bottom wetland (see Figure 5.17).

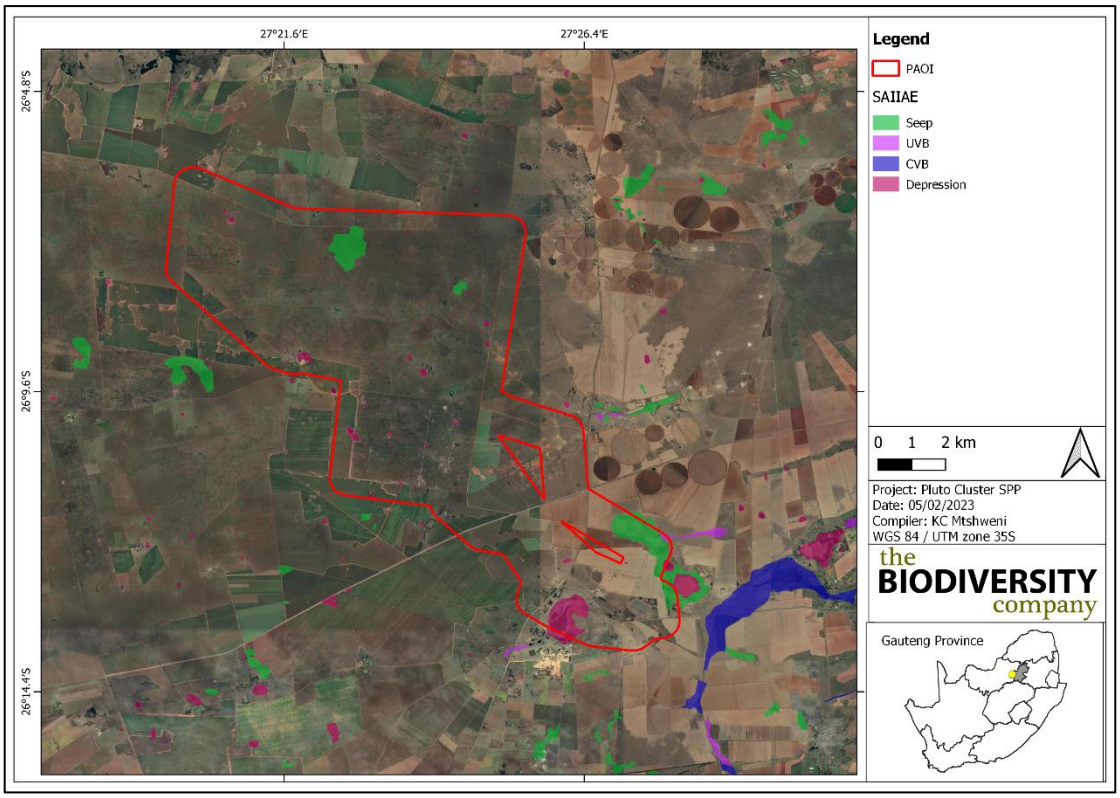



**Figure 5.17:** SAIIAE wetlands located within 500 m regulated area (PAOI)

#### 5.3.5.2 National Freshwater Ecosystem Priority Areas (NFEPA)

The National Freshwater Ecosystem Priority Areas (NFEPA) database forms part of a comprehensive approach for the sustainable and equitable development of South Africa's scarce water resources. This database provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the NWA. This directly applies to the NWA, which feeds into Catchment Management Strategies, water resource classification, reserve determination, and the setting and monitoring of resource quality objectives (Nel *et al*. 2011). The NFEPAs are intended to be conservation support tools and envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's biodiversity goals (Act No.10 of 2004) (NEM:BA), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act (Nel *et al.,* 2011).

According to Nel *et al.* (2011), four wetland types are expected to overlap with the 500m regulatory area (PAOI). These are Depressions, Channelled Valley Bottoms, a Seep and a Flat (see Figure 5.18).

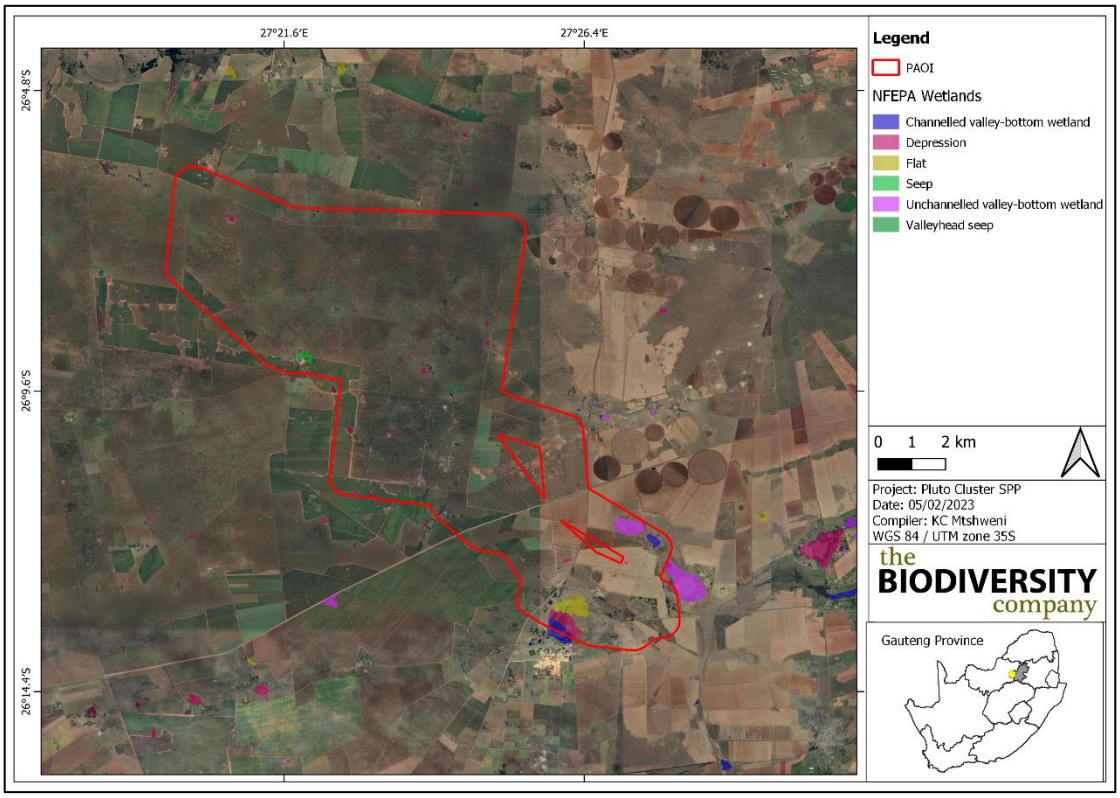



**Figure 5.18:** NFEPA wetlands located within 500 m regulated area (PAOI).

#### 5.3.5.3 Wetland Delineation and Description

The wetland areas were delineated in accordance with the DWAF (2005) guidelines. Eight (8) HGM unit was identified within the 500 m regulated area (PAOI), namely, seven (7) Depression (HGM 1 – HGM 7) wetlands, and a Seep wetland (HGM 8) (refer to Figure 5.19). These systems differ from one another regarding ecological importance and sensitivity, modification, ecological state, impacts and the general setting.

HGM 1 was located within cultivated fields, next to a farm house. The wetland was observed to be inundated at the time of assessment and dominated by alien wetland plants and naturalized exotic weeds such as *Phragmites australis, Typha capensis, Verbena bonariensis Targeted minuta Eucalyptus camaldulensis* and *Bidens Pilosa* amongst others wetland plants (*Cyperus spp*).

HGM 2 was observed to be located within short shrubland vegetation dominated by *Tarchonanthus camphoratus* and tall graminoid species. The depression was observed to be partly inundated, particularly at the impacted areas (berm and cattle trampling). It was observed to be dominated by *Nidorrella resedifolia, Tagetes minuta, Schoenoplectus sp, Cyperus spp* and terrestrial graminoid species.

HGM 3 and HGM 4 were observed to be similar in plant composition (Rushes), impacts (Cattle trampling) and topographical setting. Due to the relatively flat topographical setting of the depressions, these systems are mainly fed by surface input (rain and runoff) and surface-subsurface water exchange. Evidence of historic mining was observed around these wetland systems. Both wetlands were saturated and dominated by tall graminoids and rushes of the *Juncus* genus.

HGM 5 was observed to be the most impacted site based on alien plant species composition, water odour, water colour and substrate disturbance. These observations may be a result of the depressions locations within a cultivated field and the stockpiles which were dumped inside the depression. Runoff from the fields and stockpiles was observed to accumulated within this depression.

HGM 6 was observed to be a large pan presenting high ecological importance based on the high faunal and floral diversity observed on site. This depression was dominated by a variety of hydrophytes and water loving plants. This depression was observed to be laterally fed by springs, UVBs and a large seep (HGM8) which was observed to be connected to the pan. The pan was however located downstream of mining activities, extensive cultivation, and was observed to be impacted by cattle moving through the system.

HGM 7 was observed to be located within extensive cultivation activities and historic mining areas. The system was observed to be saturated during the site visit, with inundation being observed at old mining pits located within the wetland system. The edges of this system were observed to be dominated by alien invasive plant species owing to the adjacent agricultural activities. Plants such as *Phragmites australis* and *Tyhpa capensis* were observed around the old mining pits while the rest of the system was dominated by rushes, *Schoenoplectus spp, Cyperus spp* and wetland grasses (*Paspalum sp* and *Echinochloa sp*).

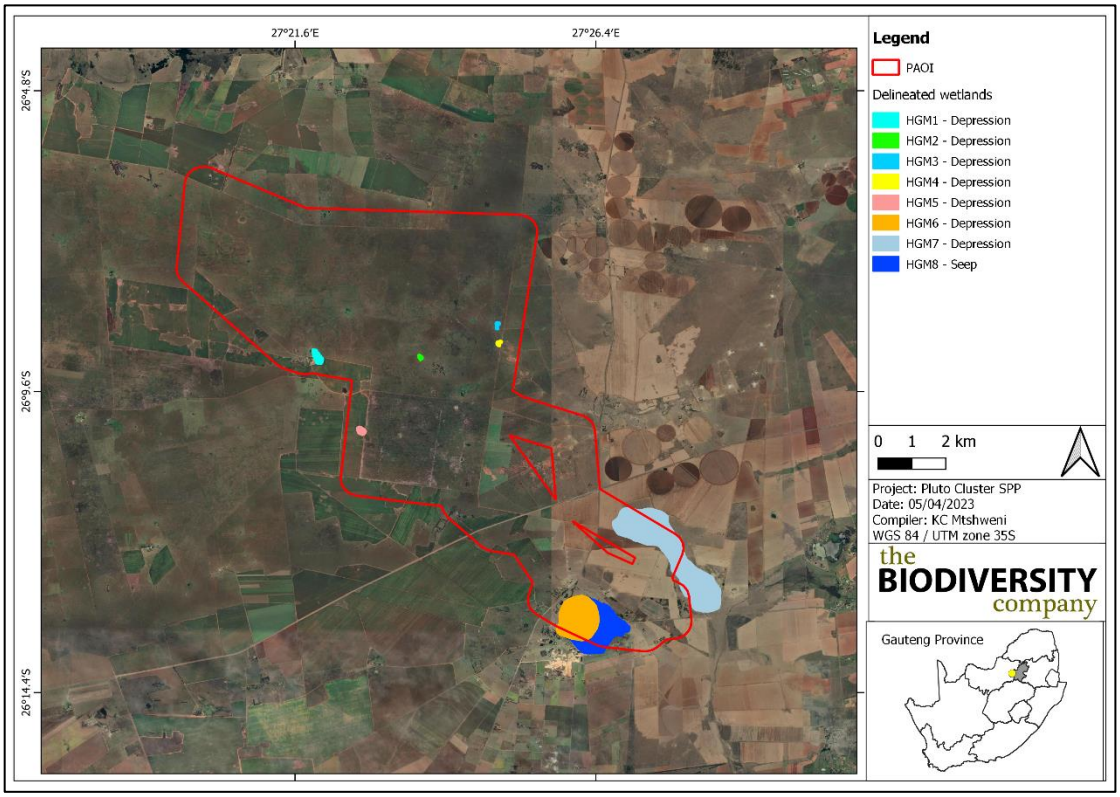



**Figure 5.19:** Delineation of wetlands within project area.

The generally impermeable nature of depressions and their inward draining features are the main reasons why the streamflow regulation ability of these systems is mediocre. Regardless of the nature of depressions in regard to trapping all sediments entering the system, sediment trapping is another Eco Service that is not deemed as one of the essential services provided by depressions, even though some systems might contribute to a lesser extent. The reason for

this phenomenon is due to winds picking up sediments within pans during dry seasons which ultimately leads to the removal of these sediments and the deposition thereof elsewhere. The assimilation of nitrates, toxicants and sulphates are some of the higher rated Eco Services for depressions. This latter statement can be explained the precipitation as well as continues precipitation and dissolving of minerals and other contaminants during dry and wet seasons respectively, (Kotze et al., 2009).

Hillslope seeps are well documented by Kotze et al., (2009) to be associated with sub-surface ground water flows. These systems tend to contribute to flood attenuation given their diffuse nature. This attenuation only occurs while the soil within the wetland is not yet fully saturated. The accumulation of organic material and sediment contributes to prolonged levels of saturation due to this deposition slowing down the sub-surface movement of water. Water typically accumulates in the upper slope (above the seep). The accumulation of organic matter additionally is essential in the denitrification process involved with nitrate assimilation. Seeps generally also improve the quality of water by removing excess nutrient and inorganic pollutants originating from agriculture, industrial or mine activities. The diffuse nature of flows ensures the assimilation of nitrates, toxicants and phosphates with erosion control being one of the Eco Services provided very little by the wetland given the nature of a typical seep's position on slopes.

It is however important to note that the descriptions of the above-mentioned functions are merely typical expectations. All wetland systems are unique and therefore, the ecosystem services rated high for these systems on site might differ slightly to those expectations.

#### 5.3.5.4 Ecological Functional and Health Assessment

Physical and hydrological features allow hydro-geomorphic units to perform specific ecosystems services. A Wet-EcoService (Rountree *et al.,* 2013) evaluation was conducted for the wetland and riparian areas assessed on site to determine the services as described in the methodology. The degree of disturbance and modification of wetlands results in a decrease in the ability to which they can perform these ecosystem services.

Ecosystem services contributing to these scores are typical to depression and seep wetlands, and include Education and research, Cultivated foods (subsistence farming), Food for livestock, Harvestable resources, Biodiversity maintenance and Carbon storage. The importance of services supplied by HGM1, HGM6 and HGM7 were High-Very High relative to that supplied by the other wetlands (Low-Moderate) assessed. These depressions were observed to be permanently inundated and presented greater vegetation abundance, robustness and structure. Charismatic avifaunal species were also observed at the permanently inundated depressions These factors contributed to increased ecosystem services provided. These systems may play an important role as animal breeding habitat and feeding sites throughout the year, unlike the other wetlands assessed, which are dependent on the rainy season. HGM8 (Seep) contributed the least Ecosystem services due to impacts from agricultural activities (Vegetation clearance and grazing).

These wetlands were observed to provide varying ecosystem services. This may be attributed to differences within the wetland systems, such as vegetation structure, topographical setting, soil characteristics and wetness regimes.

Three modules, namely hydrology, geomorphology and vegetation, were assessed as a single unit for the HGM Units and subsequently an area weighted score was obtained for the HGM Units. The potential impacts of activities such as agriculture, drought, prospecting, mining, altered hydrological functions and clearing of natural vegetation within the greater catchment were taken into consideration during the assessment.

The overall PES Category for the Depressions (HGM1, HGM3, HGM4, HGM5, HGM6) and Seep (HGM8) wetland is a C which means that the functionality of the wetland is Moderately modified, with some loss of natural habitats. Moderate change in ecosystem processes and loss of natural habitat has occurred but the natural habitat remains intact. Major impacts within the wetlands result from grazing within the wetland areas. Historic diggings were also observed within the vicinity of these systems. A decrease in the PES is likely to occur over the next few years if the proposed activities occur within the exclusion zones, further road construction takes place, and if degradation occurs due to human activities.

The overall PES Category for the Depressions (HGM2 and HGM7) is a D which means that the functionality of the wetland is Largely modified, a large loss of natural habitat and basic ecosystem function has occurred. Major impacts within the wetlands result from grazing within the wetland areas. These depressions were the only wetlands that had gravel roads and berms traversing through them. Historic diggings were also observed within HGM7. A decrease in the PES is likely to occur over the next few years if the proposed activities occur within the exclusion zones, further road construction takes place, and if degradation occurs due to human activities.

#### 5.3.5.5 Ecological Importance and Sensitivity Assessment

The wetland EIS assessment was applied to the HGM units described in the previous section to assess the levels of sensitivity and ecological importance of the wetland. The results of the assessment are shown in Table 5.10 and illustrated in Figure 5.20.

**Table 5.10**: The EIS results for the delineated HGM types.

| Very High (A) | High (B) | Moderate (C) | Low (D) |
|---|---|---|---|
| HGM6 | HGM1 | HGM2 | HGM5 |
| | HGM7 | HGM3 | HGM8 |
| | | HGM4 | |

These EIS scores are attributed to various factors contributing to the level of sensitivity and the level of ecological importance respectively. Notable factors contributing to these scores include;

- The potential presence of red data species and other unique fauna and flora species;
- The Vulnerable (VU) status of the vegetation type (Carletonville Dolomite Grassland vegetation type);
- The potential for wetlands and their surrounding providing breeding sites; and
- Diversity of habitat types;

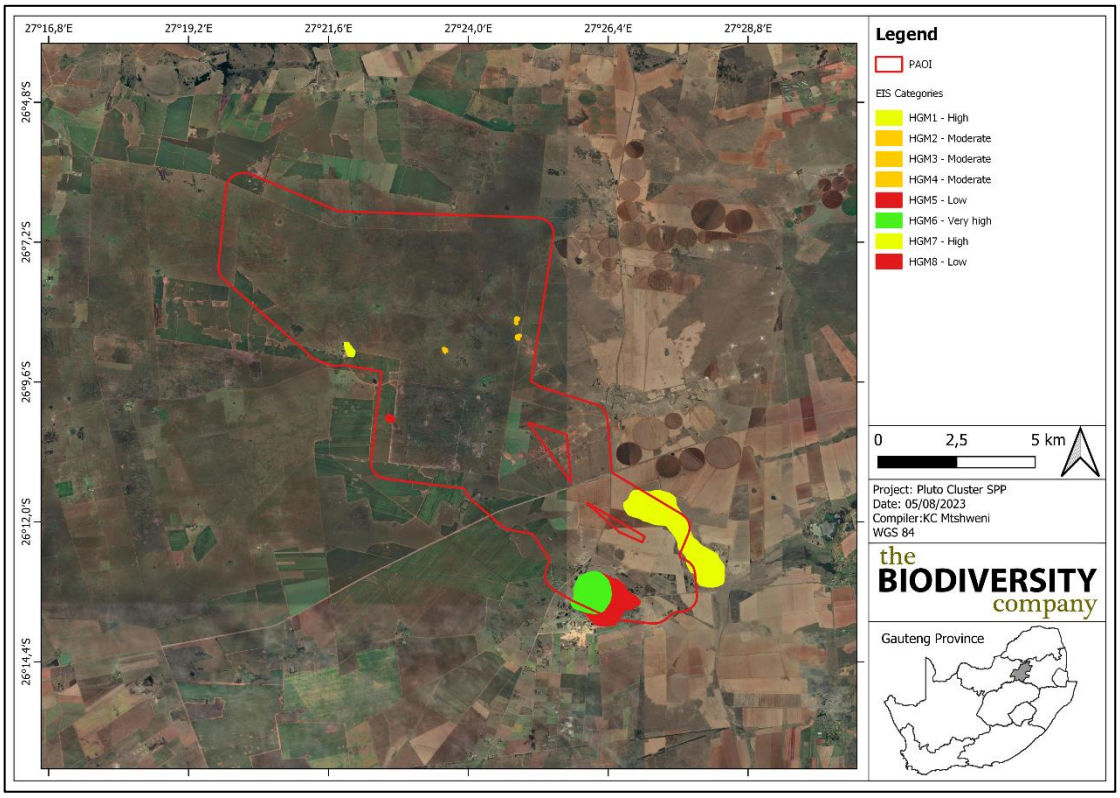



**Figure 5.20:** Ecological importance and Sensitivity of the delineated HGM units.

### 5.3.6 Avifauna

The Avifauna Impact Assessment (Appendix E3) desktop assessment considered the ecologically important landscape features indicated in the Terrestrial Biodiversity Assessment (refer to Section 5.3.4). The additional features relevant to Avifauna is discussed below.

***Important Bird and Biodiversity Area***

Important Bird & Biodiversity Areas (IBAs) are the sites of international significance for the conservation of the world's birds and other conservation significant species as identified by BirdLife International. These sites are also all Key Biodiversity Areas; sites that contribute significantly to the global persistence of biodiversity (BirdLife South Africa, 2017).

According to Birdlife South Africa (2017), selecting IBAs is achieved by applying quantitative ornithological criteria grounded in up-to-date knowledge of the sizes and trends of bird populations. The criteria ensure that the sites selected as IBAs have true significance for the international conservation of bird populations and provide a common currency that all IBAs adhere to, thus creating consistency among and enabling comparability between sites at national, continental and global levels. Irrelevant - The PAOI does not overlap with any IBA.

***Coordinated Avifaunal Road count (CAR)***

The Animal Demographic Unit (ADU)/Cape bird club pioneered the avifaunal road counts of larger birds in 1993 in South Africa. Originally it was started to monitor the Blue Crane (*Anthropoides paradiseus*) and Denham's/Stanley's Bustard (*Neotis Denham*). Today it has been expanded to monitor 36 species of large terrestrial birds (cranes, bustards, korhaans and storks) along 350 fixed routes covering over 19 000 km. Road counts are carried out twice yearly in midsummer (the last Saturday in January) and midwinter (the last Saturday in July)

using this standardised method. These counts are essential for conserving these larger species that are under threat due to habitat loss through land use changes, increases in crop agriculture and human population densities, poisoning, and man-made structures like powerlines. With the prospect of increasing wind and solar farms, using renewable energy sources and monitoring these species is most important (CAR, 2020). Irrelevant - The PAOI does not overlap with Coordinated Avifaunal Road count Routes.

***Coordinated Waterbird Count***

The ADU launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part of South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds, including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC. Relevant - The PAOI overlaps with a Coordinated Waterbird Count site.

***Expected Avifauna Species of Conservation Concern***

SABAP2 data indicate that 318 avifauna species are expected for the PAOI and surrounding landscape. Of these, 22 are considered SCC and the species with a High Likelihood of Occurrence within the PAOI are listed in Table 5.11.

**Table 5.11:** Expected avifauna Species of Conservation Concern that are expected to occur within the PAOI.
**CR = Critically Endangered, EN = Endangered, LC = Least Concern, NT = Near Threatened and VU = Vulnerable.*

| Scientific Name | Common Name | Regional* | Global+ |
|---|---|---|---|
| *Anthropoides paradiseus* | Blue Crane | NT | VU |
| *Falco biarmicus* | Lanner Falcon | VU | LC |
| *Falco vespertinus* | Red-footed Falcon | NT | VU |
| *Gyps coprotheres* | Cape Vulture | EN | VU |
| *Polemaetus bellicosus* | Martial Eagle | EN | EN |
| *Sagittarius serpentarius* | Secretarybird | VU | EN |

#### 5.3.6.1 Field Survey

Two site visits were conducted for this regime 2 assessment. The first was conducted in late summer, over 3 days from the 5th to the 7th of April 2023, and the second, during winter, over 6 days from the 15th of July to the 20th of July 2023. These two site visits are considered sufficient from a seasonal perspective and require no additional season assessment.

The total number of individual species accounts for approximately 38% of the total number of expected species. Six SCC was recorded during the survey period.

***Risk Species***

As aforementioned, Priority Species are considered threatened, rare or prone to impacts from energy development (Ralston Paton et al, 2017). Risk Species are defined as those species that are listed in Ralston Paton et al (2017) as Priority Species, as well as those listed in the Eskom poster of Birds and Power Lines (Eskom and EWT, no date), which together include all species, common or red-listed that may be at risk of collision, electrocution or habitat loss as a result of the proposed activity. Twenty six (26) of the species observed within the PAOI are regarded as priority species (Table 5.12).

**Table 5.12:** Summary of Priority Species recorded within and around the proposed development.

| Common Name | Scientific Name | Sources | Collision | Electrocution | Disturbance/ Habitat Loss |
|---|---|---|---|---|---|
| **Black-headed Heron** | *Ardea melanocephala* | O | X | X | |
| **Black-winged Kite** | *Elanus caeruleus* | X | X | X | |
| **Egyptian Goose** | *Alopochen aegyptiaca* | O | X | X | |
| **Greater Flamingo** | *Phoenicopterus roseus* | X | X | X | X |
| **Greater Kestrel** | *Falco rupicoloides* | X | X | X | |
| **Grey Heron** | *Ardea cinerea* | O | X | X | |
| **Lanner Falcon** | *Falco biarmicus* | X | X | X | |
| **Pale Chanting Goshawk** | *Melierax canorus* | X | X | X | |
| **Red-billed Teal** | *Anas erythrorhyncha* | O | X | X | |
| **Reed Cormorant** | *Microcarbo africanus* | O | X | X | |
| **Secretarybird** | *Sagittarius serpentarius* | X | X | X | X |
| **South African Shelduck** | *Tadorna cana* | O | X | X | |
| **Spur-winged Goose** | *Plectropterus gambensis* | O | X | X | |
| **White-breasted Cormorant** | *Phalacrocorax lucidus* | O | X | X | |

| | | | | | |
|---|---|---|---|---|---|
| **Northern Black Korhaan** | *Afrotis afraoides* | X | X | | X |
| **Yellow-billed Duck** | *Anas undulata* | O | X | X | |
| **Maccoa Duck** | *Oxyura maccoa* | O | X | X | |
| **Brown Snake Eagle** | *Circaetus cinereus* | X | X | X | X |
| **Cape Vulture** | *Gyps coprotheres* | X | X | X | X |
| **Martial Eagle** | *Polemaetus bellicosus* | X | X | X | X |
| **Great Egret** | *Ardea alba* | O | X | X | |
| **Blue-billed Teal** | *Spatula hottentota* | O | X | X | |
| **White-faced Whistling Duck** | *Dendrocygna viduata* | O | X | X | |
| **Cape Shoveler** | *Spatula smithii* | O | X | X | |
| **Gabar Goshawk** | *Micronisus gabar* | O | X | X | |
| **White-backed Duck** | *Thalassornis leuconotus* | O | X | X | |

***Dominant Species***

The most abundant species was the *Hirundo rustica* (Barn Swallow), with a relative abundance of 0.115 and a frequency of occurrence of 31.250%. Additional ubiquitous species was *Afrotis afraoides* (Northern Black Korhaan). No distinct seasonal differences were observed.

***Flight and Nest Analysis***

Observing and monitoring flight paths and nesting sites of SCC and/or priority species are important in ascertaining habitat sensitivity and evaluating the impact risk significance of any proposed development. Flight analysis is also important for species that exhibit diel movement between roosting and foraging sites to prevent the risk of collision with infrastructure. A very condensed version of flight path analysis was done, the aim of this was to determine if there is a general direction of most birds on site. This section needs to be interpreted cautiously based on the limited time spent on this component.

No specific flight paths were noted.

No active nest sites of Priority Species or SCC were recorded during any of the field investigations; this is mainly attributed to the point count analysis protocol, which allows for accurate sampling of the avifauna but does not exhaustively cover the site locating nests.

***Fine-Scale Habitat Use***

The main habitat types identified across the Project Area of Influence were initially delineated largely based on aerial imagery, and these main habitat types were then refined based on the field coverage and data collected during the survey. Four (4) habitats were delineated in total.

Emphasis was placed on limiting timed meander searches to within the most functional habitats, and therefore habitats with a higher potential of hosting SCC. The four habitats are briefly discussed in the sub-sections that follow, and a summary of the habitat types delineated within the Project Area of Influence can be seen in Table 5.13.

**Table 5.13:** Summary of habitat types delineated within the Project Area of Influence.

| Habitat Type | Description | Avifauna Sensitivity |
|---|---|---|
| **Rocky Outcrops** | Expansive to isolated sections of rocky outcrops that serve as important micro-habitat for unique flora and fauna. Many outcrop areas overlap with provincial CBAs. | Medium |
| **Water Resources** | Permanently to seasonally wet portions of land as delineated by the wetland specialist. Important foraging resource for local fauna. | High |
| **Degraded Dolomite Grassland** | Gently undulating open grassland habitat with some functionality and a good diversity and density of flora species. Impacted by overgrazing and some invasions. Some vast portions of this habitat overlap with provincial CBA and ESA areas. | Medium |
| **Modified** | Portions of land with very little to no indigenous vegetation remaining, such as roads and cultivated land. | Very Low |

### 5.3.7 Cultural and Heritage Aspects

According to the Heritage and Palaeontological Impact Assessment (Appendix E6), the area proposed for development is located approximately 20km north of Carletonville within the Merafong Municipality. Carletonville was developed by various mining companies from 1937 onwards, but was not officially incorporated until 1959, and was subsequently recognised as a provincial town in 1967. Surrounding Carletonville are several privately owned gold-mining township villages and contractor labour quarters established by the mining companies on land owned by the mines. The area surrounding Carletonville is dominated by a cultural landscape that is shaped and defined by the historic and on-going mining activities associated with the Witwatersrand. A detailed archaeological background of the area is provided by Du Pisanie and Nel (2012, SAHRIS NID 104305) and is therefore not repeated here. It is sufficient to note that no significant Early, Middle or Later Stone Age sites are known from this broader area, however sites representing the Iron Age occupation of the region are present in the broader context. Birkholtz and Groenewald (2016, SAHRIS NID 369805) completed an HIA on a property located immediately south of the area proposed for development. They describe the

broader areas as “The overall study area can be described as generally undulating with a number of extensive pans located within this area. While the overall study area is mostly utilised for agricultural activities, the proposed development bulk sample area that was assessed in the field is characterised by agricultural fields (maize), a large number of small livestock camps associated with stud farming (cattle) as well as Eskom power lines.” The N14 is a historic scenic route that runs between Ventersdorp and Pretoria and is likely based on the original wagon route used for this journey. This route is located approximately 1.5km south of the Tuli PV Footprint area. In general, for the development of PV infrastructure and its associated grid connection infrastructure, it is preferred for such development to be clustered with existing development, such as mining or residential development, in order to reduce the perception of urban and infrastructure sprawl across an otherwise agricultural landscape.

Birkholtz and Groenewald (2016) go on to note that examples of published excavated archaeological sites from the general surroundings of the study area include the Later Stone Age and Iron Age sites located along the Magaliesberg Mountains and sites of international palaeoanthropological significance such as Sterkfontein and Kromdraai, both located within the Cradle of Humankind World Heritage Site located approximately 33km north-east of the study area. Birkholtz and Groenewald (2016) note that the nearest published excavated archaeological site to the present study area is the underground cavern system known as Lepalong, that was used as shelter by the Kwena ba Modimosa ba Mmatau during the turmoil of the Difaqane/Mefaqane. According to Birkholtz and Groenewald (2016), oral histories indicate that Lepalong was occupied from 1827 into the 1830s (Reid & Lane, 2003). Lepalong is located some 25km south-west of the study area.

According to Du Pisanie and Nel (2016, SAHRIS NID 356134), “With the onset of the Transvaal and South African Wars, Gatsrand became a strategic location for British troops who occupied Potchefstroom. This region was located in close proximity to the Western Railway, which provided a tactical advantage. To exploit and protect this advantage, three blockhouses were constructed on the farms Driefontein 113 IQ and Driefontein 355 IQ. These structures were not identified during the pre-disturbance survey and it is assumed that they no longer exist. The next major event to take place in this region was the discovery of gold, which facilitated the establishment of several towns from the 1920s, an increase in population and an increase in services. Early mines established include Venterspost (1934), Libanon (1936), West Driefontein (1945), East Driefontein (1968) and later Kloof (1968). Shaped by these events and activities the study area has through time transformed into a historic mining landscape.” In their Heritage Impact Assessment located nearby, Du Pisanie and Nel (2016, SAHRIS NID 356134) identified a number of heritage resources, the majority of which were determined to be not conservation worthy. The nature of the resources identified include burials and burial grounds (graded IIIA) as well as historic and modern farm structures. Similar resources are likely to be present within the proposed development areas.

***Site Survey***

During the site assessment 38 observations were made during the survey and ruins from the mid-1950s onwards dominated the recordings which reflect the changing circumstances and fortunes of farming and mining in the area. Old mining diggings were recorded on Leeuwpan farm, but these were not rated as having conservation worthy significance given that a variety

of better sites representative of the industrial archaeology of mining in the area can be found to the south near Carletonville. A large modern graveyard with graves from the 1980s into the 21st century was located in the road reserve at the sand mining entrance near De Pan and the possibility of unmarked graves near the ruins and informal settlements clustered around the farms should be taken into account in the planning of the PV infrastructure. The overall heritage sensitivity of the area is very low given that the majority of the farms were built since the 1950s and have intensively transformed the landscape for maize and cattle agriculture servicing the major metropolitan area of Johannesburg. Refer to Figure 5.21.

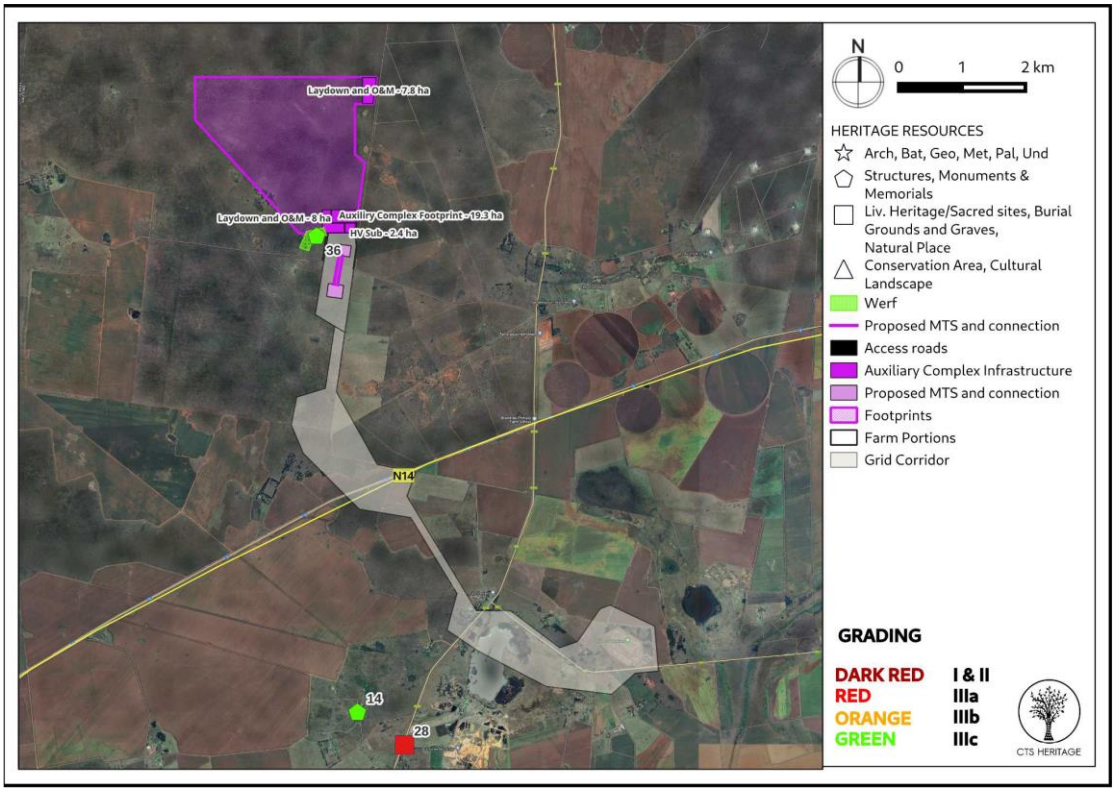



**Figure 5.21:** Map indicating all heritage features identified within the project area

The majority of the heritage observations made within the development area relate to the historic mining and agricultural occupation of the broader area. Most of these observations relate to structures and ruins of structures that have been determined to have no cultural value. These have been determined to be Not Conservation-Worthy and are not considered further here.

Three heritage resources that have cultural value were identified in this assessment. Sites 014 and 036 relate to structures and have been graded IIIC for their contextual heritage value. Neither of these structures is located within any of the areas proposed for development and as such, it is not anticipated that any of these structures will be negatively impacted by the proposed development of either the SPPs or their electronic grid infrastructure.

Site 028 represents a modern graveyard (1980's) with a number of human remains interred here. Due to the high levels of social and spiritual value associated with human remains, graveyards are accorded high levels of local significance and as such, are graded IIIA. Although Site 028 is located far from the area proposed for development and as such, is unlikely to be directly impacted by the development, a 100m buffer around this site is recommended to ensure that no indirect impact takes place to this significant site. Angus SPP is unlikely to impact any of the identified heritage sites on the Farm Leeuwpan No. 697.

### 5.3.8 Paleontological Aspects

According to the Heritage and Palaeontological Impact Assessment (Appendix E6), the Updated Geology (Council of Geosciences) confirms the geology and indicates that the proposed development is underlain by the Malmani Subgroup. The Malmani Subgroup carbonates of the Transvaal Basin comprise of an assortment of stromatolites (microbial laminates), ranging from supratidal mats to intertidal columns and large subtidal domes (Eriksson et al. 2006). Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. These structures were originally formed by the growth of layer upon layer of cyanobacteria, a single-celled photosynthesizing microbe. Cyanobacteria are prokaryotic cells (simplest form of modern carbon-bases life). Stromatolites are first found in Precambrian rocks and are known as the earliest known fossils. These algae photosynthesised in the low oxygen atmosphere and deposited layer upon layer of calcium sulphate, magnesium sulphate and calcium carbonate as well as other compounds to form these domes. Researchers have examined and classified the stromatolite structures but seldomly find preserved algal cells. The oxygen atmosphere that we depend on today was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era. Stromatolites and oolites from the Transvaal Supergroup have been described by various authors (Eriksson and Altermann, 1998). Detailed descriptions of South African Archaean stromatolites are available in the literature (Altermann, 2001; Buick, 2001; and Schopf, 2006). The Malmani stromatolites literature includes articles by Truswell and Eriksson (1972, 1973, 1975), Eriksson and MacGregor (1981), Eriksson and Altermann (1998), Sumner (2000), Schopf (2006).

The Malmani Subgroup succession is about 2 km-thick and consists of a series of formations of oolitic and stromatolitic carbonates (limestones and dolomites), black carbonaceous shales and minor secondary cherts. The Malmani Dolomites also consist of historic lime mines, and palaeocave fossil deposits. Dolomite (limestone rock) forms in warm, shallow seas from slow gathering remainders of marine microorganisms and fine-grained sediment. Dolomites of the Malmani Subgroup has a higher magnesium content than other limestones. These materials contain high levels of calcium carbonate and are often referred to as carbonates. Currently very few palaeontologists study stromatolites but geologists find the stromatolites interesting, because they reveal the change from a reducing environment (that is an oxygen-poor) to an oxidizing environment (oxygen--rich). This transition is known as the Great Oxygen Event (Eroglu et al., 2017).

***Site survey***

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 23 March 2023. Only one weathered stromatolite was identified in the Pluto Cluster footprint. This stromatolite forms part of a pile of rock that was removed from the agricultural land. However, due to preservation, mitigation it is not recommended as other well-preserved stromatolites have been identified in the area.

### 5.3.9 Visual Landscape

Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks and conservation areas, highways and travel routes, and important cultural features and historic sites.

#### 5.3.9.1 Visual Receptors

Visual Receptors can be defined as "Individuals, groups or communities who are subject to the visual influence of a particular project". Possible visual receptors identified within the 10km radius from the proposed development, which due to use could be sensitive to landscape change. They include:

- **Area Receptors** which include:
  - A small number of smallholdings.
- **Linear Receptors** which include:
  - N14 National Road.
  - R500 regional road.
  - R41 regional road.
- **Point Receptors** which include:
  - Homesteads on farms.
  - Lodging facilities.

#### 5.3.9.2 Zone of Theoretical Visibility

A Zone of Theoretical Visibility (ZTV) is a Geographic Information System (GIS)-generated tool to identify the likely (or theoretical) extent of visibility of a development. The tool used in this model does not take existing screening into account but only the above mean sea level of the landscape.

**Table 5.14:** ZTV Assumptions

| Radius | Impact Magnitude |
|---|---|
| 0-1km | Very High |
| 1-3km | High |
| 3-5km | Medium |
| 5-10km | Low |

Table 5.15. below reflects the visibility rating in terms of proximity on sensitive receptors from the Solar Power Plant (SPP) within a 10 km radius.

***Zone of Theoretical Visibility for the Angus Solar Power Plant***

**Table 5.15**: ZTV rating in terms of proximity from the SPP

| Radius | Visual Receptors | Visibility rating in terms of proximity |
|---|---|---|
| 0-1km | One homestead on a farm | Very High |

| | | |
|---|---|---|
| | **Visibility Coverage: 78.54%** | |
| 1-3km | - One homestead on a farm<br>- R500 regional road<br>**Visibility Coverage: 30.55%** | High |
| 3-5km | - One homestead on a farm<br>- N14 National Road<br>- R500 regional road<br>**Visibility Coverage: 32.85%** | Medium |
| 5-10km | - 20 homesteads on farms<br>- N14 National Road<br>- R41 regional road<br>- R500 regional road<br>**Visibility Coverage: 27.26%** | Low |

Refer to Figure 5.22 Zone of Theoretical Visibility (ZTV). This map indicates all areas that are in direct line of site of the proposed development up to a distance of 10 km as per Table 5.15 above.

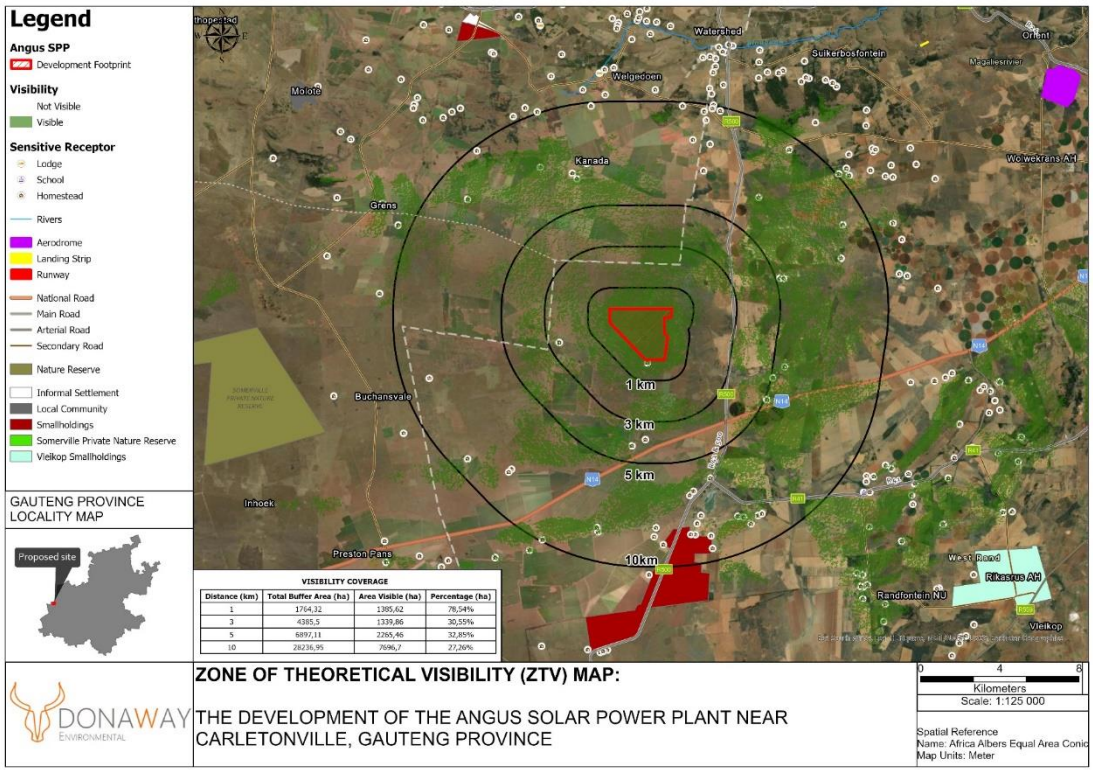



**Figure 5.22:** Zone of Theoretical Visibility (ZTV) of the SPP, Satellite View.

***Zone of Theoretical Visibility for the grid connection***

Table 5.16 below reflects the visibility rating in terms of proximity on sensitive receptors from the Power line (PL) within a 10 km radius.

**Table 5.16:** ZTV rating in terms of proximity from the PL

| Radius | Visual Receptors | Visibility rating in terms of proximity |
|---|---|---|
| 0-1km | - 12 homesteads on farms<br>- N14 National Road<br>- R500 regional road<br>- R41 regional road<br>**Visibility Coverage: 98.87%** | Very High |
| 1-3km | - 6 homesteads on farms<br>- N14 National Road<br>- R500 regional road<br>- R41 regional road<br>- Smallholdings<br>**Visibility Coverage: 86.64%** | High |
| 3-5km | - 10 homesteads on farms<br>- N14 National Road<br>- R500 regional road<br>- R41 regional road<br>- Smallholdings<br>- One primary school<br>**Visibility Coverage: 63.34%** | Medium |
| 5-10km | - 51 homesteads on farms<br>- N14 National Road<br>- R500 regional road<br>- R41 regional road<br>- Smallholdings<br>**Visibility Coverage: 42.84%** | Low |

Figure 5.23 map indicates all areas that are in direct line of site of the proposed power line up to a distance of 10 km as per Table 5.16 above.

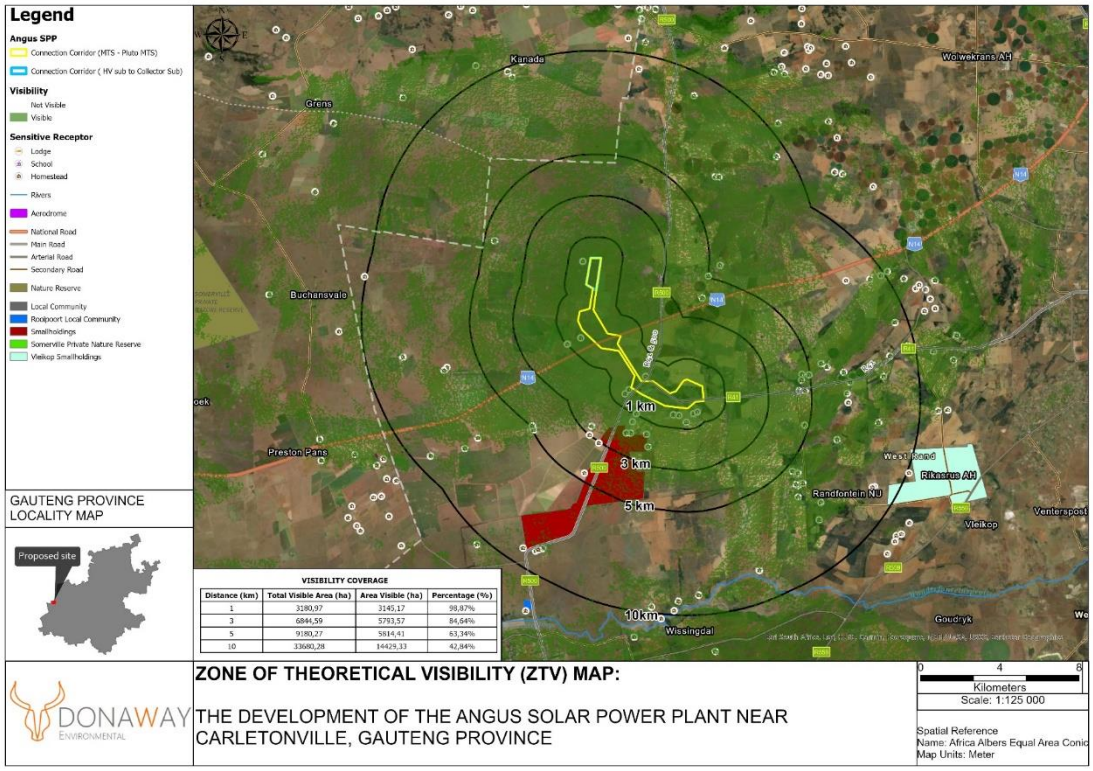



**Figure 5.23:** Zone of Theoretical Visibility (ZTV) of the Power Line, Satellite View

The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads. However, a large part of the visual landscape is still reflecting a farming and intensive mining landscape with a much lower visual quality.

### 5.3.10 Traffic Consideration

According to the Traffic Impact Assessment (Appendix E8), it is proposed that the existing unsurfaced farm roads to the west of the R500 are used to access the Angus PV SPP site as shown in Figure 5.24. An overview of the road classification for the major roads has been undertaken and was derived from the South African Classification and Access Management Manual (TRH 26):

- The N14 is a surfaced two lane, two-way roadway with wide shoulders and is classified as a Class 3 Rural Minor Arterial in the vicinity of the proposed development site. The road serves to connect Springbok (in the west) and Pretoria (in the east) and is approximately 1 190 km long.
- The R500 is a surfaced two lane, two-way roadway and is classified as a Class 3 Rural Minor Arterial in the vicinity of the proposed development site. The road extends between the R509, in the vicinity of Magaliesburg (in the north) and the R59, at Parys (in the south), and is approximately 120 km long.
- The Unnamed Road (“road to Pahtiki’) is an unsurfaced two-way roadway and is classified as a Class 5 Rural Local Road. This road serves a local access function and provides direct access to the adjacent farm properties.

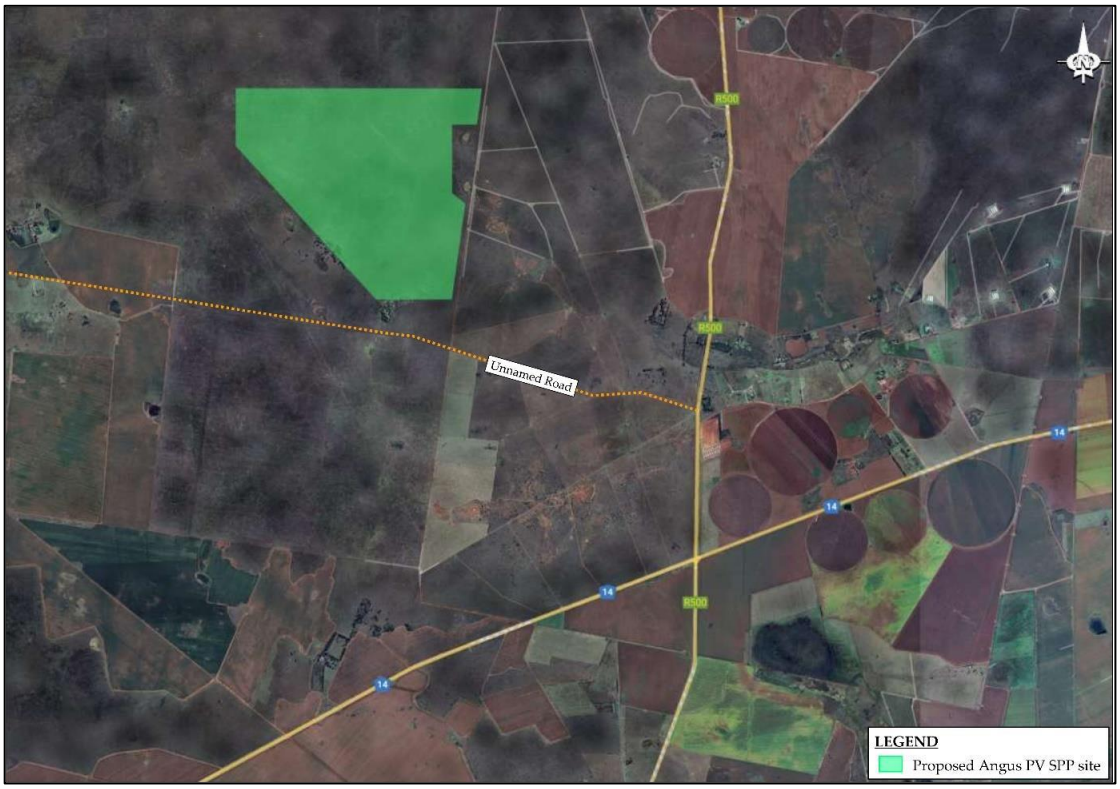



**Figure 5.24:** Existing external road network

It should be noted that the majority of the other roads surrounding the proposed project site are unsurfaced (i.e., gravel or sand-based) roadways classified as Class 5 Local Roads and primarily fulfil an access function for the neighbouring farms.

Though the proposed access roads all form part of an existing access road system (to the surrounding farms), it is important that the geometry complies with the minimum standards as detailed in the traffic report. This may likely be a requirement as part of the wayleave application approval of the Merafong Local Municipality, West Rand District Municipality and Gauteng Department of Roads and Transport.


**Figure 5.25:** Proposed access via the unnamed road off of the R500.

Two (2) possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Durban (647 km) and Richards Bay (675 km). It is recommended that the Port of Durban is the preferred port of entry as this route is the shorter of the two routes. The regional routes indicated in the analysis would need to be confirmed by freight carriers as suitable for the sensitive normal loads. The final decision on the selected route would be based on a combination of cost, distance and road condition at the time of transport. It is anticipated that these components would be imported and transported from the preferred harbour (Port of Durban is recommended) as abnormal loads. It would then be assembled in Johannesburg and transported to the proposed development site (also as abnormal loads).

Cement will be sourced from local manufacturers within the town of Carletonville. All other civil construction materials, needed for concrete and wearing course, will be obtained commercially. Furthermore, it is anticipated that construction personnel and labour would originate from the neighbouring towns such as Carletonville. These trips are classified as local trips as vehicles will not be travelling over a (comparably) long distance. It is anticipated that some route clearing may be needed with certain portions of the route already cleared for other renewable energy projects. In addition, temporary widening of intersections along the route may also be required to simplify the turning movements of the abnormal load vehicles.

### 5.3.11 Socio-Economic Conditions

According to the Social Impact Assessment (Appendix E7), Gauteng is the smallest of South Africa's provinces, covering an area of 18 178km² or approximately 1.4% of the total surface area of South Africa. It is bordered by the Gauteng, North West, Limpopo and Mpumalanga provinces. While being the smallest province, it is also the most populous, being home to 13

399 725 people – 24.1% of the national population. Gauteng lies on the highest part of the interior plateau on the rolling plains of South Africa's Highveld.

Its capital is Johannesburg, and it also contains the city of Pretoria, as well as the East Rand, West Rand and Vaal areas. Gauteng continues to serve as the economic engine room of the country and the subcontinent, responsible for over 34.8% of the country's GDP. Gauteng is the powerhouse of South Africa and the heart of its commercial business and industrial sectors. The most important sectors contributing to GDP are finance, real estate and business services; manufacturing; and general government services. Gauteng is also the financial services capital of Africa. More than 70 foreign banks have their head offices here, as do at least the same number of South African banks, stockbrokers and insurance giants. The major gold and diamond mining houses all have their headquarters in Johannesburg, the biggest being Anglo American and De Beers. Gold mining constitutes 80% of Gauteng's mineral production output. Gauteng is divided into three metropolitan municipalities, the City of Ekurhuleni, City of Johannesburg and City of Tshwane Metropolitan Municipalities, as well as two district municipalities, which are further subdivided into six local municipalities.

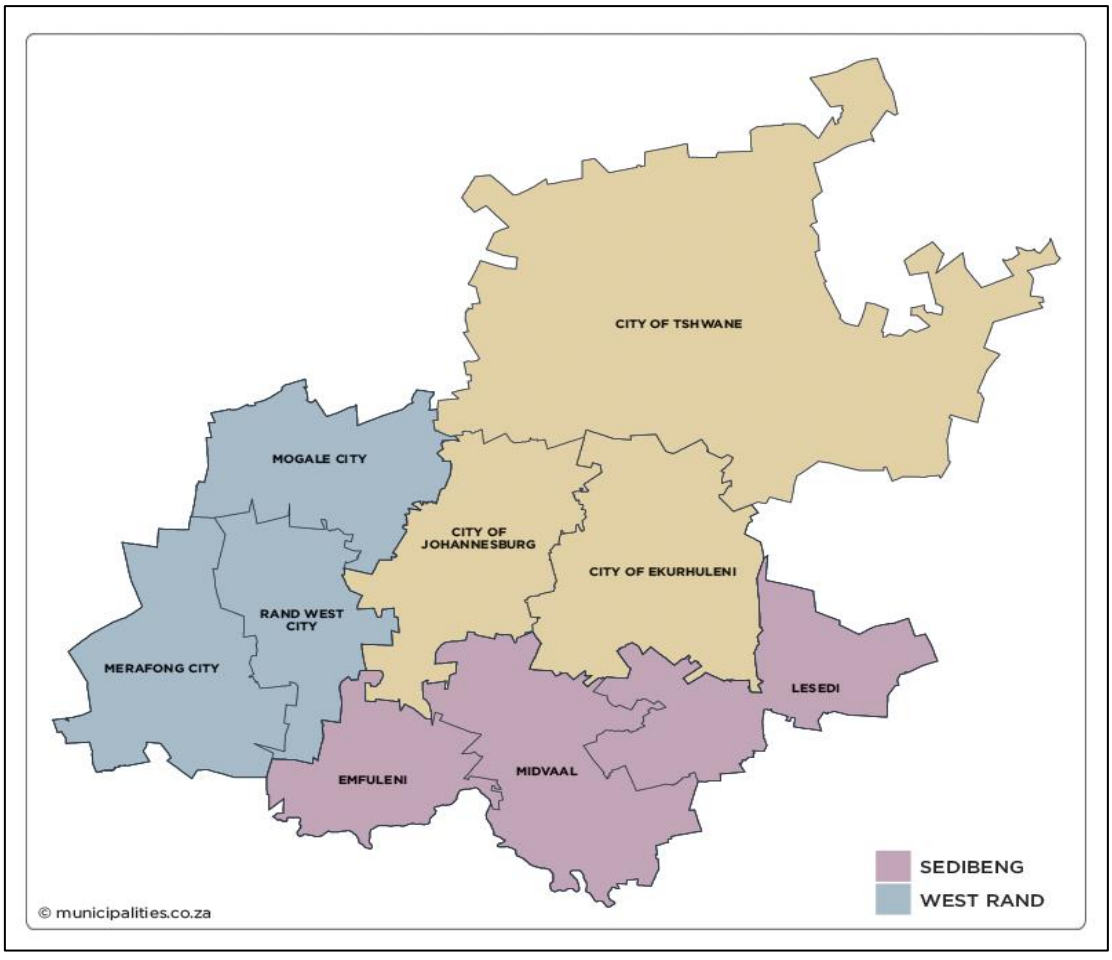



**Figure 5.26**: Map showing the District Municipalities of the Gauteng Province.

#### 5.3.11.1 West Rand District Municipality

The West Rand District Municipality is a Category C municipality located in the west of the Gauteng Province. The West Rand extends from Randfontein (the seat of the district) in the west to Roodepoort in the east and includes the town of Krugersdorp. It is bordered by

Bojanala Platinum to the north-west, City of Tshwane to the north-east, City of Johannesburg to the east, Sedibeng to the south-east, and Dr Kenneth Kaunda to the south-west. It comprises three local municipalities: Merafong, Mogale and Rand West Cities.

The municipality is situated relatively closely to the hub of economic activity in Gauteng, and is traversed by major national roads, namely the N12 and N14. Its main contribution lies primarily within the mining sector, however, areas such as Krugersdorp fulfil a residential function for many people working in Johannesburg. The West Rand remains the poorest region contributing to Gauteng's GDP. The Cradle of Humankind falls under the jurisdiction of Mogale City and Merafong City, and forms part of the World Heritage Site. The main economic sectors include Manufacturing (22%), mining (19%), community services (19%), finance (16%), trade (10%), transport (6%), construction (4%). In 2011 the Municipality had a population of 820 995 with a dependency ratio of 39.2 By 2016 the population has increased to 838 594 and the dependency ratio was reduced to 39.4.

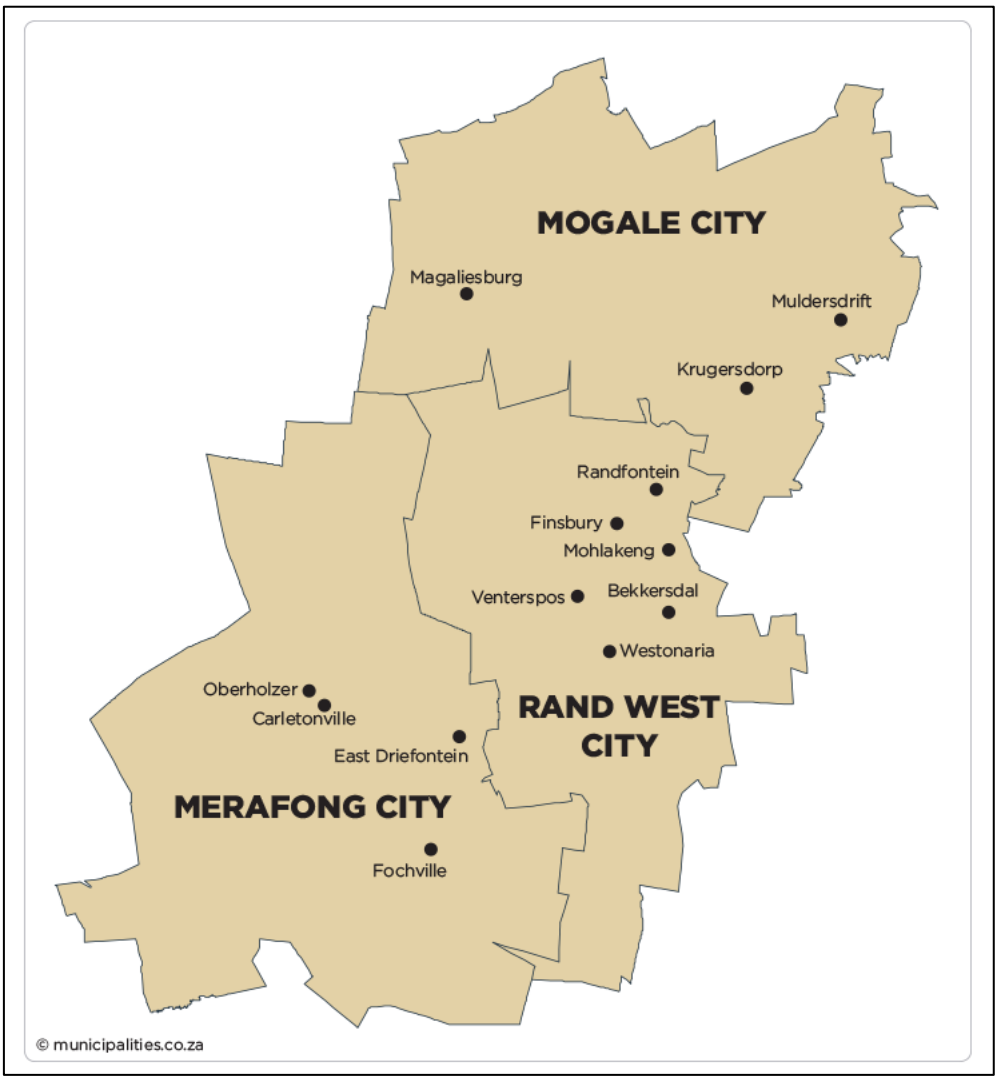



**Figure 5.27:** Map showing the Local Municipalities s of the West Rand District Municipality.

### 5.3.11.2 Merafong City Local Municipality

The Merafong City Local Municipality is a Category B municipality situated within the West Rand District in the Gauteng Province. It is the largest of three municipalities in the district,

making up almost half of its geographical area. It is situated about 65km from Johannesburg and is serviced by a number of major roads, including the N12 from Johannesburg to Cape Town and the N14, which is the main road between Gauteng and Mahikeng (previously Mafikeng) via Ventersdorp. Its boundaries enclose some of the richest gold mines in the world.

Formerly a cross-border municipality, the entire municipality was transferred to the North West Province following the abolition of cross-border municipalities by an amendment to the South African Constitution in 2005. The municipality was part of the North West Province from 2005 to 2009, when it was reincorporated into the Gauteng Province by another amendment to the Constitution, following often violent protests in the township of Khutsong.

Merafong's historical development is closely knit with the discovery of rich gold deposits in the early 1930s. Fochville is the oldest town in the region and was declared a town in 1951. The town Carletonville was named after Guy Carleton Jones, an engineer from the Gold Fields Ltd mining company, who played a prominent role in the discovery of the West Wits gold field, of which Carletonville forms a part. The mining company decided, in November 1946, to establish the town. Carletonville was proclaimed in 1948 and attained Town Council Status on 1 July 1959. Wedela is situated between Western Deep Levels and Elandsrand mine. The town's name is derived from the prefixes of the two mines: the 'Wed-' from Western Deep Levels and the '-ela' from Elandsrand. Wedela was established as a mining village in December 1978 by Harry Oppenheimer, and municipal status was granted to the town on 1 January 1990. There are three towns in the municipality, namely Carletonville, Fochville, Wedela.

The main economic sectors in the municipality are Mining (50.7%), trade (9.7%), finance and business services (9.9%), community services (9.2%), general government (9.1%).

## 5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the solar power plant is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the Gauteng Province has a high potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for a solar energy facility due to high irradiation values and optimum grid connection opportunities (i.e. the grid connection points are located within the affected property which minimizes the length of power line development and consolidates the overall impacts and disturbance of the project within the affected property). Farm Leeuwpan No. 697, where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar power plant is directly dependent on the annual direct solar irradiation values of a particular area. The Gauteng receives high averages of direct normal and global horizontal irradiation, daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of ~2118 kWh/m$^2$/year is relevant in the area.

- Topographic conditions: The surface area on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur. The topographic conditions, which are favourable, minimizes the significance of the impact that will occur during the clearing and levelling of the site for the construction activities.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 250MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm, as well as the opportunities presented for the avoidance of sensitive environmental features present. Farm Leeuwpan No. 697, and the development footprint assessed therein is considered to provide an opportunity for the successful construction and operation of a solar power plant with a capacity of 250MW, as well as opportunities for the avoidance and mitigation of impacts on the affected environment and sensitive environmental features.

- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be obtained via a public gravel road of off the R500 regional road to the east of the site.

- Grid connection: For the PV facility to connect to the national grid the facility will have to construct an on-site substation, collector substation, an MTS and a power line from the project site to connect to the Eskom grid via the existing Pluto 400/275/22kV MTS. Available grid connections are becoming scarce and play a huge role when selecting a viable site. The grid connection corridor aligns with existing Eskom powerline which presents an opportunity for the consolidation of infrastructure and disturbance within the affected landscape.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3 of this report. The area proposed for development consists of land used for agriculture activities, but depression and seep wetlands are in close proximity to the development footprint, and parts of the site are within a CBA 2 or an ESA.

It is evident from the discussion above that Farm Leeuwpan No. 697 may be considered favourable and suitable in terms of the site and environmental characteristics. As mentioned previously, the development footprint for the project has been optimised to avoid the intact rocky outcrop habitats. No alternative areas on the property have been considered for the placement of the development footprint as the assessed development footprint has been potimised. The development footprint of this project will cover a significant portion of the farm; however, provision have been made to exclude any sensitive areas from the facility layout to be developed within the development footprint.

## 5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria, the site is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of the 250 MW Angus Solar Power Plant on Farm Leeuwpan No. 697 is the preferred option. The draft layout is included as part of this Draft EIR (refer to Figure L). It may be concluded that this is the only location that will be assessed in further detail within sections 6 and 7.

# 6 DESCRIPTION OF THE IMPACTS AND RISKS

This section aims to address the following requirements of the regulations:

**Appendix 3.** (3)(h) An EIR (...) must include-

h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –
   v. the impacts and risks identified, including the nature, significance, consequence, extent, duration and probability of the impacts, including 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;
   vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;
   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; and
   viii. the possible mitigation measures that could be applied and level of residual risk

i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-
   i. a description of all environmental issues and risks that were identified during the EIA process; and
   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.

j) an assessment of each identified potentially significant impact and risk, including-
   i. cumulative impacts;
   ii. the nature, significance and consequences of the impact and risk;
   iii. the extent and duration of the impact and risk;
   iv. the probability of the impact and risk occurring;
   v. the degree to which the impact and risk can be reversed;
   vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and
   vii. the degree to which the impact and risk can be mitigated;

k) where applicable, a summary of the findings and recommendations of 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 assessment report;

## 6.1 SCOPING METHODOLOGY

The contents and methodology of the Environmental Impact Report aimed to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

### 6.1.1 Checklist analysis

The independent consultant conducted a site visit on 28 February 2023. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the site. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

**Table 6.1:** Environmental checklist

| QUESTION | YES | NO | Un-sure | Description |
|---|---|---|---|---|
| **1. Are any of the following located on the site earmarked for the development?** | | | | |
| I. A river, stream, dam or wetland | × | | | Eight (8) HGM unit was identified within the 500 m regulated area (PAOI), namely, seven (7) Depression (HGM 1 – HGM 7) wetlands, and a Seep wetland (HGM 8). |
| II. A conservation or open space area | × | | | The majority of the site is located within 'Other Natural Areas', with sections within an Important Area (CBA2) as per the Gauteng Conservation Plan. |
| III. An area that is of cultural importance | | × | | No sites, features or objects of cultural significance were identified on the project site. |
| IV. Site of geological significance | | × | | None. |
| V. Areas of outstanding natural beauty | | × | | None. |
| VI. Highly productive agricultural land | | × | | None. |
| VII. Floodplain | | × | | None. |
| VIII. Indigenous Forest | | × | | None. |

| | | | | |
|---|---|---|---|---|
| IX. Grass land | × | | | According to the Terrestrial Biodiversity Assessment (Appendix E1), the site is currently mostly a degraded grasslands and some rocky outcrop features. |
| X. Bird nesting sites | | × | | The Avifauna Impact Assessment Report (refer to Appendix E3) does not make any reference to nesting sites on the area earmarked for the development. |
| XI. Red data species | | × | | The Avifauna impact Assessment Report (refer to Appendix E3) did not record any Red Data Species on site but indicated that some species of conservation concern may occur on site. |
| XII. Tourist resort | | × | | None. |
| **2. Will the project potentially result in potential?** | | | | |
| I. Removal of people | | × | | None. |
| II. Visual Impacts | × | | | The VIA (refer to Appendix E4) confirmed that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and nearby roads. |
| III. Noise pollution | | × | | Construction activities will result in the generation of noise over a period of months. However, there are mines located directly adjacent to the site. The noise impact is therefore insignificant in comparison to the noise generated by the mine and will only be temporary in nature |
| IV. Construction of an access road | × | | | Access will be obtained from a public gravel road of off the R500 regional road to the east of the site. The road will need to be upgraded. |

| | | | | |
|---|---|---|---|---|
| V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air. | | × | | None. |
| VI. Accumulation of large workforce (>50 manual workers) into the site. | × | | | It is estimated that between 600 and 800 employment opportunities will be created during the construction and between 35 and 50 employment opportunities during the operation phase of the SPP project. |
| VII. Utilisation of significant volumes of local raw materials such as water, wood etc. | × | | | The estimated maximum amount of water required during the facility's 20 years of production is approximately 4200m³ per annum. |
| VIII. Job creation | × | | | It is estimated that between 600 and 800 employment opportunities will be created during the construction and between 35 and 50 employment opportunities during the operation phase of the SPP project. |
| IX. Traffic generation | × | | | It is estimated that 89 trips per day will be generated over the 18 – 24 months construction period for the SPP. |
| X. Soil erosion | × | | | The site will need to be cleared or graded, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction. No existing areas of erosion were identified. |
| XI. Installation of additional bulk telecommunication, transmission lines or facilities | × | | | There is existing Eskom infrastructure in the area. |
| **3. Is the proposed project located near the following?** | | | | |

| | | | | |
|---|---|---|---|---|
| I. A river, stream, dam or wetland | × | | | Eight (8) HGM unit was identified within the 500 m regulated area (PAOI), namely, seven (7) Depression (HGM 1 – HGM 7) wetlands, and a Seep wetland (HGM 8). |
| II. A conservation or open space area | × | | | The majority of the site is located within 'Other Natural Areas', with sections within an Important Area (CBA2) as per the Gauteng Conservation Plan. |
| III. An area that is of cultural importance | | × | | None. |
| IV. A site of geological significance | | × | | None. |
| V. An area of outstanding natural beauty | | × | | None. |
| VI. Highly productive agricultural land | | × | | None. |
| VII. A tourist resort | | × | | None. |
| VIII. A formal or informal settlement | × | | | The town of Carletonville is located approximately 17 km south of the proposed development. |

### 6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in-depth assessment during the EIA process. An indication is provided of the specialist studies conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, which initiates and cause impacts on elements of the environment.
- **Receptor**: Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts**: Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation**: Impacts need to be mitigated to minimise the effect on the environment.

Detailed impact assessments have been undertaken by each of the respective specialists which has informed the matrix analysis as included in Table 6.2 below, as well as the key issues identified as included in sections 6.2.1-6.2.3. The table included on the overleaf includes

reference to the sections in the respective specialist studies where the details of the in-depth assessment of potential environmental impacts can be obtained.

**Table 6.2:** Matrix analysis

For ease of reference the significance of the impacts is colour-coded as follow:

| Low significance | Medium significance | High significance | Positive impact |
|---|---|---|---|

| LISTED ACTIVITY (The Stressor) | ASPECTS OF THE DEVELOPMENT /ACTIVITY | | POTENTIAL IMPACTS | | SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS | | | | | | | MITIGATION OF POTENTIAL IMPACTS | | | SPECIALIST STUDIES / INFORMATION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Receptors | Impact description / consequence | Minor | Major | Extent | Duration | Probability | Reversibility | Irreplaceable loss of resources | Possible Mitigation | Possible mitigation measures | Level of residual risk | |
| **CONSTRUCTION PHASE** | | | | | | | | | | | | | | | |
| <u>Activity 11(i) (GN.R. 327):</u> *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*<br><br><u>Activity 12(ii)(c) (GN.R. 327):</u> "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*<br><br><u>Activity 24 (ii) (GN.R 327):</u> *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*<br><br><u>Activity 27 (GN.R. 327):</u> *"The clearance of an area of 1* | <u>Site clearing and preparation</u><br><br>Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.<br><br><u>Civil works</u><br><br>The main civil works are:<br>• Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.<br>• Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.<br>• Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning | BIOPHYSICAL ENVIRONMENT | Indigenous natural vegetation | • Loss, degradation or fragmentation of vegetation through direct clearing | | - | S | P | D | IR | SL | Yes | - See Table 6.3 | M | Terrestrial Biodiversity Assessment (Appendix E1) |
| | | | Air | • Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities. | - | | S | S | D | CR | NL | Yes | - Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. | L | - |
| | | | Geology | • Collapsible soil.<br>• Seepage.<br>• Active soil (high soil heave).<br>• Erodible soil.<br>• Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. | - | - | S | S | Pr | CR | NL | Yes | - The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. | L | - |

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| *hectares or more, but less than 20 hectares of indigenous vegetation…"*<br><br>Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*<br><br>Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*<br><br>Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*<br><br>Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*<br><br>*Activity 4 (c)(iv) (GN.R 324):*<br>*"The development of a road wider than 4 metres with a reserve less than 13,5 metres within (c) the Gauteng* | circle for trucks will also be taken into consideration.<br>Transportation and installation of PV panels into an Array<br><br>The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw.<br><br>Wiring to the Central Inverters<br><br>Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. | | | • The presence of undermined ground.<br>• Instability due to soluble rock.<br>• Steep slopes or areas of unstable natural slopes.<br>• Areas subject to seismic activity. | | | | | | | | | - Retention of vegetation where possible to avoid soil erosion. | | |
| | | | Existing services infrastructure | • Generation of waste that need to be accommodated at a licensed landfill site.<br>• Generation of sewage that need to be accommodated by the local sewage plant.<br>• Increase in construction vehicles on existing roads. | - | | L | S | D | PR | ML | Yes | - | L | Confirmation from the Local Municipality |
| | | | Groundwater | • Pollution due to construction vehicles and the storage and handling of dangerous goods. | - | | S | S | Pr | CR | ML | Yes | - A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site.<br>- Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing.<br>- Full construction details of monitoring boreholes must be recorded when they are drilled.<br>- Sampling of monitoring boreholes should be done according to recognised standards. | L | - |

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| *province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br><br>*<u>Activity 10 (c)(iv) (GN.R 324):</u>*<br>*"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br><br>*<u>Activity 12 (c)(ii) (GN.R 324):</u>*<br>*"The clearance of an area of 300 square metres or more of indigenous vegetation (c) in the Gauteng Province, (ii) within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans."*<br><br>*<u>Activity 14(ii)(c)(c)(iv) (GN.R 324):</u> "The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, (c)* | | | Aquatic Ecology | • Loss of habitat containing protected species or Species of Special Concern<br>• Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones.<br>• Loss can also include a functional loss, through change in vegetation type via alien encroachment, reducing aquatic biodiversity. | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Wetland Baseline and Risk Assessment (Appendix E2) |
| | | | General Environment<br><br>(risks associated with BESS) | • Mechanical breakdown / Exposure to high temperatures<br>• Fires, electrocutions and spillage of toxic substances into the surrounding environment.<br>• Spillage of hazardous substances into the surrounding environment.<br>• Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas.<br>• Water Pollution – spillages into surrounding watercourses as well as groundwater.<br>• Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e., rivers, streams, etc) as a primary source of water. | | - | S | M | Pr | PR | ML | Yes | - Operators are trained and competent to operate the BESS. Training should include the discussion of the following:<br>  - Potential impact of electrolyte spills on groundwater;<br>  - Suitable disposal of waste and effluent;<br>  - Key measures in the EMPr relevant to worker's activities;<br>  - How incidents and suggestions for improvement can be reported.<br>- Training records should be kept on file | L | - |

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| *within the Gauteng Province, within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*<br><br>*<u>Activity 18 (c)(iv):</u> "The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (c) in the Gauteng Province within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."* | | | | • Generation of hazardous waste | | | | | | | | and be made available during audits.<br>- Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times.<br>- Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times.<br>- Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g., the inhalation of toxic fumes, etc.).<br>- Firefighting equipment should readily be available at | | |

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| | | | | | | | | | | | | | the BESS area and within the site.<br>- Maintain strict access control to the BESS area.<br>- Ensure all maintenance contractors / staff are familiar with the supplier's specifications.<br>- Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these.<br>- Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices.<br>- Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment.<br>- The assembly of the batteries on-site should be avoided as | | |

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| | | | | | | | | | | | | | | far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed.<br>- Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant.<br>- The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS.<br>- Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.<br>- Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. | | |

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| | | | | | | | | | | | | | - The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to. | | |
| | | SOCIAL/ECONOMIC ENVIRONMENT | Local unemployment rate | • Job creation.<br>• Business opportunities.<br>• Skills development. | | + | L | S | D | CR | NL | Yes | - See Table 6.3 | M | Social Impact Assessment<br>(Appendix E7) |
| | | | Economic multiplier effects | • Significance of the impact from the economic multiplier effects from the use of local goods and services. | | + | P | S | Pr | CR | NL | Yes | - See Table 6.3 | M | Social Impact Assessment<br>(Appendix E7) |
| | | | Improvements on shared infrastructure | • Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure on farms may benefit farming operations | + | | P | S | Pr | CR | NL | Yes | - See Table 6.3 | L | Social Impact Assessment<br>(Appendix E7) |
| | | | Potential loss of productive farmland | • The potential loss in productive farmland during the construction phase, due to factors such as the construction of roads, the preparation of foundations, power lines, offices etc. | - | | S | S | Pr | BR | ML | Yes | - See Table 6.3 | L | Social Impact Assessment<br>(Appendix E7) |
| | | | Influx of jobseekers and change in population in the study area. | • In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure | - | | L | P | Pr | IR | SL | Yes | - See Table 6.3 | L | Social Impact Assessment<br>(Appendix E7) |

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| | | | Safety and security impacts | • Temporary increase in safety and security concerns associated with the influx of people during the construction phase | - | | L | S | Pr | CR | NL | Yes | - See Table 6.3 | L | Social Impact Assessment (Appendix E7) |
| | | | Daily living and movement patterns | • Temporary increase in traffic disruptions and movement patterns during the construction phase. | | - | P | S | Pr | PR | ML | Yes | - See Table 6.3 | M | Social Impact Assessment (Appendix E7) |
| | | | Nuisance impacts (noise and dust) | • Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site. | - | | L | S | D | CR | NL | Yes | - See Table 6.3 | L | Social Impact Assessment (Appendix E7) |
| | | | Increased risk of potential veld fires | • The potential loss of livestock, crops, and farmsteads in the area.<br>• This also includes the damage and loss of farm infrastructure and the threatening of human lives that are associated with the increased risk of veld fires | - | | L | S | Pr | PR | SL | Yes | - See Table 6.3 | L | Social Impact Assessment (Appendix E7) |
| | | | Sense of place | • Intrusion impacts from construction activities will have an impact on the area's "sense of place". | - | | L | S | D | PR | NL | Yes | - See Table 6.3 | L | Social Impact Assessment (Appendix E7) |
| | | | Visual landscape | • Visual impact of construction activities on sensitive visual receptors in close proximity to the SEF | - | | L | S | D | PR | ML | Yes | - See Table 6.3 | L | Visual Impact Assessment (Appendix E4) |
| | | | Visual landscape | • Visual impact of construction activities on sensitive visual receptors in close proximity to the power line | - | | L | S | Pr | PR | ML | Yes | - See Table 6.3 | L | Visual Impact Assessment (Appendix E4) |
| | | | Traffic volumes | • Increase in development trips for the duration of the construction Phase<br>• Associated noise, dust and exhaust pollution | - | | L | M | D | CR | NL | Yes | - See Table 6.3 | L | Traffic Impact Assessment (Appendix E8) |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Tourism industry | • Since there are no sensitive tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Heritage resources | • As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development | + | | S | S | U | CR | NL | N/A | - For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed. | L | Heritage and Paleontological Impact Assessment (Appendix E6) |
| | | | Paleontological Heritage | • Construction stage Angus Solar Power Plant<br>• Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study | - | | S | P | - | IR | CL | N/A | N/A | L | |
| | | | Paleontological Heritage | • Construction stage powerline<br>• Loss of fossil heritage<br>• Destroy or permanently seal-in fossils at or below the surface that are then no longer available for scientific study | - | | S | P | - | IR | CL | N/A | N/A | L | |
| **OPERATIONAL PHASE** | | | | | | | | | | | | | | | |
| Activity 11(i) (GN.R. 327):<br>*"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*<br><br>Activity 12(ii)(c) (GN.R. 327):<br>*"The development of (ii) infrastructure or structures with a physical footprint of 100* | The key components of the proposed project are described below:<br><br>• PV Panel Array - To produce 250 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to | BIOPHYSICAL ENVIRONMENT | Vegetation | • Establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors | - | | S | L | Pr | BR | ML | Yes | - See Table 6.4 | L | Terrestrial Biodiversity Impact Assessment (Appendix E1) |
| | | | Air quality | • The proposed development will not result in any air pollution during the operational phase. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Geology | • Collapsible soil.<br>• Active soil (high soil heave).<br>• Erodible soil. | - | | S | S | Po | PR | ML | Yes | - Surface drainage should be provided to prevent water ponding. | L | - |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*<br><br>Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*<br><br>Activity 10 (c)(iv) (GN.R 324): *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."* | form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the yield.<br><br>• Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into the national grid. It is expected that generation from the facility will tie in with a newly proposed collector substation to be connected to on-site MTS and connected the existing Pluto 400/275/22kV MTS, it may also be required to create a 132KV feeder bay and transformation at Pluto MTS in order to connect the collector substation at the MTS with a single or double circuit 132KV connection line. The | | | • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns.<br>• The presence of undermined ground.<br>• Instability due to soluble rock.<br>• Steep slopes or areas of unstable natural slopes.<br>• Areas subject to seismic activity.<br>• Areas subject to flooding. | | | | | | | | | - Mitigation measures proposed by the detailed engineering geological investigation should be implemented. | | |
| | | Groundwater | • Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies. | - | | L | L | Po | PR | ML | Yes | - All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. | L | - |
| | | Aquatic Ecology | • Potential spread of alien vegetation | - | | L | L | Pr | IR | NL | Yes | - See Table 6.4 | L | Aquatic Ecological Assessment (Appendix E1) |
| | SOCIAL/ECONOMIC | Employment opportunities and skills development | • The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy. | | + | P | L | Pr | BR | NL | Yes | - See Table 6.4 | M | Social Impact Assessment (Appendix E7) |
| | | Development of non-polluting, renewable energy infrastructure | • Development of non-polluting, renewable energy infrastructure | | + | I | L | D | CR | ML | No | - N/A | M | Social Impact Assessment (Appendix E7) |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Project will inject up to 250MW into the National Grid.<br>• Supporting Infrastructure – The following auxiliary buildings including a gate house, ablutions, workshops, storage and warehousing areas, site offices and a control centre. The project requires the need for both temporary and permanent laydown areas.<br>• Roads – Access will be obtained via a public gravel road of the R500 regional road to the east of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure.<br>• Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used. | | Loss of agricultural land and overall productivity | • Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property. | - | | S | L | Pr | PR | SL | Yes | - See Table 6.4 | L | Social Impact Assessment (Appendix E7) |
| | | | Contribution to LED and social upliftment | • Contribution to LED and social upliftment during the operation of the project | | + | I | L | D | PR | NL | Yes | - See Table 6.4 | H | Social Impact Assessment (Appendix E7) |
| | | | Impact on tourism | • The potential impact on tourism due to the establishment of the Angus Solar Power Plant SEF | -<br>+ | | L | L | Pr | CR | NL | Yes | - See Table 6.4 | L | Social Impact Assessment (Appendix E7) |
| | | | Sense of place | • Visual impacts and sense of place impacts associated with the operation phase of Angus Solar Power Plant SEF. | - | | L | L | Pr | CR | ML | Yes | - See Table 6.4 | L | Social Impact Assessment (Appendix E7) |
| | | | Increase in household earnings | • The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings. | | + | P | L | Pr | BR | NL | Yes | - See Table 6.4 | M | Social Impact Assessment (Appendix E7) |
| | | | Visual landscape | • Visual impact on sensitive visual receptors within a 1km radius from the SEF | - | | L | L | D | PR | ML | Yes | - See Table 6.4 | L | Visual Impact Assessment (Appendix E4) |
| | | | Visual landscape | • Visual impact on sensitive receptors within a 1km radius from the power line | - | | L | L | Pr | PR | ML | Yes | - See Table 6.4 | L | Visual Impact Assessment (Appendix E4) |
| | | | Visual landscape | • Visual impact on sensitive visual receptors between a 1km and 3km radius from the SEF | - | | L | L | Pr | PR | ML | Yes | - See Table 6.4 | L | Visual Impact Assessment (Appendix E4) |
| | | | Visual landscape | • Visual impact on sensitive receptors between a 1km and 3km radius from the power line | - | | L | L | Pr | PR | ML | Yes | - See Table 6.4 | L | Visual Impact Assessment (Appendix E4) |

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| | | | | • Visual impact on sensitive visual receptors within a 3km and 5km radius from the SEF | - | | L | L | Pr | PR | ML | Yes | - See Table 6.4 | L | |
| | | | | • Visual impact on sensitive receptors between a 3km and 5km radius from the power line | - | | L | L | Pr | PR | ML | Yes | - See Table 6.4 | L | |
| | | | | • Visual impact on sensitive visual receptors within a 5-10km radius from the SEF | - | | L | L | Po | PR | ML | Yes | - See Table 6.4 | L | |
| | | | | • Visual impact on sensitive receptors within a 5-10km radius from the power line | - | | L | L | Po | PR | NL | Yes | - See Table 6.4 | L | |
| | | | | • Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility | - | | L | L | Po | CR | ML | Yes | - See Table 6.4 | L | |
| | | | | • Visual impacts of glint and glare as a visual distraction and possible air travel hazard | - | | L | L | U | CR | NL | Yes | - See Table 6.4 | L | |
| | | | | • Visual impacts on sense of place associated with the operational phase of the SEF | - | | L | L | Pr | PR | SL | Yes | - See Table 6.4 | L | |
| | | | | • Visual impacts and sense of place impacts associated with the operation phase of the PL | - | | L | L | Po | CR | ML | Yes | - See Table 6.4 | L | |
| | | | Traffic volumes | • Slight increase in trips due to permanent staff on site.<br>• Increase in trips around twice a year for transport of water to site for the cleaning of solar panels (water source to be clarified – borehole or transported to site / size of water tankers if water is to be delivered on site). | - | | L | S | Pr | CR | NL | Yes | - See Table 6.4 | L | Traffic Impact Assessment<br>(Appendix E8) |
| | | | Health & Safety | • The proposed development will not result | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | N/A | N/A |

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| | | | | in any health and safety impacts during the operational phase. | | | | | | | | | | | |
| | | | Noise levels | • The proposed development will not result in any noise pollution during the operational phase. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Heritage resources | • As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development | + | | S | S | U | CR | NL | N/A | For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed. | L | Heritage and Palaeontological Impact Assessment (Appendix E6) |
| | | | Electricity supply | • Generation of additional electricity. The power line will transport generated electricity into the grid. | + | | I | L | D | I | N/A | Yes | - | N/A | - |
| | | | Electrical infrastructure | • Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations. | + | | I | L | D | I | N/A | Yes | - | N/A | - |
| **DECOMMISSIONING PHASE** | | | | | | | | | | | | | | | |
| - | <u>Dismantlement of infrastructure</u><br><br>During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. | BIOPHYSICAL ENVIRONMENT | Vegetation<br><br>Vegetation | • Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites | - | | S | P | Pr | PR | ML | Yes | - See Table 6.5 | L | Terrestrial Biodiversity Impact Assessment (Appendix E1) |
| | | | | • Continued establishment and spread of alien invasive plant species due to the presence of migration corridors and disturbance vectors | - | | S | L | Pr | BR | ML | Yes | - See Table 6.5 | L | |

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| | <u>Rehabilitation of biophysical environment</u><br><br>The biophysical environment will be rehabilitated. | | Air quality | • Air pollution due to the increase of traffic of construction vehicles. | - | | S | S | D | CR | NL | Yes | - Regular maintenance of equipment to ensure reduced exhaust emissions. | L | - |
| | | | Geology | • It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Existing services infrastructure | • Generation of waste that needs to be accommodated at a licensed landfill site.<br>• Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant.<br>• Increase in construction vehicles. | - | | L | S | D | I | NL | Yes | - | L | - |
| | | | Groundwater | • Pollution due to construction vehicles. | - | | S | S | Pr | CR | ML | Yes | - | L | - |
| | | | Aquatic Ecology | • Loss of habitat containing protected species or Species of Special Concern<br>• Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones.<br>• Loss can also include a functional loss, through change in vegetation type via alien encroachment, reducing aquatic biodiversity. | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Aquatic Ecological Assessment (Appendix E1) |
| | | | Aquatic Ecology | • Loss of CBAs or potential areas with conservation potential | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Aquatic Ecological |

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| | | | | • Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas | | | | | | | | | | | Assessment (Appendix E1) |
| | | | Aquatic Ecology | • Loss of riparian and or wetland habitat<br>• During construction/decommissioning, complete clearing of the PV panel areas, as well any ancillary structures (offices and substations) will be required, which may impact the aquatic function or any corridors or connections between aquatic systems. However, these areas can be avoided by the proposed layout. | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Aquatic Ecological Assessment (Appendix E1) |
| | | | Aquatic Ecology | • Changes to the hydrological regime and increase potential for erosion<br>• Activities resulting in physical disturbance of aquatic systems which provide ecosystem services, especially where new crossings are made, or large hard engineered surfaces are placed within the buffer zones and have been included in any Critical Biodiversity Areas | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Aquatic Ecological Assessment (Appendix E1) |
| | | | Aquatic Ecology | • Changes to surface water quality characteristics | - | | L | L | Pr | IR | NL | Yes | - See Table 6.3 | L | Aquatic Ecological |

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| | | | | • During construction or decommissioning, earthworks will expose and mobilise earth materials, and a number of materials as well as chemicals will be imported and used on site and may end up in the surface water, including soaps, oils, grease and fuels, human wastes, cementitious wastes, paints and solvents, etc.<br>• Any spills during transport or while works area conducted in proximity to a watercourse has the potential to affect the surrounding biota.<br>• This can result in possible deterioration in aquatic ecosystem integrity and species diversity. | | | | | | | | | | | Assessment (Appendix E1) |
| | | | Traffic volumes | • Increase in development trips for the duration of the construction Phase<br>• Associated noise, dust and exhaust pollution | - | | L | M | D | CR | NL | Yes | - See Table 6.3 | L | Traffic Impact Assessment<br>(Appendix E8) |
| | | | Tourism industry | • Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area. | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | | | Heritage resources | • As no sites, features or objects of cultural historic significance have been identified in the project area, there would be no impact as a result of the proposed development | + | | S | S | U | CR | NL | N/A | For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed. | L | Heritage and Palaeontological Impact Assessment<br>(Appendix E6) |

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| **Nature of the impact:** | (N/A) No impact | (+) Positive Impact (-) | Negative Impact | | |
| **Geographical extent:** | (S) Site; | (L) Local/District; | (P) Province/Region; | (I) International and National | |
| **Probability:** | (U) Unlikely; | (Po) Possible; | (Pr) Probable; | (D) Definite | |
| **Duration:** | (S) Short Term; | (M) Medium Term; | (L) Long Term; | (P) Permanent | |
| **Intensity / Magnitude:** | (L) Low; | (M) Medium; | (H) High; | (VH) Very High | |
| **Reversibility:** | (CR) Completely Reversible; | (PR) Partly Reversible; | (BR) Barely Reversible; | - | |
| **Irreplaceable loss of resources:** | (IR) Irreversible | (NL) No Loss; | (ML) Marginal Loss; | (SL) Significant Loss; | (CL) Complete Loss |
| **Level of residual risk:** | (L) Low; | (M) Medium; | (H) High; | (VH) Very High | - |

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPr for the Solar Power Plant is included in Appendix F1. The EMPr for the power line is included in Appendix F2 and the EMPr for the substation is included in Appendix F3.

The Alien Invasive Plant Species Management and Rehabilitation Plan is included as Appendix F4.

## 6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which are addressed in more detail in this Draft EIR.

### 6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 12(ii)(c) (GN.R. 327): "*The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (c) within 32 meters of a watercourse measured from the edge of a watercourse."*
- Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."*
- Activity 27 (GN.R. 327): *"The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation…"*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 56 (ii) (GN.R 327): "*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"*
- Activity 1 (GN.R. 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*
- Activity 15 (GN.R. 325): *"The clearance of an area of 20 hectares or more of indigenous vegetation..."*
- Activity 4 (c)(iv) (GN.R 324): "*The development of a road wider than 4 metres with a reserve less than 13,5 metres within (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*
- Activity 10 (c)(iv) (GN.R 324): *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*

- Activity 12 (c)(ii) (GN.R 324): *"The clearance of an area of 300 square metres or more of indigenous vegetation (c) in the Gauteng Province, (ii) within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans."*

- Activity 14(ii)(c)(c)(iv) (GN.R 324): "*The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (c) within 32 metres of a watercourse, measured from the edge of a watercourse, c) within the Gauteng Province, within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*

- Activity 18 (c)(iv) (GN.R 324): *"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (c) in the Gauteng Province within (iv) sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*

During the construction phase temporary negative impacts are foreseen over the short term. Table 6.3 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

**Table 6.3:** Impacts and the mitigation measures during the construction phase.

| SPECIALIST STUDY | IMPACT | PRE-MITIGATION RATING | POST MITIGATION RATING | SUMMARY OF MITIGATION MEASURES |
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| Terrestrial Biodiversity Impact Assessment (Appendix E1) | Destruction, loss and fragmentation of habitats (including wetlands and rocky outcrop habitats in certain areas), ecosystems and the vegetation community (including protected plants). | Negative High | Negative Low | • All 'High' sensitivity areas must be avoided, and these areas should be clearly demarcated by non-hazardous/dangerous fencing. Brush cutting should be implemented beneath the panels developed within the medium sensitivity areas, and no vegetation clearing should be permitted beneath the panels.<br>• Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Low' sensitivity areas.<br>• The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon.<br>• A pre-construction walkthrough for protected flora and any flora SCC must be conducted. Any observed SCC flora or protected plants must be clearly demarcated prior to the commencement of site clearing. If construction activities are likely to affect any SCC or protected plants these individuals must be relocated as part of a plant rescue and protection plan, and a permit may need to be obtained before doing so.<br>• Existing access routes, especially roads, must be made use of.<br>• Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas.<br>• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. |

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| | | | | • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.<br>• No servicing of equipment on site unless necessary.<br>• All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.<br>• Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment.<br>• Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.<br>• All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.<br>• It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.<br>• A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.<br>• All construction waste must be removed from site at the closure of the construction phase.<br>• Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes the wetting of exposed soft soil surfaces.<br>• No non-environmentally friendly suppressants may be used as this could result in the pollution of water sources.<br>• Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. |

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| | | | | • Litter, spills, fuels, chemical and human waste in and around the project area must be minimised and controlled according to the waste management plan.<br>• Cement mixing may not be performed on the ground. It is recommended that only closed side drum or pan type concrete mixers be utilised. Any spills must be immediately contained and isolated from the natural environment, before being removed from site.<br>• A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.<br>• The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility within every 10 days at least.<br>• Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regards to waste management. Under no circumstances may domestic waste be burned on site or buried on open pits.<br>• Refuse bins will be responsibly emptied and secured. Temporary storage of domestic waste shall be in covered and secured waste skips. Maximum domestic waste storage period will be 10 days. |
| | Introduction of IAP species and invasive fauna. | | | • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition.<br>• The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.<br>• Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. |

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| | | | | • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC. |
| | Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching). | | | • A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.<br>• Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna.<br>• The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.<br>• The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna.<br>• Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.<br>• No trapping, killing, or poisoning of any wildlife is to be allowed and<br>• Signs must be put up to enforce this. Monitoring must take place in this regard.<br>• Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. |

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| | | | | • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.<br>• Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.<br>• Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling.<br>• Fencing mitigations:<br>  ○ Top 2 strands must be smooth wire<br>  ○ Routinely re-tension loose wires<br>  ○ Minimum 30cm between wires<br>  ○ Place markers on fences.<br>• Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area.<br>• Use environmentally friendly cleaning and dust suppressant products.<br>• Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).<br>• All personnel and contractors are to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. |

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| | | | | • Discussions are required on sensitive environmental receptors within the PAOI to inform contractors and site staff of the presence of protected species and sensitive habitat, their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr.<br>• Contractors and employees must all undergo the induction and must be made aware of any sensitive areas to be avoided.<br>• Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds.<br>• Only existing access routes and walking paths may be made use of.<br>• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events etc.<br>• A stormwater management plan must be compiled and implemented. |
| Avifauna Impact Assessment (Appendix E3) | Habitat Destruction | Negative High | Negative Low | • Demarcation and avoidance of the riparian area must be done by using safety tape to ensure a known barrier is present that may not be crossed;<br>• If possible solar panels must be mounted on pile driven or screw foundations, such as post support spikes, rather than heavy foundations, such as trench-fill or mass concrete foundations, to reduce the negative effects on natural soil functioning, such as its filtering and buffering characteristics, while maintaining habitats for both fossorial and epigenic biodiversity (Bennun et al, 2021). If concrete foundations are used that would increase the impact of the project as there would be direct impacts to soil permeability and characteristics, thereby influencing inhabitant fauna. In addition, stormwater runoff and runoff from cleaning the panels would be increased, increasing erosion in the surrounding areas;<br>• Indigenous vegetation to be maintained under the solar panels to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). The photographs below are sourced from these documents;<br>• Vegetation clearing to commence only after the necessary permits have been obtained; |

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| | | | | • Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities;<br>• Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place.<br>• Habitat clearing should only occur within the approved PV layout. |
| | Destruction, degradation and fragmentation of surrounding habitats | Negative High | Negative Low | • Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc;<br>• All solid waste must be managed in accordance with a Solid Waste Management Plan. Recycling is encouraged;<br>• All construction activities and roads to be within the clearly defined and demarcated areas;<br>• Temporary laydown areas must be clearly demarcated and rehabilitated with indigenous vegetation subsequent to end of use;<br>• Appropriate dust control measures to be implemented;<br>• Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act;<br>• Cement must be mixed in a designated area on a liner away from water sources and buffers and that successful rehabilitation of the construction areas can take place; and<br>• All hazardous materials, if any, must be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner. |
| | Displacement/emigration of avifauna community (including SCC) due to noise pollution | Negative Medium | Negative Low | • Construction activity should be restricted to daylight hours, as nocturnal species are highly dependent on sound and/or vocalisations for behavioural processes. However, low impact and low noise construction activities with minimal light might be considered during night time; |

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| | | | | • All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected; and<br>• If generators are to be used these must be soundproofed. Reduce the decibel level of a generator by 15-30 decibels. |
| | Direct mortality from persecution or poaching of avifauna species and collection of eggs | Negative Medium | Negative Low | • All personnel must undergo environmental awareness training that includes educating on not poaching/persecuting species and collecting eggs;<br>• Prior to commencing work each day, two individuals should traverse the working area to disturb any avifauna and so they have a chance to vacate the area; and<br>• Any avifauna threatened by construction activities that does not vacate the area should be removed safely by an appropriately qualified environmental officer or removal specialist. |
| | Direct mortality from increased vehicle and heavy machinery traffic | Negative Medium | Negative Low | • All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and<br>• All construction vehicles must adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. |
| Wetland Baseline and Risk Assessment (Appendix E2) | Disturbance and degradation of wetland vegetation | Negative Medium | Negative Low | • Restrict the disturbance and clearance footprint to within 5 m on either side of the proposed connection corridor (10 m disturbance corridor).<br>• Avoid wetlands and buffers where feasible.<br>• Implement a rehabilitation plan for any disturbed wetlands. Cleared areas must be rehabilitated and stabilised to avoid impacts to adjacent wetland and buffer areas.<br>• Although the prescribed post-mitigation buffer as per the national buffer determination tool is 25 m attempt wherever possible to maintain a 33 m buffer on the delineated wetlands to lower the potential for bird collisions which are highest near water resources.<br>• Reduce the disturbance footprint and the unnecessary clearing of vegetation when traversing the identified drainage lines. |

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| | | | | • Make use of existing access routes as much as possible before new routes are considered. Any selected "new" route must not encroach into the wetland areas. |
| | Increased bare surfaces, runoff and potential for erosion. | Negative Low | Negative Low | • Keep tower base excavation and soil heaps neat and tidy.<br>• Limit construction activities in proximity (< 50 m) to wetlands to the dry season when storms are least likely to wash concrete and sand into wetlands. This is only where towers are within wetlands and buffer areas.<br>• Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.<br>• Mixing of concrete must under no circumstances take place in any wetland or their buffers. Scrape the area where mixing and storage of sand and concrete occurred to clean once finished.<br>• Limit the placement of towers within wetlands and buffer areas where feasible.<br>• Do not situate any of the construction material laydown areas within any wetland or buffer area. Adhere to a 25 m buffer in these instances.<br>• No machinery should be allowed to be parked in any wetlands or buffer areas. |
| | Introduction and spread of alien and invasive vegetation | Negative Medium | Negative Low | • Promptly remove all alien and invasive plant species that may emerge during construction (i.e., weedy annuals and other alien forbs) must be removed.<br>• Limit soil disturbance<br>• The use of herbicides is not recommended in or near wetlands (opt for mechanical removal).<br>• Appropriately stockpile topsoil cleared from the corridor footprint.<br>• Clearly demarcate corridor construction footprint and limit all activities to within this area.<br>• Minimize unnecessary clearing of vegetation beyond the tower footprints and connection corridors.<br>• Lightly till any disturbed soil around the tower footprint to avoid compaction. |
| | Increased sediment loads to downstream reaches | Negative Low | Negative Low | • See mitigation for increased bare surfaces, runoff and potential for erosion.<br>• Re-instate topsoil and lightly till transmission tower disturbance footprint. |

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| | Contamination of wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles as well as Contamination and eutrophication of wetland systems with human sewerage and litter. | Negative Low | Negative Low | • Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility.<br>• Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering wetland or buffer areas.<br>• Mixing of concrete must under no circumstances take place within the wetland or buffer areas.<br>• Check for oil leaks, keep a tidy operation, and promptly clean up any spills or litter.<br>• Provide appropriate sanitation facilities for workers during construction and service them regularly.<br>• The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility;<br>• The Contractor must be in possession of an emergency spill kit that must be always complete and available on site;<br>• Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in situ or be placed in containers and removed from the site for disposal in a licensed facility; |
| Visual Impact Assessment (Appendix E4) | Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP | Negative Low | Negative Low | Planning:<br>• Retain and maintain natural vegetation immediately adjacent to the development footprint.<br>Construction:<br>• Ensure that vegetation is not unnecessarily removed during the construction phase.<br>• Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.<br>• Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. |
| | Visual impact of construction activities on sensitive visual receptors to the grid connection. | Negative Low | Negative Low | |

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| | | | | • Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site.<br>• Reduce and control dust during construction by utilising dust suppression measures.<br>• Limit construction activities between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting.<br>• Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping. |
| Soil and Agricultural Assessment (Appendix E5) | Loss of Land Capability, Soil erosion and compaction effects | Negative Low | Negative Low | • Vegetate or cover all stockpiles after stripping/removing soils.<br>• Storage of potential contaminants should be undertaken in bunded areas.<br>• All contractors must have spill kits available and be trained in the correct use thereof.<br>• All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".<br>• No cleaning or servicing of vehicles, machines and equipment may be undertaken in water resources.<br>• Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems. |
| Social Impact Assessment (Appendix E7) | The creation of direct and indirect employment opportunities during the construction phase of the project | Low Positive | Medium Positive | Enhancement:<br>• A local employment policy should be adopted to maximise opportunities made available to the local labour force.<br>• Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Merafong City LM, West Rand DM, Gauteng Province, South Africa, or elsewhere.<br>• Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase.<br>• As with the labour force, suppliers should also as far as possible be sourced locally. |

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| | | | | • As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used.<br>• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. |
| | Significance of the impact from the economic multiplier effects from the use of local goods and services. | Low Positive | Medium Positive | Enhancement:<br>• It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy.<br>• A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable.<br>• Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible. |
| | Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure on farms may benefit farming operations | Low Positive | Low Positive | Enhancement:<br>• The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure.<br>• The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved.<br>• A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created (or sourced from the local Municipality, where available) and companies listed thereon should be invited to bid for project-related work where applicable and this would include the maintenance of this shared infrastructure. |
| | The potential loss in productive farmland during the construction phase, due | Negative Medium | Negative Low | • The proposed site for the Angus Solar Power Plant SEF needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. |

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| | to factors such as the construction of roads, the preparation of foundations, power lines, offices etc | | | • Game grazing on the proposed site need to be relocated.<br>• All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO).<br>• Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.<br>• Mitigation measures from the Agricultural and Soil Report, should also be implemented. |
| | In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure | Negative Medium | Negative Low | • Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work.<br>• Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.<br>• Provide transportation for workers (from Carletonville and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site.<br>• As far as possible, working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.<br>• Compile and implement a grievance mechanism.<br>• Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.<br>• Prevent the recruitment of workers at the project site.<br>• Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.<br>• Establish clear rules and regulations for access to the proposed site.<br>• Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours.<br>• Inform local community organisations and policing forums of construction times and the duration of the construction phase.<br>• Establish procedures for the control and removal of loiterers from the construction site. |

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| | Temporary increase in safety and security concerns associated with the influx of people during the construction phase | Negative Medium | Negative Low | • As far as possible, working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.<br>• Provide transportation for workers to prevent loitering within or near the project site outside of working hours.<br>• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.<br>• The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.<br>• Access in and out of the construction site should be strictly controlled by a security company appointed to the project.<br>• A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.<br>• The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security.<br>• The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.<br>• The EPC Contractor must prepare a Method Statement which deals with fire prevention and management. |
| | Temporary increase in traffic disruptions and movement patterns during the construction phase. | Negative Medium | Negative Medium | • All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.<br>• Heavy vehicles should be inspected regularly to ensure their road worthiness.<br>• Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the R501 and R500 roads to warn road users of the |

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| | | | | construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.<br>• Implement penalties for reckless driving to enforce compliance to traffic rules.<br>• Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work).<br>• The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.<br>• The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.<br>• The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase.<br>• A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. |
| | Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site | Negative Medium | Negative Low | • The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible.<br>• Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.<br>• Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues.<br>• A CLO should be appointed, and a grievance mechanism implemented. |
| | The potential loss of livestock, crops, and farmsteads in the area. This also includes the damage | Negative Medium | Negative Low | • A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. |

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| | and loss of farm infrastructure and the threatening of human lives that are associated with the increased risk of veld fires | | | • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment.<br>• No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas.<br>• Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly.<br>• Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.<br>• The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor. |
| | Intrusion impacts from construction activities will have an impact on the area's "sense of place". | Negative Medium | Negative Low | • Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project.<br>• Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.<br>• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible.<br>• Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.<br>• All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.<br>• Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area. |

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| Traffic Impact Assessment (Appendix E8) | Access requirements and internal road infrastructure. | Negative Low | Negative Low | • Maintenance to lower order roads can be incorporated into the schedule, especially the maintenance of the road accessing the site. The site access road would require construction at the start of the construction project to safely transport the sensitive cargo through the site. A gravel roads maintenance programme for the gravel roads on site is recommended. |
| | Increased traffic on haulage routes: | Negative Low | Negative Low | • The impact of the increased traffic on regional routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic. |
| | Increased traffic on local routes: | Negative Low | Negative Low | • The impact of the increased traffic on local routes can be mitigated by staggering trips and scheduling so that peak hour traffic in local towns is not impacted by construction traffic. |

### 6.2.2 Impacts during the operational phase.

During the operational phase the site will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 14 (GNR 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- Activity 1 (GN.R 325): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."*
- Activity 10 (c)(iv) (GN.R 324): *"The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres (c) the Gauteng province, (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans."*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 20-year period. Table 6.4 summarizes the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

**Table 6.4:** Impacts and the mitigation measures during the operational phase.

| SPECIALIST STUDY | IMPACT | PRE-MITIGATION RATING | POST MITIGATION RATING | SUMMARY OF MITIGATION MEASURES |
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| Terrestrial Biodiversity Assessment Report (Appendix E1) | Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive wetland and rocky areas, and protected plants). | Negative High | Negative Low | • Mitigation measures proposed for the construction phase should be implemented.<br>• The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon.<br>• Existing access routes, especially roads, must be made use of.<br>• Areas that are denuded during construction need to be re-vegetated with indigenous vegetation according to a habitat rehabilitation plan, to prevent erosion during flood and wind events and to promote the regeneration of functional habitat. This will also reduce the likelihood of encroachment by invasive alien plant species. All grazing mammals must be kept out of the areas that have recently been re-planted.<br>• A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site.<br>• Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.<br>• No servicing of equipment on site unless necessary.<br>• All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers.<br>• Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. |

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| | | | | • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem.<br>• All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.<br>• It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.<br>• A fire management plan needs to be complied and implemented to restrict the impact fire would have on the surrounding areas.<br>• Waste management must be a priority and all waste must be collected and stored effectively and responsibly according to a site-specific waste management plan. Dangerous waste such as metal wires and glass must only be stored in fully sealed and secure containers, before being moved off site as soon as possible. |
| | Continuing spread of IAP and weed species. | Negative High | Negative Low | • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.<br>• Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.<br>• No trapping, killing, or poisoning of any wildlife is to be allowed and<br>• Signs must be put up to enforce this. Monitoring must take place in this regard.<br>• Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. |

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| | | | | • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.<br>• Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons.<br>• Use environmentally friendly cleaning and dust suppressant products.<br>• An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changed in IAP composition.<br>• The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths.<br>• Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas.<br>• A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC. |
| | Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.) | Negative High | Negative Low | • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this.<br>• Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals.<br>• No trapping, killing, or poisoning of any wildlife is to be allowed and |

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| | | | | • Signs must be put up to enforce this. Monitoring must take place in this regard.<br>• Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible.<br>• All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.<br>• Schedule activities and operations during least sensitive periods, to avoid migration, nesting, and breeding seasons. |
| Avifauna Impact Assessment Report (Appendix E3) | Collisions with infrastructure associated with the SPP Facility | Negative High | Negative Medium | Solar Mitigations:<br>• Post-construction monitoring should follow the BirdLife South Africa best practice guidelines for solar energy facilities (BirdLife South Africa, 2017). If monitoring results indicate excessive bird fatalities, then adaptive mitigations should be implemented. Before implementation, these should be discussed with the avifaunal specialist and ECO and could include the retrofitting/incorporation of additional visual cues/diverters to existing PV panels/infrastructure.<br>• Fencing mitigations:<br>o Top 2 strands must be smooth wire;<br>o Routinely retention loose wires;<br>o Minimum distance between wires is 300 mm; and<br>o Place markers on fences.<br>Power line mitigations:<br>• The design of the proposed grid connection must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa. |

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| | | | | • The air space used by the gridlines must be minimised by placing them underground as far as possible;<br>• Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. Place pylons and associated infrastructure along exciting infrastructure (e.g. roads, other power lines).<br>• The power line should be marked with bird diverters along the entire line in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that Blue Crane mortality was reduced by 92% (95% confidence interval [CI]: 77–97%) and all large birds by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted along the entire length of the OHL. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites. The devices must be placed 5 m apart. |
| | Electrocution due to infrastructure associated with the SPP Facility | Negative Medium | Negative Low | • The design of the proposed grid connection must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.<br>• Insulation where energised parts and/or grounded parts are covered with materials appropriate for providing incidental contact protection to birds. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present, these should be covered; and<br>• Perch discouragers can be used such as perch guards or spikes. Considerable success achieved by providing artificial bird safe perches, which are placed at a safe distance from the energised parts (Prinsen et al, 2012). |

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| | Direct mortality from roadkills, persecution or poaching of avifauna species and collection of eggs | Negative Medium | Negative Low | • Signs must be put up to enforce this. Should someone be caught, an appropriate fine must be enforced.<br>• All personnel must undergo environmental induction with regards to awareness about speed limits and roadkill; and<br>• All vehicles must adhere to a speed limit of a maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. |
| | Pollution of water sources and surrounding habitat due to cleaning products of the solar panels | Negative High | Negative Low | • Only environmentally friendly chemicals are to be used for cleaning of the panels. |
| | Heat radiation from the BESS and solar panels | Negative Medium | Negative Low | • The BESS must be enclosed in a structure with a non-reflective surface;<br>• A fire management plan needs to be put in place; and<br>• Existing vegetation should be kept under the panels to ensure that additional reflection is not taking place from the surface below the panels. |
| | Encroachment of Invasive Alien Plants into disturbed areas | Negative High | Negative Low | • An IAP Management Plan must be written and implemented for the development. The developer must contract a specialist to develop the plan and the developer is responsible for its implementation;<br>• All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan. |
| Wetland Baseline and Risk Assessment (Appendix E2) | Degradation of wetland vegetation wetland vegetation | Negative Low | Negative Low | • Clear vegetation in line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead powerline servitudes".<br>• Avoid the use of herbicides and diesel to treat stumps within the wetland and buffer areas.<br>• Make use of existing access routes as much as possible, before new routes are considered. Any selected “new” route must not encroach into the wetland areas. |

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| | Proliferation of alien and invasive species | Negative Medium | Negative Low | • In line with the 2010 Eskom Environmental Procedure Document entitled "Procedure for vegetation clearance and maintenance within overhead powerline servitudes" all alien vegetation along the transmission servitude should be managed in terms of the Regulation GNR.1048 of 25 May 1984 (as amended) issued in terms of the Conservation of Agricultural Resources Act, Act 43 of 1983. By this Eskom is obliged to control category 1, 2 and 3 plants to the extent necessary to prevent or to contain the occurrence, establishment, growth, multiplication, propagation, regeneration and spreading such plants within servitude areas. |
| Visual Impact Assessment (Appendix E4) | Visual impact on sensitive visual receptors within a 1km radius from the SEF | Negative Medium | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>• Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient.<br>Operations:<br>• Maintain general appearance of the facility as a whole. |
| | Visual impact on sensitive receptors within a 1km radius from the power line | Negative Medium | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>Operations:<br>• Maintain general appearance of the power line corridor.<br>• Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source. |
| | Visual impact on sensitive visual receptors between a 1km and 3km radius from the SEF | Negative Medium | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>• Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient. |

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| | | | | Operations:<br>• Maintain general appearance of the facility as a whole. |
| | Visual impact on sensitive receptors between a 1km and 3km radius from the power line. | Negative Medium | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>Operations:<br>• Maintain general appearance of the power line corridor.<br>• Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source. |
| | Visual impact on sensitive visual receptors within a 3km and 5km radius from the SEF | Negative Medium | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>• Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient.<br>Operations:<br>• Maintain general appearance of the facility as a whole. |
| | Visual impact on sensitive receptors between a 3km and 5km radius from the power line. | Negative Low | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>Operations:<br>• Maintain general appearance of the power line corridor.<br>• Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source. |
| | Visual impact on sensitive visual receptors within a 5-10km radius from the SEF | Negative Low | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>• Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient. |

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| | | | | Operations:<br>• Maintain general appearance of the facility as a whole. |
| | Visual impact on sensitive receptors within a 5-10km radius from the power line | Negative Low | Negative Low | Planning:<br>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.<br>Operations:<br>• Maintain general appearance of the power line corridor.<br>• Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source. |
| | Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility | Negative Medium | Negative Low | Planning & Operation<br>As far as practically possible:<br>• Shield the source of light by physical barriers (walls, vegetation etc.)<br>• Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights.<br>• Make use of minimum lumen or wattage in fixtures.<br>• Make use of down-lighters, or shield fixtures.<br>• Make use of low-pressure sodium lighting or other types of low impact lighting.<br>• Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.<br>• The use of night vision or thermal security cameras are very effective and can replace security lighting entirely. |
| | Visual impacts of glint and glare as a visual distraction and possible air travel hazard | Negative Low | Negative Low | • No mitigation measures are required. |

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| | Visual impacts on sense of place associated with the operational phase of the SEF | Negative Medium | Negative Low | • It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity.<br>• The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area.<br>• Implement good housekeeping measures. |
| | Visual impacts and sense of place impacts associated with the operation phase of the PL. | Negative Low | Negative Low | • It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity.<br>• The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area.<br>• Implement good housekeeping measures. |
| Soil and Agricultural | Loss of Land Capability, Soil erosion and compaction effects | Negative Low | Negative Low | • Continuously monitor erosion on site.<br>• Monitor compaction on site. |

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| Assessment (Appendix E5) | | | |
| Heritage and Palaeontological Impact Assessment (Appendix E6) | Potential Impact on Heritage Features | Neutral | • it is not anticipated that the proposed development of the SPP and associated grid connection infrastructure will negatively impact on significant archaeological heritage. Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment.<br>• If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward. |
| | Potential Impact on Palaeontological Features | Neutral | • The proposed development will not lead to damaging impacts on the palaeontological resources of the area.<br>• The ECO for this project must be informed that the Malmani Subgroup has a Very High Palaeontological Sensitivity.<br>• If Palaeontological Heritage is uncovered during surface clearing and excavations the Chance find Protocol attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/site manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out.<br>• Before any fossil material can be collected from the development site the specialist involved would need to apply for a collection permit from SAHRA. Fossil material must be housed in an official collection (museum |

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| | | | | or university), while all reports and fieldwork should meet the minimum standards for palaeontological impact studies proposed by SAHRA (2012). |
| Social Impact Assessment (Appendix E7) | The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy | Positive Low | Positive Medium | Enhancement:<br>• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community.<br>• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.<br>• Vocational training programs should be established to promote the development of skills. |
| | Development of non-polluting, renewable energy infrastructure | Positive Medium | Positive Medium | • N/A |
| | Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property | Negative Medium | Negative Low | • The proposed mitigation measures for the construction phase should have been implemented at this stage. |
| | Contribution to LED and social upliftment during the operation of the project | Positive Medium | Positive High | Enhancement:<br>• A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.<br>• Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused.<br>• The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time). |
| | The potential impact on tourism due to the | Positive/Negative Low | Positive/Negative Low | • Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a |

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| | establishment of the Angus Solar Power Plant SEF | | | "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. |
| | Visual impacts and sense of place impacts associated with the operation phase of Angus Solar Power Plant SEF | Negative Low | Negative Low | • To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Angus Solar Power Plant, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard. |
| | The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings | Positive Low | Positive Medium | Enhancement:<br>• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community.<br>• With the recruitment of the local community for job creation and increasement in household earnings will automatically be seen in the area surrounding the development. |
| Traffic Impact Assessment (Appendix E8) | Slight increase in trips due to permanent staff on site. | Negative Low | Negative Low | • Source on-site water supply if possible.<br>• Utilise cleaning systems for the panels needing less vehicle trips.<br>• Schedule trips for the provision of water for the cleaning of panels outside peak traffic times as much as possible. |

### 6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. Table 6.5 provides a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impacts on soils, pressure on existing service infrastructure and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

**Table 6.5**: Impacts and the mitigation measures during the decommissioning phase

| SPECIALIST STUDY | IMPACT | PRE-MITIGATION RATING | POST MITIGATION RATING | SUMMARY OF MITIGATION MEASURES |
|---|---|---|---|---|
| Wetland Baseline and Risk Assessment (Appendix E1) | Degradation of wetland vegetation and proliferation of alien and invasive species | Negative Low | Negative Low | • See mitigation for the impacts on direct loss, disturbance and degradation of wetlands and spread of alien and invasive plants.<br>• Control should continue for a minimum of three years following decommissioning. |
| | Increased bare surfaces, runoff and potential for erosion | Negative Low | Negative Low | • See mitigation for increased bare surfaces, runoff and potential for erosion and increased sediment loads during construction |
| Traffic Impact Assessment (Appendix E8) | Increase in development trips for the duration of the construction Phase<br><br>Associated noise, dust and exhaust pollution | Negative Medium | Negative Low | • Refer to construction mitigation measures (Table 6.3) |

## 6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Terrestrial Biodiversity Assessment– The Biodiversity Company (see Appendix E1)
- Wetland Baseline and Risk Assessment – The Biodiversity Company (see Appendix E2)
- Avifaunal Impact Assessment – The Biodiversity Company (see Appendix E3)
- Visual Impact Assessment – Donaway Environmental (see Appendix E4)
- Soil and Agricultural Assessment - The Biodiversity Company (see Appendix E5)
- Heritage and Palaeontological Impact Assessment – CTS Heritage (see Appendix E6)
- Social Impact Assessment – Donaway Environmental (see Appendix E7)
- Traffic Impact Assessment – Bvi Consulting Engineers (see Appendix E8)
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics, in conjunction with the project specialists (refer to Section 7 of this report).

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

### 6.3.1 Terrestrial Biodiversity Impacts

The potential impact of the proposed development on threatened flora and fauna known to occur in the Gauteng Province had to be determined. The main question which needs to be addressed is:

*"How will the proposed development impact on the terrestrial biodiversity?"*

The Terrestrial Biodiversity Impact Assessment (refer to Appendix E1), the project activities will have a negative effect on the natural environment of the area. Anthropogenic activities drive habitat destruction leading to the displacement of fauna and flora and possibly causing direct mortality. Land clearing destroys local wildlife habitat and can lead to the loss of local breeding grounds, foraging and nesting sites, and wildlife movement corridors such as rivers, streams and drainage lines, or other locally important features. The removal of natural vegetation is likely to reduce the habitat available for all types of fauna species and hence reduce animal populations and species compositions within the area.

Potential impacts were evaluated against the data captured during the desktop assessment and field survey to identify associated relevance to the habitats within the PAOI. The impacts associated with the proposed activities were then subjected to a prescribed impact assessment methodology as provided by the client, which is available on request. The planning, decommissioning and/or rehabilitation phases were not considered based on the nature of the likely activities and the associated negatable impacts expected during these phases. Refer to section 6.2 below for the full impact assessment.

The Angus SPP project area overlaps with impacted CBA and ESA areas, which are considered to maintain at least a moderate level of ecological functionality. Parts of the PAOI also intercept with important wetland systems and rocky features. For these reasons it is important that the management outcomes presented above be adhered to, in order to properly mitigate the negative environmental impacts that will stem from the project activities.

No flora SCC were recorded during the survey; however, it is noted that some of these may be found to occur in the 'High' sensitivity areas. No fauna SCC were recorded; however, it has been noted that up to three (3) have been previously observed within the area, with the Pyxicephalus adspersus (Giant Bullfrog) being the only species likely to frequently occur. No protected tree species are likely to occur, although a number of provincially protected plants were recorded and numerous protected fauna species have been historically observed in the area, such as Orycteropus afer (Aardvark) and Proteles cristatus (Aardwolf).

Completion of the terrestrial biodiversity assessment led to an overall validation of the 'Very High' classification for the terrestrial biodiversity theme sensitivity as allocated by the National Environmental Screening Tool. This is due to the large portions of high sensitivity habitat within the project area (rocky outcrops and water resources) – which overlap with both CBA and ESA sites. It is noted that large areas of medium sensitivity grassland do exist, and proposed development may be limited to these sections (in addition to 'Low' sensitivity areas). Both the animal and plant species themes are assigned a 'Medium' sensitivity, largely due the fact that protected fauna and flora are known to exist in the area, and the presence of SCC is considered possible.

The main impacts that may be expected to occur, as a result of the proposed activities, include the following:

- Direct habitat loss and fragmentation (including the loss of functional grassland areas);
- Degradation of surrounding habitat;
- Disturbance and displacement of fauna (including direct mortality); and
- Introduction and further spreading of IAP and weed species.

All mitigation measures as described in this report must be implemented so as to reduce the significance of all anticipated impacts to an acceptable level (from 'High' to 'Low'). The cumulative impact of a single project PV site, taking into account the transformation of surrounding land, is rated as 'Low'. This is because a single proposed development does not result in the significant loss of any important habitat corridors and one project footprint is regarded as relatively small, especially considering the fact that no other significant solar projects are approved in the region (within a 30 km radius). However, the cumulative impact of all four proposed Pluto PV projects, also taking into account the transformation of surrounding land, is rated as 'Medium' – largely due to the more significant loss in important corridors of remaining habitat. Careful and considerate spatial management and planning within the region must be a priority, in order to preserve the remaining important and functional local habitat corridors. Additionally, functional CBA areas within the overall PAOI (high sensitivity rocky and wetland habitat) must be preserved in order to achieve this goal.

Considering the assessment findings, no fatal flaws are evident for the proposed project. It is the opinion of the specialists that the project may be favourably considered, on condition that all prescribed mitigation measures and below recommendations are implemented.

All 'High' sensitivity habitat features must be avoided, this includes the Water Resource and Rocky Outcrop habitat units. These areas intercept with provincial CBA and ESA sites, and they represent important and unique biodiversity resources within a degraded landscape and as such serve a critical supportive role to the ecology and habitat connectivity of the region.

It is recommended that a plant rescue and protection plan be developed for the proposed project and implemented prior to the start of the construction phase and during the wet season. This is to limit the loss of a number of provincially protected plant species that were confirmed to occur within the PAOI, and to ensure that no flora SCC are present in the final footprint areas. An IAP management and habitat rehabilitation plan must be developed and implemented for the project, with a particular focus on preserving and rehabilitating the highly sensitive habitats adjacent to any approved development.

The specialist notes that the proposed layout, as presented in is deemed sufficient from an ecological perspective in that a suitable amount of high sensitivity habitat is avoided by proposed development. Powerline towers should avoid water resource areas.

### 6.3.2 Wetland Impacts

The potential impact of the proposed development on wetlands and riparian areas had to be determined. The main question which needs to be addressed is:

*"How will the proposed development impact on wetlands?"*

According to the Wetland Baseline and Risk Assessment (Appendix E2), during the site assessment, Eight HGM units were identified and assessed within the project area of influence. These comprise of seven depression wetlands and a hillslope seep wetland. Of these identified wetlands, four were noted to fall within the Angus SPP footprint (connection corridor) The wetlands presented PES scores of C – "Moderately Modified due to the modification of the substrate, hydrology and vegetation of the wetlands through anthropogenic activities. The ecosystem service and EIS scores were determined to be "Low" (HGM 8), "Moderate" (HGM 3 and HGM 4) and "Very High" (HGM 6). A 25 m post mitigation buffer was assigned to the wetland systems for the connection corridor.

One risk assessment was conducted for the project, which only considers the connection corridor. The risk assessment for the PV area was not considered due the area posing no risk to the assessed wetlands and lies approximately 350m away from the nearest wetland. therefore, no fatal flaws were identified for the PV area.

The risk assessment for the connection corridor revealed that both direct and indirect impacts may occur within the wetland areas, but with the correct placements of the pylons, avoidance can be met.

Based on the results and conclusions presented in this report, the specialist recommends that if all mitigation measures can be met with the placement of the pylons, it is expected that the proposed activities will pose low risks on the wetlands and thus no fatal flaws were identified

for the project. A General Authorisation (GN 509 of 2016) is required for the water use authorisation.

If the pylon placements cannot be altered in such a way that the wetland and their associated buffers cannot be avoided a wetland compensation plan should be compiled and a Water Use Licence (WUL) will be required.

### 6.3.3 Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Gauteng Province had to be determined. The main question which needs to be addressed is:

*"How will the proposed development impact on the avifauna?"*

According to the Avifaunal Impact Assessment (Appendix E3) This Avifauna Impact Assessment aimed to provide information to guide the risk of the proposed Solar PV project and the associated infrastructure to the Avifauna community likely affected by its development. Two site visits were conducted for this regime 2 assessment. The first was conducted in late summer, over 3 days from the 5th to the 7th of April 2023, and the second, during winter, over 6 days from the 15th of July to the 20th of July 2023. These two site visits are considered sufficient from a seasonal perspective and require no additional season assessment. Sampling consisted of Standardised Point Counts as well as random diurnal incidental surveys. The total number of individual species accounts for approximately 38% of the total number of expected species. Six SCC was recorded within the PAOI during the survey period within point counts Twenty six (26) risk species were recorded in the field investigation. These are species at risk for collisions, electrocutions or sensitive to habitat loss.

The SEI of the proposed PAOI was found to be mainly medium. However, the sensitivity can be assumed to be Impacts were identified as being High to Medium in the Construction Phase, most of which could be reduced to Medium to Low, and even Absent with the application of mitigation measures. Impacts in the operational phase are expected to be Medium and can be reduced to Medium to Low with mitigation measures. Decommissioning phase impacts are expected to be Medium and can be reduced to Low with mitigation measures. Cumulative impacts are Low for the project in isolation and medium in consideration with the other similar projects. The final layout of the proposed development (Figure L) avoids the delineated sensitive features, further supporting that the residual risks are deemed to be "Low".

Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic devices) and thickened wire spirals (static devices) that increase the visibility of the lines should be fitted along the entire length of overhead lines. In addition, surrounding Eskom lines needs to mitigate as the cumulative impact is high. An injured Gyps coprotheras (Cape Vulture) was found and admitted to VulPro for rehabilitation due to Power line collision.

Management measures include ensuring the construction footprint is kept small and industry-standard mitigations are put into place for solar panels, fencing and electrical infrastructure, among other measures.

The main expected impacts of the proposed PV and associated infrastructure will include the following:

- Habitat loss and fragmentation;
- Electrocutions; and
- Collisions.

Mitigation measures as described in this report, can be implemented to reduce the significance of the risk to an acceptable residual risk level. Considering the above-mentioned information, it is the opinion of the avifauna specialist that the project may be favourably considered, on condition that all the mitigation and recommendations provided in this report and other specialist reports are implemented.

### 6.3.4 Visual Impacts

Due to the extent of the proposed photovoltaic solar plant, it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

*"To what extent will the proposed development be visible to observers and will the landscape provides any significant visual absorption capacity?"*

The Visual Impact Assessment (Refer to Appendix E3) concluded that the post mitigation impact is a "*Negative Low"* impact during the construction, decommissioning and operational phases. The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area.

The construction and operational phases of the Angus SPP and its associated infrastructure, may have a visual impact on the area, especially within (but not restricted to) a 5km radius of the proposed SPP. The visual impact will differ amongst places, depending on the distance of the SPP.

Due to the height of the power line (32m) and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the PV facility and power lines, but the possible visual impacts can be reduced. A number of mitigation measures have however been proposed regardless of whether or not mitigation measures will reduce the significance of the of the anticipated impacts, they are considered good practice and should be implemented and maintained throughout the construction, operational and decommissioning phases of the project.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and is characterised by agricultural activities. No buffer areas or areas to be avoided are applicable for this development.

Taking into account all positive factors of such a development including economic factors, social factors and sustainability factors, especially in an arid country, and the industrialised and degraded landscape, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. The specialist recommends that the details of the power line be submitted with the South African Civil Aviation Authority (SACAA).

The specialist recommends that the project be approved from a visual perspective.

### 6.3.5 Agricultural / impacts on the soil

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated a soil survey has been conducted. The main question which needs to be addressed is:

*"How will the proposed development impact on agricultural resources and the soil?"*

The Soil and Agricultural Potential Assessment (Appendix E4), the results indicate "Low" post-mitigation significance score ratings for the proposed Angus SPP project and associated infrastructure. It is therefore clear that the proposed activities are expected to have a low impact on land potential resources. It is worth noting that some "High" and "Very High" sensitivity crop field areas were identified by means of the DFFE Screening tool (2022) in the current existing project assessment area. It is recommended stakeholder engagement must be undertaken during the project phases to investigate possible scenarios for appropriate compensation of landowners for high crop field land use areas where necessary. Potential livestock grazing for small stocks can also be investigated as integration below the solar panels.

Two main sensitive soil forms were identified within the assessment area, namely Avalon and Hutton soil forms. The land capability sensitivities (DAFF, 2017) indicate land capabilities with "Moderate" to "Moderate High" sensitivities, which agrees with the findings from the baseline assessment in most areas. The land potential falls mostly within "Moderate High" sensitivities which also concur with some sections from the DAFF, (2017) sensitivities. However, the verified soil baseline findings also dispute some of the areas which were categorised as "High" sensitivities following the DFFE (2023) agricultural theme screening tool. The project area based on the site-verified soil findings is therefore assigned an overall sensitivity of 'Medium.'

The assessment area is associated with arable soils. However, the available climatic conditions of low annual rainfall and high evapotranspiration potential severely limits crop production significantly resulting in land capabilities with "Moderate" and "Moderate high" sensitivities. The land capabilities associated with the assessment area are suitable for rainfed cropping, irrigated cropping and livestock grazing, which corresponds with the current land use.

It is the specialist's opinion that the proposed Angus Solar Power Plant Project and associated grid connection and infrastructure will have an overall low residual impact on the agricultural production ability of the land. The proposed activities will result in the segregation of some high production agricultural land. However, the planned grid connection for the proposed development will occur on already established infrastructure with minimal impacts to the land potential of these crop fields. In areas where these crop fields are actively cultivated, stakeholder engagement must be undertaken to compensate landowners for high crop field land use where necessary. It is, therefore, the specialist`s recommendation that the proposed Angus Solar Power Plant project and associate infrastructure may be favourably considered for development with implementation of mitigation measure to ensure low expected significant impacts occurrence.

### 6.3.6 Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix H8). The main question which needs to be addressed is:

*"How will the proposed development impact on the socio-economic environment?"*

The findings of the Social Impact Assessment (Refer to Appendix E7) indicate that there are some vulnerable communities within the area that may be affected by the development of the Angus SPP and its associated infrastructure. Traditionally, the construction phase of a SPP is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as "fatal flaws.

The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV projects(these relate to an influx of non-local workforce and jobseekers, intrusion, and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated

The development will introduce employment opportunities during the construction phase(temporary employment) and a limited number of permanent employment opportunities during operation phase.

The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases.

The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.

It should be noted that the perceived benefits associated with the project, which include Renewable Energy generation and local economic and social development, outweigh the perceived negative impacts associated with the project.

The specialist concludes that the project, and its associated infrastructure, will be unlikely to result in permanent damaging social impacts, and therefore from a social perspective the project can be development subject to the implementation of the recommended mitigation measures.

### 6.3.7 Heritage and archaeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such sites. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

*"Will the proposed development impact on any heritage or archaeological artefacts?"*

The Heritage Impact Assessment (Refer to Appendix E6) confirmed the following:

The majority of the heritage observations made within the development area relate to the historic mining and agricultural occupation of the broader area. Most of these observations relate to structures and ruins of structures that have been determined to have no cultural value. These have been determined to be Not Conservation-Worthy and are not considered further here.

Three heritage resources that have cultural value were identified in this assessment. Sites 014 and 036 relate to structures and have been graded IIIC for their contextual heritage value. Neither of these structures is located within any of the areas proposed for development and as such, it is not anticipated that any of these structures will be negatively impacted by the proposed development of either the SPPs or their electronic grid infrastructure.

Site 028 represents a modern graveyard (1980's) with a number of human remains interred here. Due to the high levels of social and spiritual value associated with human remains, graveyards are accorded high levels of local significance and as such, are graded IIIA. Although Site 028 is located far from the area proposed for development and as such, is unlikely to be directly impacted by the development.

The survey proceeded with no major constraints and limitations, and the project area was comprehensively surveyed for heritage resources, and no archaeological remains of significance were identified within any of the areas proposed for development.

### 6.3.8 Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

"How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix E6), the study area is entirely underlain by Malmani Subgroup (Chuniespoort Group, Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of the Malmani Subgroup is Very High, while Groenewald et.al (2014) allocated a High Sensitivity to the Group. Updated Geology (Council of Geosciences) confirms that the Angus SPP is underlain by the Malmani Subgroup.

A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 23 March 2023. Site access was a problem and only one weathered stromatolite was identified in the development footprint of the Angus SPP. This stromatolite forms part of a pile of rock that was removed from the agricultural land. Most probably other stromatolites are also present in the SPP footprint. However, due to preservation, mitigation it is not recommended as other well-preserved stromatolites have been identified in the area. A high Palaeontological Significance has been allocated for the construction phase of the SPP development pre-mitigation and a low significance post mitigation. The construction phase will be the only development phase impacting Palaeontological Heritage and no significant impacts are expected to impact the Operational and Decommissioning phases. As the No-Go Alternative considers the option of 'do nothing' and maintaining the status quo, it will have a Neutral impact on the Palaeontological Heritage of the development.

It is therefore considered that the proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

### 6.3.9 Traffic Impacts

Large developments are normally associated with an increase in construction vehicle traffic. The main question which needs to be addressed is:

"How will the proposed development impact on the traffic on main delivery routes to the site?"

According to the Traffic Impact Assessment (Appendix E8), The major traffic impact occurs during the construction phase of the project. The impact of the construction trip generation, on the predicted traffic volumes on the local and the regional transportation routes are expected to be low. No mitigation measures for these routes will be necessary.

Two possible ports of entry have been identified from where the solar panel technology and large electrical components will be transported, namely: Durban (647 km) and Richards Bay (675 km). It is recommended that the Port of Durban is the preferred port of entry as this route is the shorter of the two routes. The regional routes indicated in the analysis would need to be confirmed by freight carriers as suitable for the sensitive normal loads. The final decision on the selected route would be based on a combination of cost, distance and road condition at the time of transport.

Transformer and substation components will be transported via abnormal loads. An abnormal load will necessitate an application to the Department of Transport and Public Works for a permit. A permit is required for each province that the transportation route traverses. Only one to two abnormal load trips are expected for the Angus PV SPP development (and related grid connection). Abnormal load transportation is therefore considered to be isolated and would have a negligible impact on traffic over the construction phase of the project.

Access to the site is proposed via two accesses to the south of the proposed site that connect to the external road network via the Unnamed Road, an existing unsurfaced Class 5 Rural Local Street. The formalisation of these accesses, to the standard, might be a requirement as part of the wayleave approval of the Gauteng Department of Roads and Transport. Adequate traffic accommodation signage must be erected and maintained on either side of the access throughout the construction period of the project, and

All internal roads considered should conform to the geometric and pavement design parameters as indicated on the design standard certificate.

The regional construction trips generated by the proposed development are not considered significant in comparison to the Average Daily Traffic (ADT) and will not affect the existing Level of Service. In terms of estimated traffic volumes, no mitigation measures will be necessary. Mitigation measures, such as staggered trips and reduced peak time travel are proposed if needed.

The development of the Angus PV SPP (and related grid connection), located on the Farm Leeuwpan No. 697 in the Gauteng Province is therefore supported from a traffic and transportation perspective.

### 6.3.10 Risk Assessment for battery storage system

Battery storage facilities are a relatively new technology, particularly in South Africa. Batteries, as with most electrical equipment, can be dangerous and may catch fire, explode or leak dangerous pollutants if damaged, possibly injuring people working at the facility or polluting the environment. Common failure scenarios of Li-ion batteries include: electrical, mechanical, and thermal. The potential hazards associated with them are fire with consequent emission of gas and explosion. The major risks include thermal runaway, difficulty of fighting battery fires, failure of control systems and the sensitivity of Li-ion batteries to mechanical damage and electrical transients.

As with any fire or explosion, a potential consequence of Li-ion battery fires is the endangerment of life and property. These consequences are assessed based on their severity and likelihood. First, the severity of this consequence changes based on the quantity of cells in a system, as well as the system's proximity to people and property. Therefore, the size and location of the installation should be taken into consideration. For the Angus SPP the location of the BESS and the fact that the area is sparsely populated will reduce the risk associated with toxic chemicals, flammability and overpressure from explosions. The risk level is seen to be of a low risk that is unlikely to occur with the proper safety measures taken as mitigation. Provided that the facility is designed and managed properly, and the batteries are handled in the manner prescribed by the manufacturer, an incident is unlikely to happen. However,

because of the risk special management actions are recommended in the EMPr to reduce the risk of an incident and manage an incident should one ever occur.

## 6.4 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. Different impacts need to be evaluated in terms of its significance and in doing so highlight the most critical issues to be addressed.

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 6.6.

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.

### 6.4.1 Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- 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 should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

**Table 6.6:** The rating system

| **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. | | |
| **GEOGRAPHICAL EXTENT** | | |
| This is defined as the area over which the impact will be experienced. | | |
| 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** | | |
| 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). |
| **DURATION** | | |
| This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity. | | |
| 1 | Short term | The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact 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 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 – 30 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 indefinite. |

| | | |
|---|---|---|
| **INTENSITY/ MAGNITUDE** | | |
| Describes the severity of an impact. | | |
| 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. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation. |
| **REVERSIBILITY** | | |
| This describes the degree to which an impact 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** | | |
| 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. |

**CUMULATIVE EFFECT**

This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.

| | | |
|---|---|---|
| 1 | Negligible cumulative impact | The impact would result in negligible to no cumulative effects. |
| 2 | Low cumulative impact | The impact would result in insignificant cumulative effects. |
| 3 | Medium cumulative impact | The impact would result in minor cumulative effects. |
| 4 | High cumulative impact | The impact would result in significant cumulative effects |

**SIGNIFICANCE**

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. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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 |
|---|---|---|
| 6 to 28 | Negative low impact | The anticipated impact will have negligible negative effects and will require little to no mitigation. |
| 6 to 28 | Positive low impact | The anticipated impact will have minor positive effects. |

| | | |
|---|---|---|
| 29 to 50 | Negative medium impact | The anticipated impact will have moderate negative effects and will require moderate mitigation measures. |
| 29 to 50 | Positive medium impact | The anticipated impact will have moderate positive effects. |
| 51 to 73 | Negative high impact | The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact. |
| 51 to 73 | Positive high impact | The anticipated impact will have significant positive effects. |
| 74 to 96 | 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". |
| 74 to 96 | Positive very high impact | The anticipated impact will have highly significant positive effects. |

# 7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

## 7.1 INTRODUCTION

The EIA Regulations (2017) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix E. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the project itself, and the overall effects on the ecosystem of the project area that can be attributed to the project and other existing and planned future projects.

## 7.2 GEOGRAPHIC AREA OF EVALUATION

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 7.1 below.

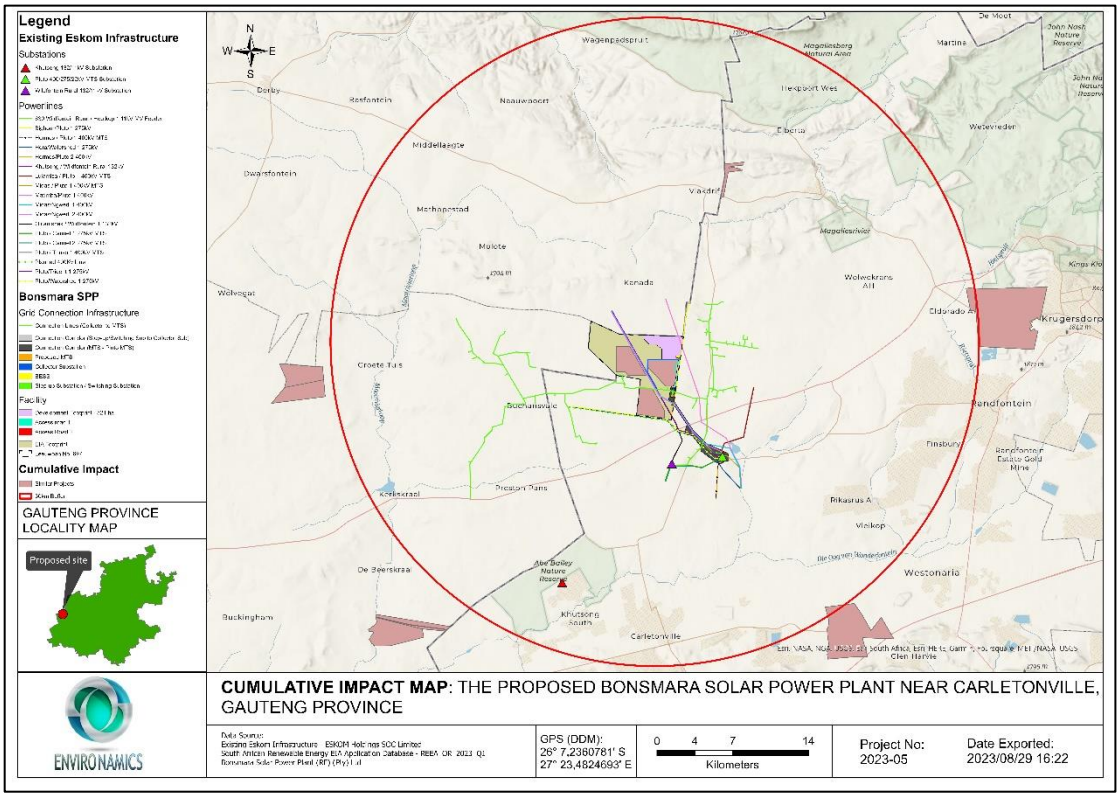


**Figure 7.1:** Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Gauteng Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

### 7.2.1 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for these cumulative effects analysis are the anticipated lifespan of the proposed project, beginning in 2025 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where

appropriate, particular focus is on near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

## 7.3 OTHER PROJECTS IN THE AREA

### 7.3.1 Existing Projects in the Area

According to the DFFE's database and desktop analysis, eight (08) solar PV plant applications have been submitted to the Department within the geographic area of investigation - refer to Table 7.1.

Table 7.1: A summary of related projects that may have a cumulative impact, in a 30 km radius of the study area

| Site name | Distance from study area | Proposed generating capacity | DEFF reference | EIA process | Project status |
|---|---|---|---|---|---|
| Portion 3 (Portion Of Portion 2 Of The Farm Rietpoort 395 | 14.5km | 15 MW | 12/12/20/2330 | BAR | Approved |
| Portion 64 (A Portion Of Portion 1) Of The Farm Waterval 174 | 28km | 25 MW | 12/12/20/2537 | Scoping and EIA | Approved |
| Portion 57 (A Portion Of Portion 1) Of The Farm Waterval 174 | 27.5KM | 70 MW | 12/12/20/2539 | Scoping and EIA | In process |
| Portion 1, 2, 4, 5 and 6 of the Farm Uitval 280 | 25.6km | 200 MW | 14/12/16/3/3/2/919 | Scoping and EIA | In process |
| Farm Brickvale 161 | 27.3km | 19.9 MW | 14/12/16/3/3/1/636 | BAR | In process |
| Tuli Solar Power Plant | 0km | 250MW | To be obtained | Scoping and EIA | In process |
| Angus Solar Power Plant | 0km | 250MW | To be obtained | Scoping and EIA | In process |

| | | | | | |
|---|---|---|---|---|---|
| Simbra Solar Power Plant | 0km | 250MW | To be obtained | Scoping and EIA | In process |

It is unclear whether other projects not related to renewable energy is or has been constructed in this area, and whether other projects are proposed. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.

## 1.1 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for process flow. The following sections present their findings. The following sections present their findings.

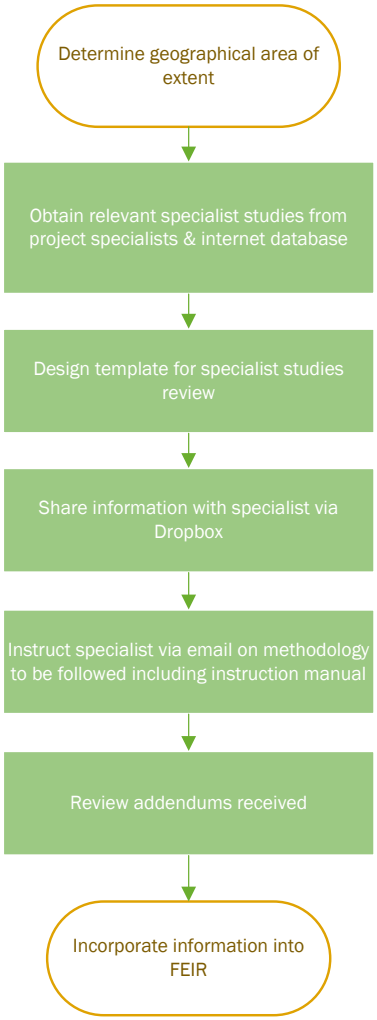


**Figure 7.2:** Process flow diagram for determining cumulative effects.

### 7.3.2 Soil, Land Capability and Agricultural Potential

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

What level of loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

Department of Forestry, Fisheries and the Environment (DFFE) requires compliance with a specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of this author, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

All of these projects have the same agricultural impacts in a similar agricultural environment, and therefore the same mitigation measures apply to all.

As previously indicated, the proposed development poses a low risk in terms of causing soil degradation because it can be fairly easily and effectively prevented by standard best practice soil degradation control measures, as recommended and included in the EMPr of the EIA Report. If the risk for each individual development is low, then the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved. The transformation that has taken place.

### 7.3.3 Terrestrial Biodiversity, including Avifauna

In order to spatially quantify the cumulative effects of the proposed developments, each sub-project in isolation (and then also the total combined project) is compared with the overall effects of surrounding development (including total transformation and transformation as a result of new and proposed developments of a similar type, i.e., solar). Note that only the PV development footprints are considered, not any grid connection corridors.

According to the 2018 National Biodiversity Assessment, the total amount of historical Grassland and Savannah habitat within 30 km of the PAOI amounts to 371 251 ha, but when considering the total transformation that has taken place within this radius – 220 316 ha remains. Therefore, the area within 30 km of the project has experienced approximately 40% of historical loss in Grassland and Savannah habitat. Additionally, it is noted that a single project footprint is 500 ha, and up to 3 additional similar projects exist, or will soon be constructed, in the 30 km region (as per the latest South African Renewable Energy EIA Application Database) – measuring up to a total of 4286 ha. This means that the total amount of remaining habitat lost as a result of all existing and/or approved solar projects in the region amounts to 2.2% (the sum of all related developments as a percentage of the total remaining habitat). If all four sub-projects are developed, measuring a total of up to 2000 ha, then the total remaining habitat lost would amount to 2.9%. **Error! Reference source not found.** 7.2 o utlines the calculation procedure for the spatial assessment of cumulative impacts.

**Table 7.2:** Loss of Grassland habitat within a 30 km radius.

| | Total Habitat (ha) | Tot. Remaining Habitat (ha) | Total Historical Loss | Footprint (ha) | Similar Projects (ha) | Cumulative Habitat Lost |
|---|---|---|---|---|---|---|
| **Sub-project cumulative effects (Spatial)** | 371 251 | 220 316 | **40%** | 500 | 4286 | **2.2%** |
| **Total project cumulative effects (spatial)** | | | | 2000 | 4286 | **2.9%** |

The cumulative impact of a single sub-project development is rated as ‘Low’, due to the smaller overall footprint of the individual area and the fact that more functional habitat remains as viable corridor area (note: this statement assumes that no other sub-projects would be developed).

A large quantity of the local habitat has already been transformed, and thus the contribution of the total new development (overall project) to further loss is considered important - this is largely due to the fact that the last remaining corridors of functional habitat are under threat. Therefore, the overall cumulative impact of the overall project is rated as ‘Medium’. Careful and considerate spatial management and planning within the region must be a priority, in order to preserve important and functional habitat corridors. Additionally, functional CBA areas within the PAOI (high sensitivity rocky and wetland habitat) must be preserved.

### 7.3.4 Social Impact Assessment

The Social Impact Assessment (refer to Appendix E6) indicate that from a social impact point of view the project represents an important development opportunity for the communities surrounding Angus SPP. Should it be approved, it will not only supply the national grid with much needed clean power but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report. The most significant cumulative social impacts are both positive and negative: the community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area, but impacts on family and community relations may, in some cases, persist for a long period of time. Also, in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

### 7.3.5 Visual

The Visual Impact Assessment (refer to Appendix E3), eight other solar facilities are proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely. Permanent residents of the area might be desensitised over time with the construction of more solar facilities but will stay subjective for each viewer. Although the cumulative impact might be high if all proposed projects be constructed, the location of the solar facilities within the study area will contribute to the consolidation of solar PV structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

The construction and operation of the PV facility may increase the cumulative visual impact together with farming activities, dust on gravel roads, existing Eskom power line infrastructure and new projects, mines in the area and other proposed solar power facilities in the area. The significance of the visual impacts can only be determined once projects have been awarded preferred bidder status. However, taking into account the already disturbed visual surrounds due to extensive mining activities in the area and all the positive factors of such a development including economic factors, social factors and sustainability factors, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view.

### 7.3.6 Heritage

The Heritage Impact Assessment (Refer to Appendix E6) concluded that from a review of available databases, publications, as well as available heritage impact assessments done for the purpose of developments in the region, it was determined that the Angus SPP is in an area with a very low presence of heritage sites and features.

The cultural heritage profile of the larger region is very low. Most frequently found are farmsteads, formal and informal burial sites. For this review, heritage sites located in urban areas have been excluded.

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the proposed for development and the generally low density of sites in the wider landscape the overall cumulative impacts to heritage are expected to be of generally low significance before mitigation.

### 7.3.7 Paleontology

According to the Palaeontological Impact Assessment (refer to Appendix E5), based on the SAHRIS website, the only palaeontological heritage assessments (PIAs) available for this region (Almond 2015, Brink undated, Groenewald 2013b, Millsteed 2013b) are all at desktop level with no field data. The cumulative Impacts of the area will include approved electrical facilities within a 30 km radius of the project site. As the mentioned MTS and Powerlines and corridors are all underlain by similar geology the Impact on these developments will be similar. The Palaeontological Significance of the proposed Angus SPP is rated as neutral, and the cumulative Impacts will thus also be Low Negative.

### 7.3.8 Traffic

According to the Traffic Impact Assessment (refer to Appendix E8) depending on the timing of the other nearby renewable energy projects, where construction in particular could overlap, traffic impact will increase accordingly. It should be noted that the volume of traffic is related to the specific development stage, logistics planning and development size.

The construction period for other renewable energy projects is relatively short (between 18 and 24 months), where traffic flow will vary during the construction period. It is assumed that 50% of these projects' construction periods would likely coincide with the Angus SPP construction period. This additional traffic, however, will be widely dispersed and easily accommodated on the surrounding road network. In addition, the traffic impact of the operational and maintenance periods will be low/ negligible, and it is also unlikely that the decommissioning of these projects will coincide with each other.

In conclusion, the cumulative impact and significance of the various nearby renewable energy projects is considered to have a low/ negligible impact and therefore no corrective measures will be required.

## 7.4 IMPACT ASSESSMENT

Following the definitions of the term, the "residual effects on the environment", i.e., effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a "combination of different individual environmental effects of the project acting on the same environmental component" can result in cumulative effects.

### 7.4.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects

discussed are summarized in Table 7.2. There have been specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

**Table 7.3**: Potential cumulative effects for the proposed project

| | Valued Ecosystem Components (VECs) | Rationale for Inclusion / Exclusion | Level of Cumulative Effect |
|---|---|---|---|
| **Construction Phase** | | | |
| **Wetland Baseline and Risk Assessment** | Impacts on the aquatic resources of the area | The cumulative impact assessment considers the combined impact of the remaining and other renewable projects within a 30km radius, that are also in the development phase and the associated grid lines on the aquatic resources. The rating below is based on the premise that important or sensitive features will be avoided by the various projects, while the mitigations proposed will ensure that the form and or function of downstream areas remain intact. | - Low |
| **Social Impact Assessment** | An increase in employment opportunities, skills development and business opportunities with the establishment of more than one SEF | The establishment of several SEFs under the REIPPP Programme in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted, and local services providers are utilised by the developers to maximise the project opportunities available to the local community. | + Medium |
| | Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area. | While the development of a single solar power project may not result in a major influx of people into an area, the development of three other projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in | - Medium |

| | | | |
|---|---|---|---|
| | | search of better employment opportunities and higher standards of living.<br><br>It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring. | |
| **Traffic Impact Study** | Further increase of development trips during construction phase if the developments listed in Table 7.1 will be constructed at the same time as the proposed Angus Solar Power Plant. | It is noted that it is unlikely that all developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects. | - Medium |
| **Operational Phase** | | | |
| **Visual Impact Assessment** | Cumulative visual impacts related to the SEF and PL. | The anticipated cumulative visual impact for the SEF and power line are expected to include the change in sense of place, as well as the precedent being set for SEFs in the area where currently there is only a precedent for agricultural and mining related activities. Further construction and operation of the SEF in the area is likely to have a negative impact. | - Medium |
| **Decommissioning Phase** | | | |
| **General** | Generation of waste | During the decommissioning of the facility waste will be generated that will need to be disposed of where recycling and re-use is not available. This may lead to pressure on waste disposal facilities in the area. | - Medium |

## 7.5 CONCLUSION

This chapter of the Scoping Report addressed the cumulative environmental effects of the construction, operation and decommissioning project phases to be further assessed as part of the EIA Phase. The information to date has shown that no significant adverse residual impacts

are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Impacts on the aquatic resources of the area (- Low)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Impact with large-scale in-migration of people (- Medium)
  - Further increase of development trips during construction phase if the developments (-Medium)
- Cumulative effects during the operational phase:
  - Visual intrusion (- Medium)
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project are expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment.

Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Gauteng Province. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one (where the landscape has already experienced degradation), than to lose land with a higher environmental value elsewhere in the country. Also, the low acceptable cumulative impacts expected will not result in a whole-scale change of the environment and therefore are considered to be acceptable, and considering the associated positive impacts associated with the development of solar energy facilities the proposed facility is considered desirable.

# 8 ENVIRONMENTAL IMPACT STATEMENT

This section aims to address the following requirements of the regulations:

**Appendix 3.** (3) An EIR (...) must include-

(l) an environmental impact statement which contains-

(i) a summary of the key findings of the environmental impact assessment:

(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

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

## 8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report:

- Impacts during construction phase:
  - Direct habitat destruction (- Low)
  - Habitat Fragmentation (- Low)
  - Impact on the characteristics of the watercourse (- Low)
  - Creation of direct and indirect employment opportunities (+ Medium)
  - Economic multiplier effects from the use of local goods and services (+ Medium)
  - Impacts on daily living patterns (- Low)
- Impacts during the operational phase:
  - Habitat destruction and fragmentation (- Low)
  - Displacement of priority avian species from important habitats (- Low)
  - Impact on the characteristics of the watercourse (- Low)
  - Creation of employment opportunities and skills development. (+ Medium)

- Development of non-polluting, renewable energy infrastructure. (+ Medium)
- Contribution to LED and social upliftment (+ High)

- Impacts during the decommissioning phase:
  - Improvement of habitat through revegetation / succession over time (+ Medium)
- Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity are expected to occur, however the cumulative impact assessment included in Section 7 of this report has indicated that all cumulative impacts will be of a medium or low significance, with no impacts expected to be of a high and unacceptable significance.

## 8.2 SENSITIVITY ANALYSIS SUMMARY AND SITE-SPECIFIC CONDITIONS

The sensitivity analysis has guided the developer in optimising the layout of the Angus Solar Power Plant through identifying specific environmental areas and features present within the site which needs to be avoided through the careful placement of infrastructure as part of the development footprint. The draft layout map (Figure L) which avoids the areas required to be conserved.

The main features to be avoided are related to ecology. The intact rocky outcrop habitat is regarded as environmentally sensitive. These areas have been avoided by the proposed layout as per Figure L.

Further mitigation measures for the development, as recommended by the independent specialists, have been included in the EMPr(s) for the project as per Appendix F1 – F4.

## 8.3 TECHNICAL DETAILS OF THE PROPOSED INFRASTRUCTURE TO BE AUTHORISED

- PV Panel Array - To produce up to 250MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun or using one-axis tracker structures to follow the sun to increase the Yield.

- Wiring to Inverters - Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV and higher. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into the step-up transformers to 132kV. An onsite substation will be required to step the voltage up to 132kV, after which the power will be evacuated into a new proposed collector substation to step the voltage up from 132KV to 275/400KV in order to evacuate the power into the national grid at the same voltage level as the MTS via the proposed

132/275/400KV power line. Whilst Angus Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with the on-site step up and switching substation that will be connected to a newly proposed collector substation, the collector substation will be connected to a newly proposed MTS to be connected to the existing Pluto 400/275/22kV MTS. The connection power line will be constructed within the limits of the grid connection corridor. The project will generate up to 250MW of electricity.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.
- Supporting Infrastructure – All associated infrastructure will be constructed within the limits of the infrastructure and ancillary complex which will include an on-site substation, Battery Energy Storage System, Operations and Maintenance buildings etc.
- Battery storage – A Battery Storage Facility with a maximum height of 8m and a maximum volume of 1,740 $m^3$ of batteries and associated operational, safety and control infrastructure.
- Roads – Access will be obtained via a public gravel road from the R500 regional road to the east of the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Fencing with a height of 2.5 meters will be used.

## 8.4 RECOMMENDATION OF EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the Final EIA report. In terms of the legal requirements, it is concluded that:

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 EIA Regulations (as amended in 2017) – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017) and the public participation plant - already approved by the environmental authority.
- The EIA process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 23 and Appendix 3.
- The EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations (as amended in 2017).
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.

- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase. These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

**The final recommendation of the EAP is that:**

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures and avoidance of certain areas within the site as recommended by the specialists. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Angus Solar Plant and associated infrastructure, Registration Division Theunissen, Gauteng Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPrs (Appendix F1-F4).
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and tasks allocated in the EMPr should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- The required biodiversity walk-throughs must be undertaken prior to construction.
- The period for which the Environmental Authorisation is required is between 7 and 10 years. This is based on the fact that the project is proposed to be bid as part of the DMRE REIPPP Programme, with there being uncertainty regarding the announcement of the next bidding rounds, and the need for a valid Environmental Authorisation. It must however be noted that the project will also participate in other programs/opportunities to generate power in South Africa, as available.

We trust that the department find the report in order and await your comments in this regard.

**Mr. Herman 'Attie' Alberts**
Environamics Environmental Consultants

ENVIRONAMICS

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