Limestone PV1

Northern Cape Province

DFFE Reference: 14/12/16/3/3/2/2269

Revised EIA Report

July 2023

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PROJECT DETAILS

DFFE Reference	:	14/12/16/3/3/2/2269
Title	:	Limestone PV1
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Client	:	K2022578784 (SOUTH AFRICA) (Pty) Ltd
Report Revision	:	Revised report for review
Date	:	July 2023

When used as a reference this report should be cited as: Savannah Environmental (2023), EIA Report for the Limestone PV1

PURPOSE OF THE EIA REPORT AND INVITATION TO COMMENT

K2022578784 (SOUTH AFRICA) (Pty) Ltd is proposing the development of a commercial Solar Energy Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and 10km east of Lime Acres in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The facility will have a maximum export capacity of up to 150MW and will be known as the Limestone PV1 Solar Energy Facility. The project is planned as part of a larger cluster of renewable energy projects, which includes another 150MW PV Solar Energy Facility (Limestone PV2) located on the same property as Limestone PV1 and a 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil.

K2022578784 (SOUTH AFRICA) (Pty) Ltd appointed Savannah Environmental as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for the proposed project. The EIA process is being undertaken in accordance with the requirements of the 2014 EIA Regulations, as amended, promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This EIA Report consists of twelve chapters, as follows:

- **Chapter 1** provides background to the Limestone PV1 Solar Energy Facility and the EIA process.
- **Chapter 2** provides a description of the Solar Energy Facility and associated infrastructure.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** describes solar as a power generation option and provides insight to technologies for solar energy.
- **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa, and specifically for the proposed facility.
- **Chapter 6** describes the need and desirability of the Limestone PV1 Solar Energy Facility within the project site.
- **Chapter 7** outlines the process which was followed during the EIA process.
- **Chapter 8** describes the existing biophysical and socio-economic environment affected by the proposed facility.
- **Chapter 9** provides an identification and evaluation of the potential issues associated with the proposed solar energy facility and associated infrastructure.
- **Chapter 10** provides a description and assessment of the potential cumulative issues associated with the proposed solar energy facility and associated infrastructure.
- **Chapter 11** presents the conclusions and recommendations based on the findings of the EIA for Limestone PV1 Facility.
- **Chapter 12** provides references used in the compilation of the EIA Report.

The EIA Report was made available for review from **18 May 2023 to 19 June 2023** on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/). In response to comments raised through the public participation process, additional information has now been included in and forms part of the Environmental Impact Assessment Report (EIAr). In terms of the provisions of Regulation 23(1)(b), the EIAr has been revised and is now released for a second public comment period of 30 days. The review period for the revised report is from **21 July 2023** to **21 August 2023**. The revised EIA Report is available for review at https://savannahsa.com/public-documents/energy-generation. Changes made to this revised report have been underlined for ease of reference.

All comments received and recorded during the 30-day review and comment period will be included, considered, and addressed where possible within the final EIA report for the consideration of the DFFE.

Please submit your comments by **21 August 2023** to:
Molatela Ledwaba of **Savannah Environmental**
PO Box 148, Sunninghill, 2157
Tel: 011-656-3237
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Comments can be made as written submission via fax, post, or email.

EXECUTIVE SUMMARY

K2022578784 (SOUTH AFRICA) (Pty) Ltdis proposing the development of a solar energy facility. PV technology is proposed to be utilised for the generation of electricity, and Limestone PV1 Solar Energy Facility will have a maximum export capacity of up to 150MW. Infrastructure associated with the solar PV facility will include:

- PV modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS)
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance
- Access roads and internal distribution roads
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.

The project is planned as part of a larger cluster of renewable energy projects, which includes another 150MW PV Solar Energy Facility (Limestone PV2) located on the same property as Limestone PV1 and a 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil. Site-specific studies and assessments will delineate areas of potential sensitivity within the identified project site. Once constraining factors have been confirmed, the layout of the solar PV facility can be planned to minimise social and environmental impacts.

From a regional perspective, the Limestone PV1 project site is considered favourable for the development of a commercial solar energy facility by virtue of land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project.

Limestone PV1 facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. The developer intends to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) to evacuate the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply.

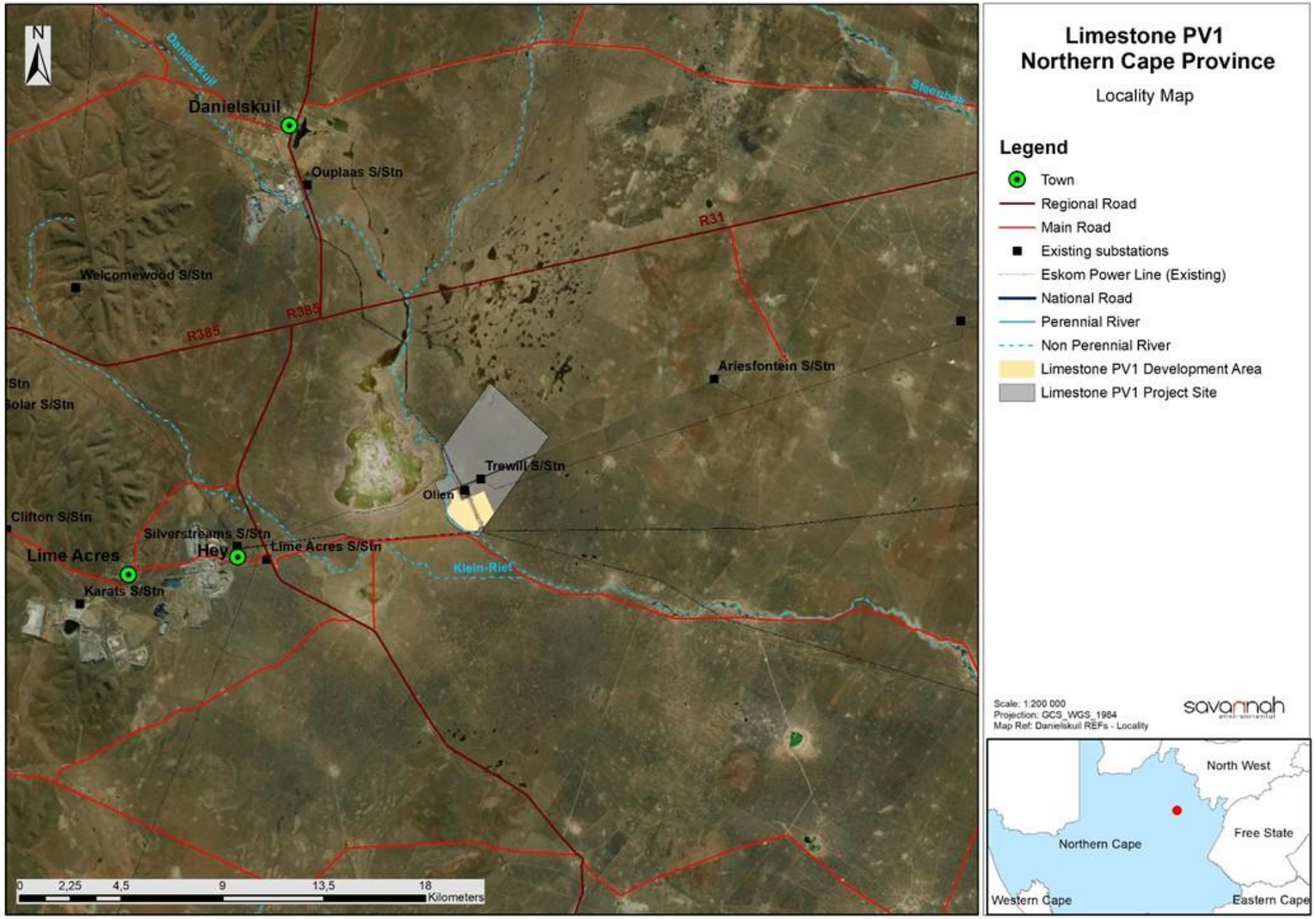

Figure 1: Locality map for the Limestone PV1 Solar Energy Facility

A technically viable development footprint was proposed by the developer and assessed as part of the EIA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA report. The specialist findings have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site. The potential environmental impacts associated with the Limestone PV1 identified and assessed through the EIA process include:

Impacts on Terrestrial Ecology and Freshwater Ecology

Six habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld, Open Grassland, Water Resources (Depression/ Pan) and Transformed. Watercourses/Rivers were identified as no-go areas where no development should take place. These areas provide surface water resources within the landscape, corridors for fauna dispersion within the landscape and important foraging and nesting habitat. These features also form part of CBA1, CR and FEPA rivers and FEPA wetlands. The remaining habitats were identified as having high sensitivity, with the exception of the transformed habitat which is considered to be very low sensitivity.

A total of 55 tree, shrub and herbaceous plant species were recorded in the project site during the field assessment, of which two were identified as being provincially protected trees:

- *Prepodesma orpenii*
- *Olea europaea subsp. cuspidata*

Seven (7) mammal species were observed. *Suricata suricatta* (Suricate) and *Geosciurus inauris* (South African Ground Squirrel) are ecosystem engineers within the region. The former species is also regarded as a keystone species within the Nama Karoo biome. The burrows they create are also utilised as shelter by an array of faunal species, which is pertinent in the climatically variable and semi-arid environment of the PAOI and surrounding landscape:

- Common Mole-rat (*Cryptomys hottentotus*)
- Common duiker (*Sylvicapra grimmia*)
- Black-backed jackal (*Lupulella mesomelas*)
- Yellow mongoose (*Cynictis penicillata*)
- Suricate (*Suricata suricatta*)
- Scrub Hare (*Lepus capensis*)

One species of amphibian (Boettger's dainty frog - *Cacosternum boettgeri*) was recorded within the project site during the survey period.

Five (5) species of reptile were recorded within the project site during the survey period. However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. None of the species recorded are regarded as threatened. Species found include:

- Common Ground Agama (*Agama aculeata aculeata*)
- Cape Gecko (*Pachydactylus capensis*)
- Leopard Tortoise (*Stigmochelys pardalis*)
- Wahlberg's Snake-eyed Skink (*Panaspis wahlbergii*)
- Cape Skink (*Trachylepis capensis*)

In terms of the guideline for interpreting Site Ecological Importance in the context of the development, it is indicated that "*Offset mitigation may be required for high impact activities*". Renewable energy projects can be considered low intensity developments with the correct implementation of the mitigation hierarchy. Referring to the mitigation hierarchy, the project will achieve avoidance by means of revised and reduced spatial planning, suggested seasonal constraints for construction to prioritise the dry season period and the 'avoidance' of vegetation clearing beneath the panels.

The primary expected impacts of the proposed project will be the loss of habitat and emigration of fauna. Based on the outcomes of the Site Ecological Importance (SEI) determination, there are areas within the Project Area of Influence (PAOI) that possess a 'Very High' SEI. This indicates that avoidance mitigation is the only appropriate option for these areas and no destructive development activities should be considered. Avoidance of these designated areas has been achieved by the project layout. The maintenance of basal vegetation cover beneath the solar panels will contribute to achieving avoidance, so complete clearance is not recommended. Project alternatives, planning and technology considered provides favourable avoidance mitigation. The overall low residual impact does not present a fatal flaw for the development, and the project may be favoured for authorisation. Due to the low residual impacts expected for the project, no biodiversity offset strategy is required.

Considering the above-mentioned information, 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 supporting recommendations are implemented.

Impacts on Avifauna

A field assessment was conducted 13-16 September 2022 (dry season) and 14 – 16 February 2023 (wet season), during this survey 106 bird species (of the recorded 125 in the general area) were recorded of which four were SCCs, namely *Phoenicopterus roseus* (Greater Flamingos), *Cursorius rufus* (Burchell's Courser), *Falcon biarmicus* (Lanner Falcon) and *Ciconia nigra* (Black Stork). 25 species were identified that would be at risk for collisions, electrocutions or habitat loss due to the development.

Five habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld and Open Grassland. Some of the area within the project site was also transformed. Watercourses/Rivers were identified as no-go areas where no development should take place. The remaining habitats were identified as having high sensitivity, with the exception of the transformed areas which is considered to be very low sensitivity.

A detailed assessment of the development footprint confirms that there is no infrastructure located within the Very High avifauna sensitivity areas. As a result, the development of the Limestone PV1 facility would avoid significant impact on the major avifaunal features of the site. Majority of the infrastructure is proposed in high sensitivity areas. Development of low impact, such as that proposed, is supported within these areas as long as mitigation measures are implemented. As a result, there are no fatal flaws and with the avoidance of very high sensitive features by the facility layout, no high impacts are likely to occur as a result of the development. It is the specialist's opinion that development may proceed but with caution and only with the implementation of mitigation measures.

Impacts on Soils and Agricultural Potential

The most sensitive soil forms identified within the assessment area are the Etosha and Vaalbos soil forms, with other associated soils also occurring. The Etosha soil form has an orthic topsoil with a neocutanic subsurface horizon underlain by a soft carbonate horizon. The Vaalbos soil form consists of an orthic topsoil horizon on top of a red apedal horizon merging into a hard rock substratum below.

The land capability of the above-mentioned soils has been determined to have land capability classes of "III" and "IV" with a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capability and climate capability results in land potential "L6". The "L6" land potential level is characterised by a very restricted potential. Regular and/or severe limitations occur due to soil, slope, temperatures or rainfall. These areas are non-arable. The "L6" land potential of the assessment area is characterized with an overall "Low" sensitivity following the baseline findings. Land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also fall within the DAFF, (2017) requirements for a compliance statement report only. The DEA screening tool, (2022) shows that there are no crop fields with "High" sensitivity within the assessment area and as a result there will be no segregation of crop production. It is the specialist's opinion that the proposed solar power project will have limited impact on the agricultural production ability of the land. Therefore, the proposed solar power project may be favourably considered.

Impacts on Heritage Resources (archaeology, palaeontology and cultural landscape)

Specific heritage resources and recommended buffers which needs to be considered for the placement of PV panels have been identified within the project site. Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation worthy. The Limestone PV1 Solar Energy Facility is anticipated to have an overall moderate impact on heritage resources as a result. The most significant site identified in the vicinity of the development is the farmhouse werf. It is recommended that site must not be impacted by any activity and the placement of panels should occur outside of the 500m buffer area. A 300m buffer is considered acceptable by the specialist should the farmhouse be used as a site office as proposed by the developer.

With the opportunities presented for the reduction of impact through the implementation of the recommended mitigation measures, no unacceptable impacts of a high significance are expected to occur. No fatal flaws are therefore associated with the Limestone PV1 Solar Energy Facility from a heritage perspective. The specialist indicates that the Limestone PV1 Solar Energy Facility can proceed, subject to the implementation of the recommended mitigation measures. These include:

- The recommendations in the Visual Impact Assessment (VIA) are implemented.
- A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any buried archaeological resources or human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African

Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

Visual Impacts

The findings of the VIA undertaken for the proposed Limestone PV1 Facility is that the visual environment surrounding the site, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e., a minimum of 20 years).

The following is a summary of impacts remaining:

- Construction activities may potentially result in a high temporary visual impact, that may be mitigated to moderate.
- The operation of the proposed PV facility is expected to have a high visual impact that may be mitigated to moderate on sensitive visual receptors within a 1km radius of the PV facility.
- The operational facility could have a moderate visual impact (significance rating = 45) which may be mitigated to low (significance rating = 26) on residents/visitors to the homestead of Langverwag as well as observers travelling along the secondary road within 1 – 3km radius of the facility.
- The operational facility could have a moderate visual impact (significance rating = 36) which may be mitigated to low (significance rating = 24) on residents/visitors to the various homesteads as well as observers travelling along the secondary road within 3 – 6km radius of the facility.
- The operational facility could have a low visual impact both pre and post mitigation on residents/visitors to various homesteads as well as observers travelling along the various secondary roads beyond the 6km radius of the facility.
- This anticipated lighting impact is likely to be of moderate significance and may be mitigated to moderate especially within 0-3 km radius of the PV facility.
- The potential visual impact related to solar glint and glare as a rail travel hazard is expected to be of moderate significance.
- There are two (2) affected residences within a 1km radius of the proposed PV facility, namely England. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of moderate significance before mitigation and low post mitigation.
- The anticipated visual impact resulting from ancillary infrastructure is likely to be of low significance both before and after mitigation.
- Decommissioning activities may potentially result in a high pre mitigation and moderate post mitigation.
- The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6 km radius of the development and within the greater region) is expected to be of Moderate significance.
- The anticipated cumulative visual impact of the proposed facility is expected to be of high significance.

The anticipated visual impacts listed above (i.e., post mitigation impacts) range from prominently moderate to low significance. One visual impact of high significance is anticipated in terms of the cumulative visual impact of the proposed Limestone PV facilities. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed Limestone PV 1 Facility are not considered to be fatal flaws for the proposed PV facility.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

Social Impacts

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium significance pre-enhancement and post-enhancement. Negative impacts during both construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies. Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to.

Impacts on Traffic

Traffic impacts have been identified for the construction, operation and decommissioning phases, with the most significant impact expected to occur during the construction phase.

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. During the operation phase impact would be minimal. The traffic generated during the decommissioning phase will be similar but less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of low significance before and of low significance after mitigation.

No impacts of high significance were identified, and no fatal flaws are associated with the Limestone PV1 from a traffic perspective.

Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

Limestone PV1 will contribute to the cumulative impact experienced within the area. The cumulative impacts associated with the facility have been assessed to be acceptable, with no unacceptable loss or risk expected.

Table 1: Summary of the cumulative impact significance for the Limestone PV1 Facility

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Moderate
Avifauna	Low	Moderate
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Moderate	Moderate
Visual	Moderate	High
Socio-Economic	*Positive impacts:* Moderate *Negative impacts:* Low	*Positive impacts:* High *Negative impacts:* Moderate
Traffic	Low	Moderate

Based on the specialist cumulative assessment and findings, the development of Limestone PV1 and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that Limestone Solar PV1 cumulative impacts will be of mostly low to moderate significance. The cumulative visual impact will be high but is still considered acceptable by the specialist. Based on all other areas of study considered as part of this EIA report, the development of Limestone PV1 will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment.

Figure 2 provides an environmental sensitivity map of the development footprint assessed as part of the BA process, as well as the environmental sensitivities identified.

Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar PV as the preferred technology, due to the availability of a strong solar resource, available grid connection, benign topography and good site access, amongst others. A technically viable development footprint was proposed by the developer considering environmental sensitivities identified in the scoping study and assessed as part of the EIA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA Report.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level.

The specialist findings from the EIA studies undertaken have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site subject to implementation of the recommended mitigation measures. Although the proposed layout for the PV

facility and associated infrastructure overlaps with areas of sensitivity, the specialists have concluded that the project as proposed is acceptable within the development area, and can be authorised on condition that the recommended mitigation measures are implemented. Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The layout assessed within this EIA Report is therefore considered to be acceptable for implementation.

As detailed in the cost-benefit analysis, the benefits of Limestone PV1 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised as detailed in this report, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility. From a social perspective, both positive and negative impacts are expected. The implementation of the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of Limestone PV1.

Through the assessment of the development footprint within the project site, it can be concluded that the development of Limestone PV1 will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

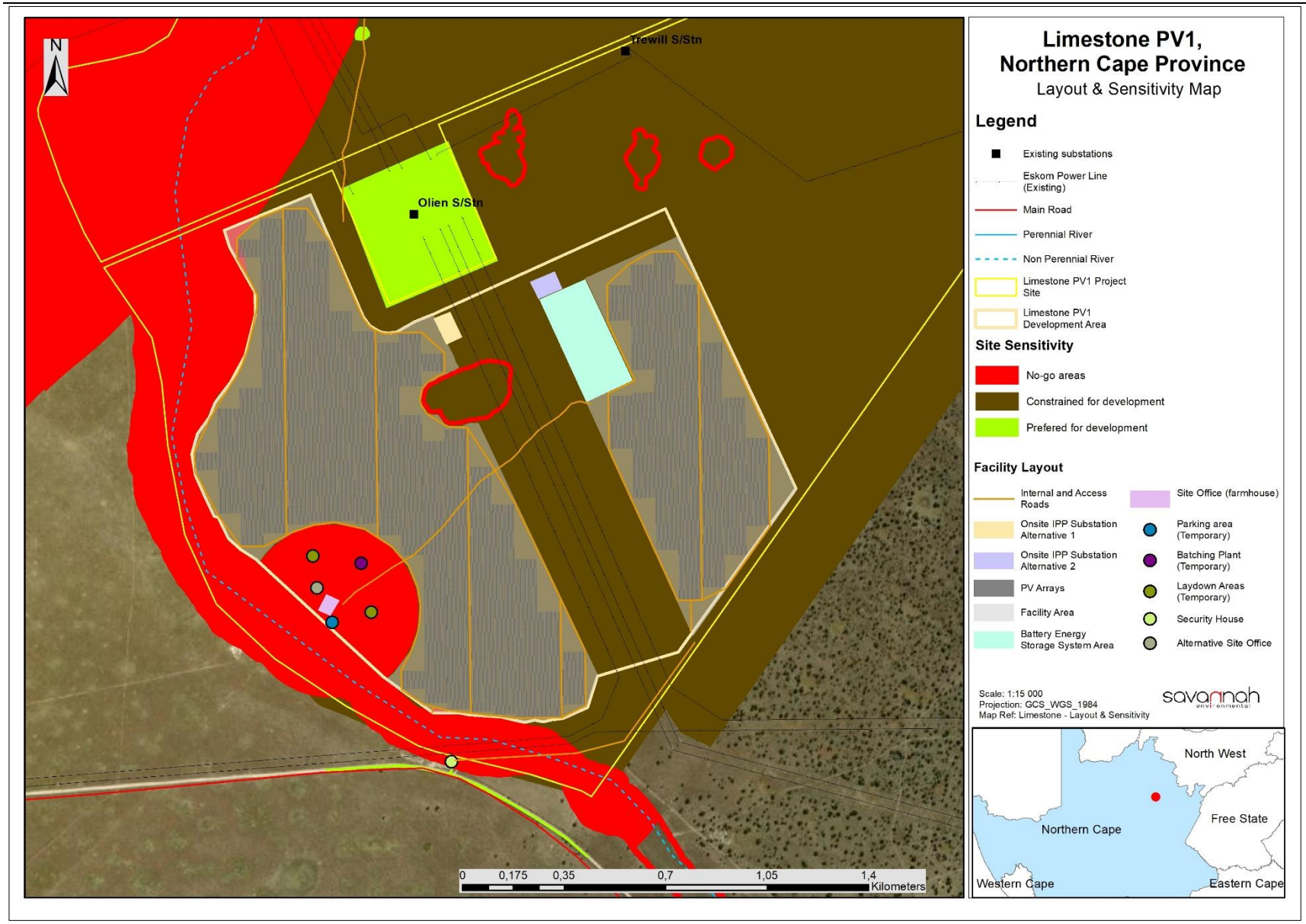

Figure 2: Environmental sensitivity and Layout map for the Limestone PV1 Solar Energy Facility.

DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Commercial Operation date: The date after which all testing and commissioning has been completed and is the initiation date to which the seller can start producing electricity for sale (i.e. when the project has been substantially completed).

Commissioning: Commissioning commences once construction is completed.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Development area: The development area is that identified area (located within the project site) where the project is planned to be located.

Development footprint: The development footprint is the defined area (located within the development area) where the PV array and other associated infrastructure for the project is planned to be constructed. This is the actual footprint of the facility, and the area which would be disturbed.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Emergency: An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts

include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Method statement: A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

No-go areas: Areas of environmental sensitivity that should not be impacted on or utilised during the development of a project as identified in any environmental reports.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect

Pre-construction: The period prior to the commencement of construction, this may include activities which do not require Environmental Authorisation (e.g., geotechnical surveys).

Project site: The project site includes the entirety of all properties within which the development footprint will be located.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

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Appendix C3: Background Information Document
Appendix C4: Organs of State Correspondence
Appendix C5: Stakeholder Correspondence
Appendix C6: Comments Received
Appendix C7: Minutes of Meetings
Appendix C8: Comments and Responses Report
Appendix D: Maps
Appendix E: EAP Affirmation and Declaration of Independence
Appendix F: DFFE National web-based screening report
Appendix G: Terrestrial Ecology and Freshwater Ecology Assessment
Appendix H: Avifauna Impact Assessment
Appendix I: Soils and Agricultural Assessment
Appendix J: Heritage Impact Assessment
Appendix K: Visual Impact Assessment
Appendix L: Socio-Economic Scoping Assessment
Appendix M: Traffic Impact Assessment
Appendix N1: Facility EMPr
Appendix N2: Substation Generic EMPr
Appendix O: Site Sensitivity Verification Report
Appendix P: Civil Aviation Compliance Statement
Appendix Q: Defence Compliance Statement
Appendix R: RFI Compliance Statement
Appendix S: Specialist Declarations

CHAPTER 1: INTRODUCTION

K2022578784 (SOUTH AFRICA) (Pty) Ltd is proposing the development of a commercial Solar Energy Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and 10km east of Lime Acres in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality (refer to **Figure 1.1**). The facility will have a contracted capacity of up to 150MW and will be known as the Limestone PV1 Solar Energy Facility. The project is planned as part of a larger cluster of renewable energy projects, which includes another 150MW PV Solar Energy Facility (Limestone PV2) located on the same property as Limestone PV1 and a 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil.

Each renewable energy facility will be constructed as a separate stand-alone project and therefore, separate Scoping and Environmental Impact Assessment (S&EIA) processes will be undertaken for each of the renewable energy facilities. The preferred grid connection for the project will also be subjected to a separate Application for Authorisation.

The Limestone PV1 facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. The developer intends to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) to evacuate the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP) with the Limestone PV1 Facility set to inject up to 150MW Maximum Export Capacity into the national grid. The Limestone PV1 Solar Energy Facility will provide valuable jobs and socio-economic benefits that are required in the area.

From a regional perspective, the area within the Northern Cape identified for the project is considered favourable for the development of a commercial PV facility due to the excellent solar resource, low environmental sensitivity of the identified site and availability of land on which the development can take place. There is also potential for evacuating the power to the national grid via a direct grid connection at the Olien MTS (Main Transmission Substation) which is adjacent to the proposed site.

1.1. Requirement for an Environmental Impact Assessment Process

Section 24 of South Africa's National Environmental Management Act (No. 107 of 1998) (NEMA) pertains to Environmental Authorisations (EA), and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the Competent Authority (CA). The 2014 Environmental Impact Assessment (EIA) Regulations, as amended (GNR 326), published under the NEMA prescribe the process to be followed when applying for Environmental Authorisation (EA), while the Listing Notices (Listing Notice 1 (GNR 327), Listing Notice 2 (GNR 325), and Listing Notice 3 (GNR 324)) contain those activities which may not commence without an EA from the CA.

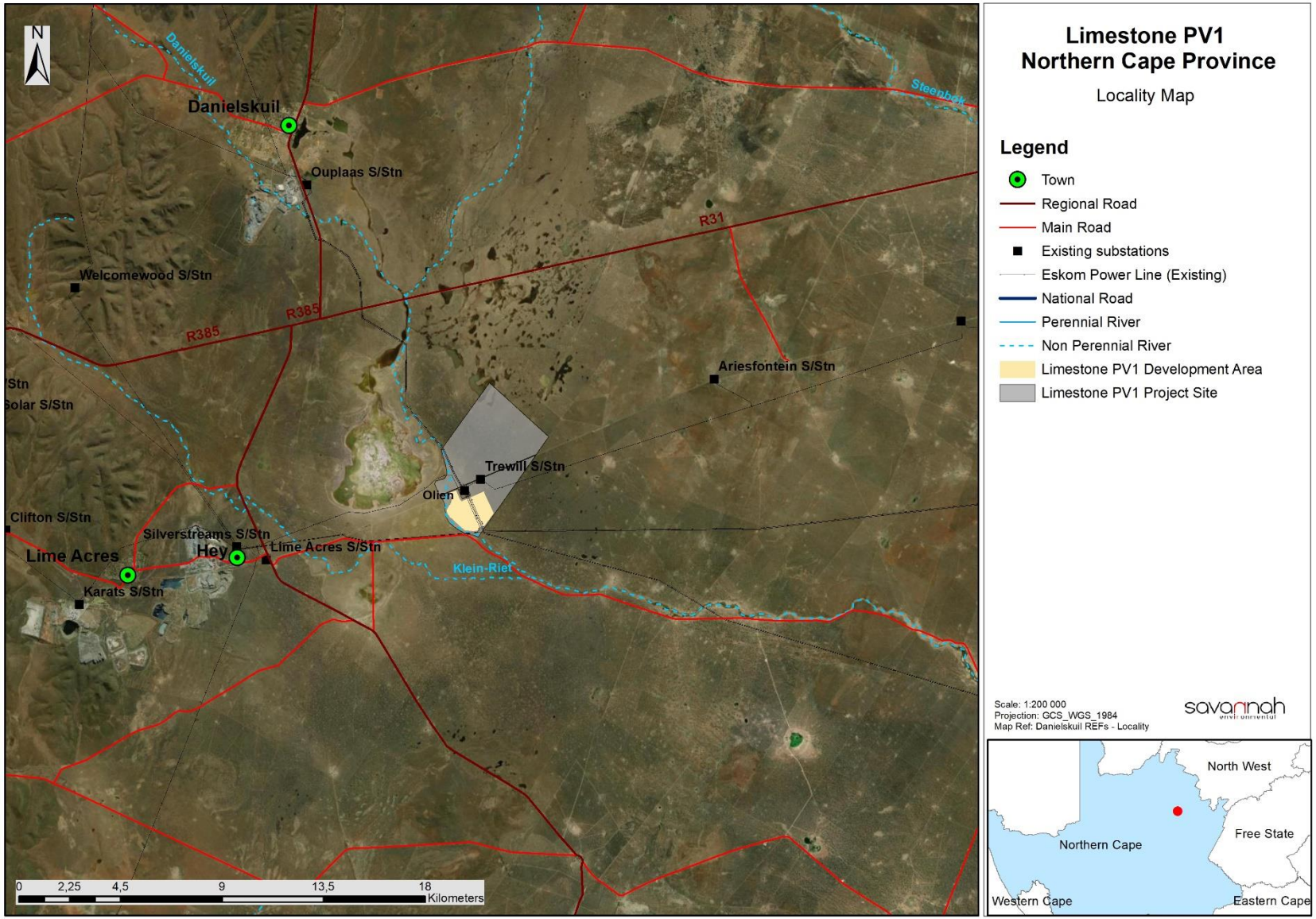


Figure 1.1: Locality map of the project site and development area within which the Limestone PV1 Solar Energy Facility is proposed to be developed (also refer to **Appendix D** for project maps).

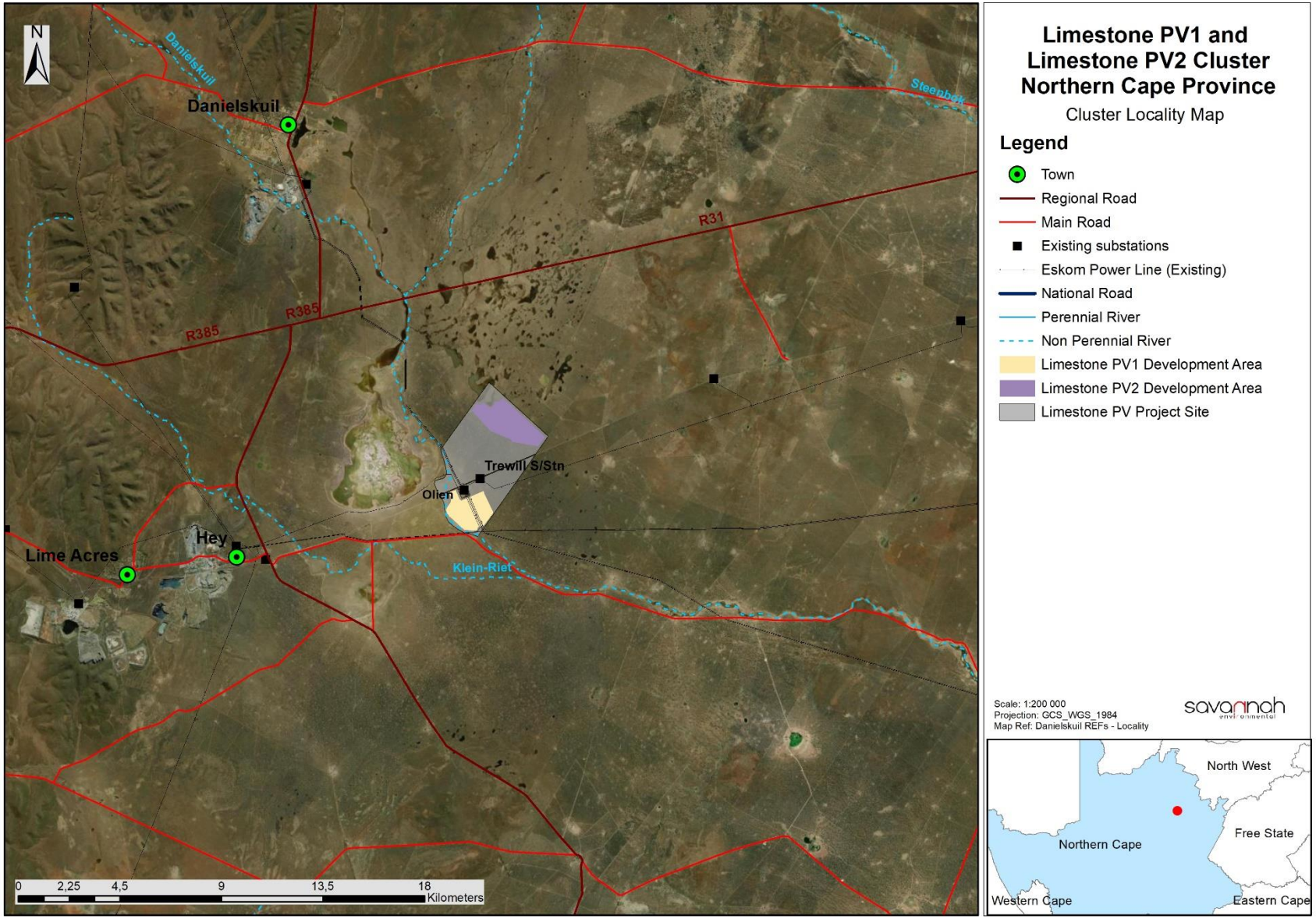


Figure 1.2: Map showing Limestone PV cluster comprising the Limestone PV1 and Limestone PV2 facilities proposed to be developed.

As the project has the potential to impact on the environment, an Environmental Authorisation (EA) is required from the National Department of Forestry, Fisheries, and the Environment (DFFE) subject to the completion of a full Scoping and Environmental Impact Assessment (S&EIA) process, as prescribed in Regulations 21 and 24 of the 2014 EIA Regulations (GNR 326), as amended. The requirement for EA subject to the completion of a full S&EIA process is triggered by the inclusion of, amongst others, Activity 1 of Listing Notice 1 (GNR 327), namely:

"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more."

The Applicant intends on bidding the project into the Renewable Energy Independent Power Producers Power Procurement Programme (REIPPPP)[1], therefore in terms of GNR 779 of 01 July 2016, the DFFE has been determined as the Competent Authority for all projects which relate to the IRP for Electricity 2010 – 2030, and any updates thereto. Through the decision-making process, the DFFE will be supported by the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR) as the commenting authority.

1.2. Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Environmental Impact Assessment Report

This EIA Report has been prepared in accordance with the requirements of the EIA Regulations published on 08 December 2014 (and amended on 07 April 2017) promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No 107 of 1998). This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(a) the details of (i) the EAP who prepared the report and (ii) the expertise of the EAP; including a curriculum vitae.	The details of the EAP and the expertise of the EAP have been included in **section 1.5**. The Curriculum vitae of the Savannah Environmental team have been included as **Appendix A**.
3(1)(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the project site proposed for the development of the Limestone PV1 Solar Energy Facility is included as **Figure 1.1**. The details of the affected properties, including the property names and numbers, as well as the SG-codes are included in **Table 1.1**. The development footprint is detailed in Chapter 2
3(1)(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.	The locality of the project site is illustrated on a locality map included as **Figure 1.1**. The centre point co-ordinates of the project site are included in **Table 1.1**. The affected footprint including the location of all structures and infrastructure is provided in **Figure 2.1** of Chapter 2.

[1] If the REIPPPP does not continue, the intention is for the developer to bid into a similar programme.

This EIA Report consists of twelve chapters, as follows:

- **Chapter 1** provides background to the Limestone PV1 Solar Energy Facility and the EIA process.
- **Chapter 2** provides a description of the Solar Energy Facility and associated infrastructure.
- **Chapter 3** provides the site selection information and identified project alternatives.
- **Chapter 4** describes solar as a power generation option and provides insight to technologies for solar energy.
- **Chapter 5** outlines the strategic regulatory and legal context for energy planning in South Africa, and specifically for the proposed facility.
- **Chapter 6** describes the need and desirability of the Limestone PV1 Solar Energy Facility within the project site.
- **Chapter 7** outlines the process which was followed during the EIA process.
- **Chapter 8** describes the existing biophysical and socio-economic environment affected by the proposed facility.
- **Chapter 9** provides an identification and evaluation of the potential issues associated with the proposed solar energy facility and associated infrastructure.
- **Chapter 10** provides a description and assessment of the potential cumulative issues associated with the proposed solar energy facility and associated infrastructure.
- **Chapter 11** presents the conclusions and recommendations based on the findings of the EIA for Limestone PV1 Facility.
- **Chapter 12** provides references used in the compilation of the EIA Report.

1.3. Project Overview

The development area is proposed to accommodate the following infrastructure:

- PV modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 5m wide).
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.

The key infrastructure components proposed as part of the Limestone PV1 Solar Energy Facility are described in greater detail in Chapter 2 of this EIA Report.

A technically feasible project site, with an extent of ~1 842ha has been identified by K2022578784 (SOUTH AFRICA) (Pty) Ltd as a technically suitable area for the development of the Limestone PV1 Solar Energy Facility. The project site details are as listed in **Table 1.1** below.

Table 1.1: Detailed description of the Limestone PV1 Solar Energy Facility project site

Province	**Northern Cape Province**		
District Municipality	ZF Mgcawu District Municipality		
Local Municipality	Kgatelopele Local Municipality		
Ward Number (s)	Ward 6 of the Kgatelopele Local Municipality		
Nearest town(s)	Danielskuil (~16km north west); Lime Acres (~10km west)		
Affected Properties:	**Parent Farm Number**	**Farm Portions**	**SG 21 Digit Code (s)**
	Farm Engeland 300	4	C0070000000030000004
Current zoning	Agriculture		
Site Coordinates (centre of project site)	28°20'14.723"S; 23°37'12.805"E		
Site Coordinates (corners)	**Corner 1**	28°19'59.22"S	23°37'0.61"E
	Corner 2	28°20'5.96"S	23°37'4.54"E
	Corner 3	28°20'12.65"S	23°37'3.29"E
	Corner 4	28°20'18.63"S	23°36'59.04"E
	Corner 5	28°20'21.64"S	23°36'56.92"E
	Corner 6	28°20'23.83"S	23°36'56.29"E
	Corner 7	28°20'26.13"S	23°36'56.53"E
	Corner 8	28°20'30.89"S	23°36'58.98"E
	Corner 9	28°20'31.10"S	23°36'59.40"E
	Corner 10	28°20'33.45"S	23°37'0.59"E
	Corner 11	28°20'53.29"S	23°37'26.33"E
	Corner 12	28°20'53.25"S	23°37'29.70"E
	Corner 13	28°20'53.53"S	23°37'30.86"E
	Corner 14	28°20'53.67"S	23°37'34.82"E
	Corner 15	28°20'54.36"S	23°37'37.66"E
	Corner 16	28°20'54.18"S	23°37'38.99"E
	Corner 17	28°20'52.92"S	23°37'45.70"E
	Corner 18	28°20'49.38"S	23°37'47.19"E
	Corner 19	28°20'46.63"S	23°37'57.49"E
	Corner 20	28°20'28.64"S	23°38'12.55"E
	Corner 21	28°19'57.11"S	23°37'56.27"E
	Corner 22	28°20'10.40"S	23°37'22.37"E
	Corner 23	28°20'10.40"S	23°37'19.50"E
	Corner 24	28°20'9.22"S	23°37'17.96"E
	Corner 25	28°19'55.25"S	23°37'11.53"E

The overarching objective for the Limestone PV1 Solar Energy Facility is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts in accordance with the principles of sustainable development. The full extent of the development area was considered within the Scoping phase of the process through site-specific specialist studies with the aim of determining the suitability from an environmental and social perspective and identifying areas that should be avoided in development planning. The exact location of the development area within the project site for the Limestone PV1 Solar

Energy Facility is defined within this EIA report (refer to Chapter 12). In order to assess the project, the following is considered through this S&EIA process:

Project site	Farm Engeland 300 (~1 842ha in extent).
Development area	The identified area (to be located within the project site) where the Limestone PV1 Solar Energy Facility is planned to be positioned. This area will be selected as a practicable location option for the facility, considering technical preference and environmental constraints. The development area is ~250ha in extent and will be demarcated as a result of the findings of the Scoping phase.
Development footprint (facility layout)	The defined area (located within the development area) where the PV panel array and other associated infrastructure for the Limestone PV1 Solar Energy Facility is planned to be constructed. This is the facility footprint, and the area which would be disturbed by project-related infrastructure.

As is clear from the above, the development area is larger than the area needed for the development footprint of a 150MW PV facility, and therefore provides the opportunity for the optimal placement of the infrastructure, ensuring avoidance of environmental sensitivities or constraints identified through this Scoping and EIA process.

A development area of ~250ha was identified within the project site by the proponent for the development based on the outcome of the specialist assessments and technical considerations.

1.4. Overview of the Environmental Impact Assessment (EIA) Process

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues and allows for the resolution of the issues reported on in the Scoping and EIA reports as well as dialogue with interested and affected parties (I&APs).

The EIA process comprises of two (2) phases (i.e., Scoping and Impact Assessment) and involves the identification and assessment of potential environmental impacts through the undertaking of independent specialist studies, as well as public participation. The processes followed in these two phases is as follows:

» The **Scoping Phase** includes the identification of potential issues associated with the project through a desktop study (considering existing information), limited field work and consultation with interested and affected parties and key stakeholders. This phase considers the project site in order to identify and delineate any environmental fatal flaws, no-go and / or sensitive areas. Following a public review period of the Scoping report, this phase culminates in the submission of a final Scoping Report and Plan of Study for the EIA to the Competent Authority for consideration and acceptance. The Scoping Report was accepted, and the Plan of Study for the EIA Phase approved by the DFFE on 31 March 2023.

» The **EIA Phase** involves a detailed assessment of the potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase considers a proposed development footprint within the project site and includes detailed specialist investigations as well as public consultation. Following a public review period of the EIA Report, this phase culminates in the submission of a final EIA Report and an Environmental Management Programme (EMPr), including recommendations of practical and achievable mitigation and management measures, to the Competent Authority for final review and decision-making.

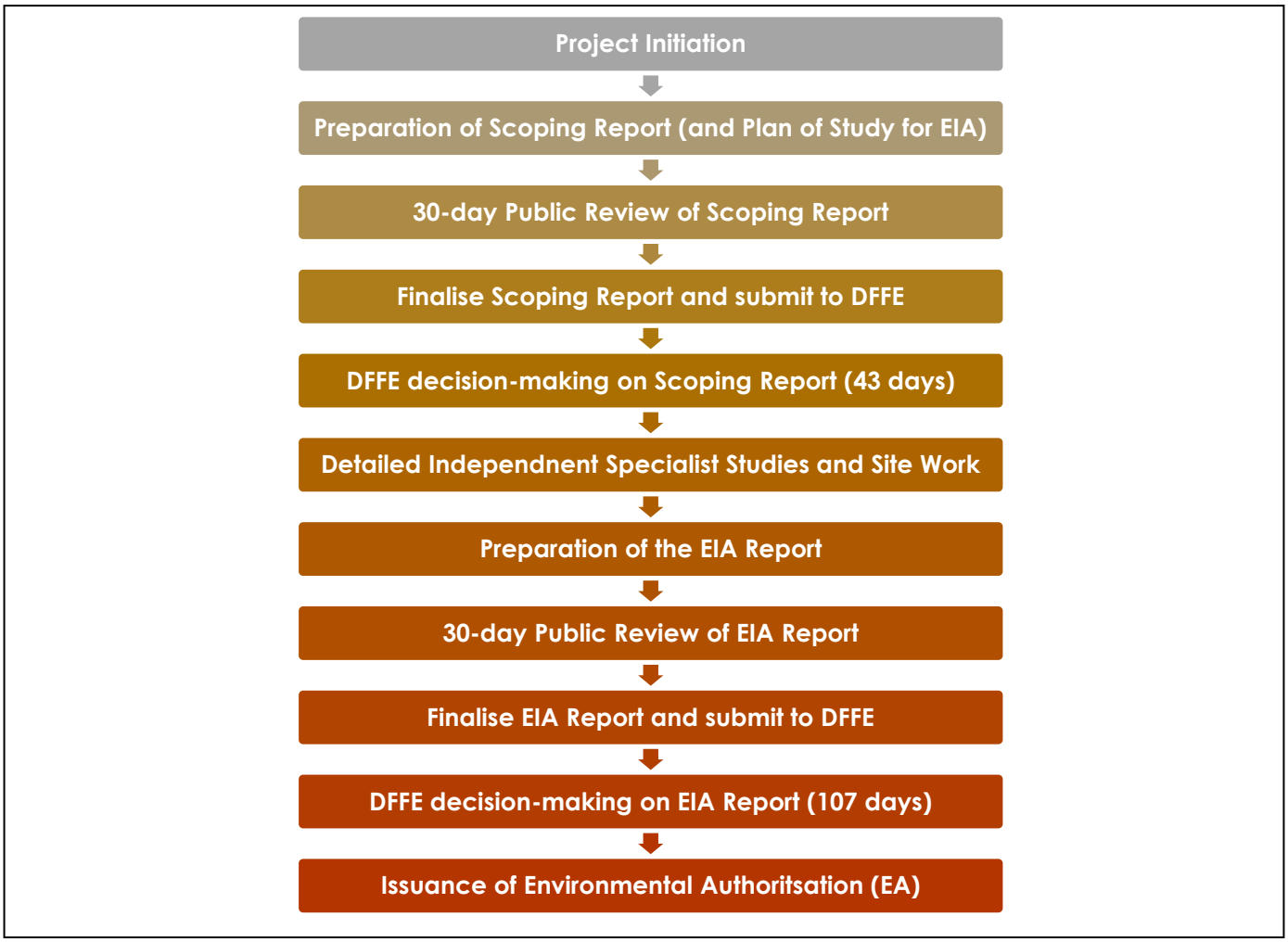


Figure 1.2: Regulated timeframe of an EIA Process

1.5. Details of Environmental Assessment Practitioner and Expertise to conduct the S&EIA Process

In accordance with Regulation 12 of the 2014 EIA Regulations (GNR 326), K2022578784 (SOUTH AFRICA) (Pty) Ltd has appointed Savannah Environmental (Pty) Ltd as the independent Environmental Consultant responsible for managing the Application for EA and supporting Scoping and Environmental Impact Assessment (S&EIA) process; inclusive of comprehensive, independent specialist studies. The application for EA and S&EIA process will be managed in accordance with the requirements of NEMA, the 2014 EIA Regulations (GNR 326), and all other relevant applicable legislation.

Neither Savannah Environmental, the Environmental Assessment Practitioners (EAPs) employed by the company nor any of the specialists responsible for undertaking studies for this project are subsidiaries or are affiliated to the applicant. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed facility.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment, and planning to ensure compliance and evaluate the risk of development, and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessment processes and environmental management and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa, including those associated with electricity generation from renewable energy sources.

» **Nkhensani Masondo**, the principal EAP and author on this project, is registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA (2020/1385) and holds a MSc in Environmental Management. She has seven (7) years of working experience in the environmental field and has gained extensive experience in conducting Environmental Impact Assessments, Stakeholder Engagements, Environmental Auditing and Environmental Management Plans Programmes for a wide range of projects.

» **Jo-Anne Thomas**, is a registered EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA - 2019/726) and a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP). She provides technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Her key focus is on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures.

» **Molatela Ledwaba**, the principle public participation consultant for this project has a BA in Environmental Management and is currently working on her BA(Hons) in Environmental Management. Molatela has thirteen (13) years of experience in office administration, project coordination, and public participation in a variety of industries including geohydrological and environmental services projects, but not limited to infrastructure development and mining.

In order to adequately identify and assess potential environmental impacts associated with the proposed Limestone PV1 Solar Energy Facility, the following specialist sub-consultants have provided input into this Scoping Report:

Specialist	Area of Expertise
Marnus Erasmus of The Biodiversity Company	Terrestrial ecology and freshwater
Ryno Kemp of The Biodiversity Company	Avifauna
Matthew Mamera of The Biodiversity Company	Soils and agricultural potential
Jenna Lavin of Cedar Tower Solutions (CTS)	Heritage (incl. Archaeology and Palaeontology)
Lourens du Plessis of LOGIS	Visual
Molatela Ledwaba of Savannah Environmental	Social
Iris Wink of iWink	Traffic

Appendix A includes the curricula vitae for the project team and specialists.

CHAPTER 2: PROJECT DESCRIPTION

This chapter provides a description of the proposed Limestone PV1 Solar Energy Facility and associated infrastructure. It must be noted that the project description presented in this Chapter may change to some extent based on the outcomes and recommendations of detailed engineering and other technical studies, the findings and recommendations of the EIA and supporting specialist studies, and any licencing, permitting, and legislative requirements.

2.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of a Scoping Report

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014, as amended - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including (i) the 21-digit Surveyor General code of each cadastral land parcel, (ii) where available the physical address and farm name and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties.	The location of the proposed project, including the 21 digit Surveyor General code is detailed in Section 2.2.1 below.
3(1)(d)(ii) a description of the scope of the proposed activity, including (ii) a description of the activities to be undertaken including associated structures and infrastructure related to the development.	A description of the activities to be undertaken with the development of project is included in **Table 2.1** and **Table 2.2**.

2.2 Nature and Extent of the Limestone PV1 Solar Energy Facility

In responding to the growing electricity demand within South Africa, the need to promote renewable energy and sustainability within the Northern Cape Province, as well as the country's targets for renewable energy, K2022578784 (SOUTH AFRICA) (Pty) Ltd is proposing the development of the Limestone PV1 Solar Energy Facility and associated infrastructure to add up to 150MW Maximum Export Capacity new capacity to the national electricity grid. The project will make use of photovoltaic modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost. These options are being considered within this EIA Report.

2.2.1. Overview of the Project Site

The project is to be developed on a site located approximately ~16km south-east of the town of Danielskuil and 10km east of Lime Acres in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality in the ZF Mgcawu District Municipality. A project site of 1 842ha was initially considered within which a development area of 250ha was identified. A development footprint of ~177ha has been identified within the project site and assessed for the construction of the facility and its associated infrastructure (refer to **Figure 2.1**). The optimal position for the PV facility was determined taking into consideration the environmental sensitivities identified through the Scoping Study. The PV infrastructure has been

appropriately placed to optimise the energy generating potential of the solar resource while also minimising impacts on environmental sensitivities. The project site consists of a single property, as detailed in **Table 2.1** below.

Table 2.1: Properties within which the Limestone PV1 Solar Energy Facility project site will be located

Parent Farm Number	Farm Portions	SG 21 Digit Code (s)
Farm Engeland 300	4	C00700000000030000004

Access to the project site is ample with the presence of existing roads mainly consisting of regional roads. The project site is situated close to the R31 and R385 regional roads. An unnamed road provides access to the project site and development area. Internal roads are also proposed to allow access to facility infrastructure.

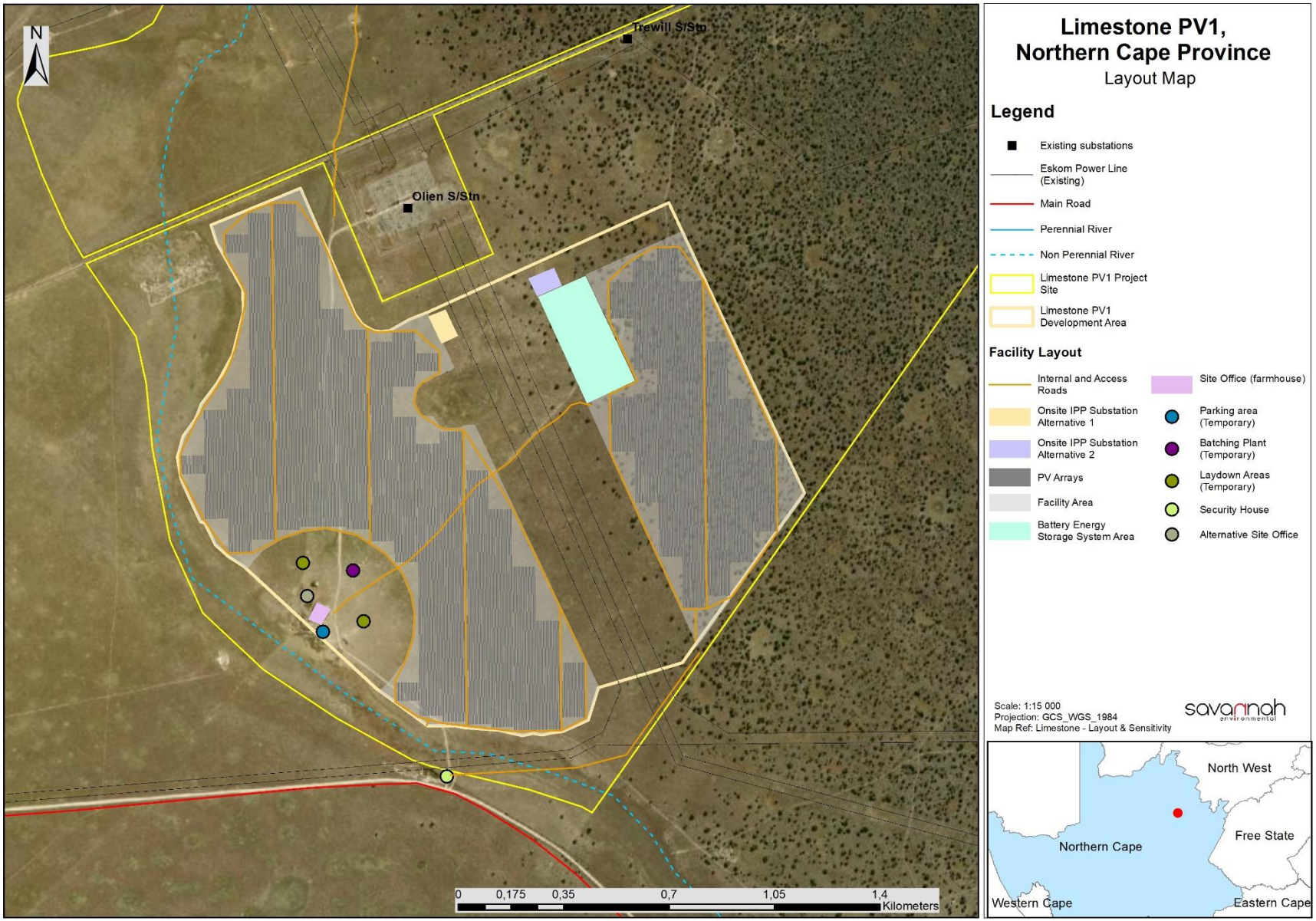


Figure 2.1: Layout of the Limestone PV1 facility

2.2.2. Components of the Limestone PV1 Solar Energy Facility

The development area is proposed to accommodate the PV panels and all associated infrastructure which is required for such a facility, and will include:

- PV modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost (up to 167ha).
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation with a capacity up to 250 MVA (up to 0.75ha)
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings to either be situated within the onsite farmhouse or alternative proposed site, including workshop areas for maintenance and storage as well as parking for staff and visitors (up to 1ha).
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) with a length of up to 3km (up to 1.8ha)
- Internal distribution roads (up to 5m wide) with a length of 13km (up to 6ha)
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.

A summary of the details and dimensions of the planned infrastructure associated with the project, as available at this stage in the process, is provided in **Table 2.2.**

Table 2.2: Details or dimensions of typical infrastructure required for the Limestone PV1 Solar Energy Facility

Infrastructure	Footprint and dimensions
Panel Height	+/- 2.2m (when panel is horizontal)
Technology	Use of fixed-tilt or single-axis tracking.
Contracted Capacity	Up to 150MW maximum export capacity
Area occupied by the solar array	~167ha
Area occupied by the on-site facility substation (IPP Portion)	Up to 0.75ha
Capacity of on-site facility substation	100.5 MVA
Cabling between the PV array and the onsite substation	The cabling will be in underground trenches and operate at a voltage of up to 33kV.
Coordinates of on-site facility substation (IPP portion)	Alternative 1 (Preferred Alternative):

	Latitude	Longitude
Corner 1	28°20'8.74"S	23°37'26.92"E
Corner 2	28°20'11.73"S	23°37'28.48"E
Corner 3	28°20'10.89"S	23°37'30.56"E
Corner 4	28°20'7.98"S	23°37'29.09"E

<table>
<tr><th>Infrastructure</th><th>Footprint and dimensions</th></tr>
<tr><td></td><td>Alternative 2:<table><tr><th></th><th>Latitude</th><th>Longitude</th></tr><tr><td>Corner 1</td><td>28°20’4.82”S</td><td>23°37’39.18”E</td></tr><tr><td>Corner 2</td><td>28°20’6.76”S</td><td>23°37’40.21”E</td></tr><tr><td>Corner 3</td><td>28°20’5.62”S</td><td>23°37’43.28”E</td></tr><tr><td>Corner 4</td><td>28°20’3.67”S</td><td>23°37’42.36”E</td></tr></table></td></tr>
<tr><td>Battery Energy Storage System (BESS)</td><td>» The BESS will use solid state battery technology (e.g. Lithium-ion technology) as a preferred technology.
» The BESS will be housed in containers approximately 3m high covering a total approximate footprint of up to 6ha</td></tr>
<tr><td>BESS Coordinates</td><td><table><tr><th></th><th>Latitude</th><th>Longitude</th></tr><tr><td>Corner 1</td><td>28°20’6.83”S</td><td>23°37’40.33”E</td></tr><tr><td>Corner 2</td><td>28°20’18.34”S</td><td>23°37’46.13”E</td></tr><tr><td>Corner 3</td><td>28°20’15.98”S</td><td>23°37’52.07”E</td></tr><tr><td>Corner 4</td><td>28°20’4.61”S</td><td>23°37’46.19”E</td></tr></table></td></tr>
<tr><td>Extent of areas required for laydown of materials, equipment etc.</td><td>Less than 2ha</td></tr>
<tr><td>Access and internal roads</td><td>Existing roads will be used as far as possible. Existing gravel roads can be utilised for site access (width of up to 6m). Upgrading of existing roads or new roads will be required.

New internal access roads required (width of up 5m), same for construction and operation. Internal access roads will be gravel/hard surfaced.</td></tr>
</table>

Table 2.2 provides details regarding the requirements and the activities to be undertaken during the Limestone PV1 Solar Energy Facility development phases (i.e., construction phase, operation phase and decommissioning phase). **Table 2.3** provides photographs of the construction phase of a Solar Energy Facility similar to the Limestone PV1 Solar Energy Facility.

2.2.3. Project Development Phases Associated with the Limestone PV1 Solar Energy Facility

Table 2.2: Details of the Limestone PV1 Solar Energy Facility project development phases (i.e., design and pre-construction, construction, operation, and decommissioning)

Design and Pre-Construction Phase	
Requirements	» Conducting final planning and surveys for the Limestone PV1 site before construction
Activities to be undertaken	
Planning	» Several post-authorisation factors are expected to influence the final design of the solar energy facility and could result in small-scale modifications of the PV array and/or associated infrastructure. An objective of the Engineering, Procurement and Construction (EPC) Contractor, who will be responsible for the overall construction of the project, will be to comply with the approved facility design as far as possible. It should be understood however, that the construction process is dynamic and that unforeseen changes to the project specifications may take place. This EIA Report therefore describes the project in terms of the best available knowledge at the time. » The final facility design is required to be approved by the DFFE prior to commencement of construction. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project following approval thereof, the DFFE will need to be notified and where relevant, environmental approval obtained.
Conduct Surveys	» Prior to initiating construction, a number of surveys will be required including, but not limited to, confirmation of the micro-siting footprint (i.e., the precise location of the PV panels, substation and the associated infrastructure) and a geotechnical survey. Geotechnical surveys acquire information regarding the physical characteristics of soil and rocks underlying a proposed project site and informs the design of earthworks and foundations for structures.
Construction Phase	
Requirements	» Project receives Environmental Authorisation from the DFFE, preferred bidder allocation granted by DMRE (or other entity) and a generating license issued by NERSA. » Construction is expected to be 12 – 18 months for the Limestone PV1 Solar Energy Facility. » Create direct construction employment opportunities. The number of employment opportunities that will be created is still to be determined. The majority of the labour force is expected to be locally sourced however this is to be confirmed. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Danielskuil and Lime Acres and transported to and from site with a mode of transport still to be determined. » Wastewater and sewage management still to be determined. » The amount and types of waste, as well as waste disposal methods are still to be determined. » The electricity requirement and supply for construction activities will be determined at a later stage. » Water to be sourced through either boreholes or the local municipal (still to be determined) and will provide an estimated 80 000 – 100 000 m^3 of water. Method of transportation of the water to site is still to be determined.
Activities to be undertaken	

Establishment of access roads to the Site	» Existing gravel roads (6m wide) to be used for site access and will be utilised, where possible, to minimise impact. » Internal access roads within the site will be established at the commencement of construction. » Access roads will need to be upgraded or added (most likely as gravel/hard surface) as part of the proposed development. New onsite access roads to be up to 5m wide. » Roads to be permanent for operation and maintenance purposes
Undertake site preparation	» Including the clearance of vegetation at the footprint of PV panel supports, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread onsite. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Transport of components and equipment to and within the site	» The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase. » Some of the components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989) by virtue of the dimensional limitations. » Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures and site preparation.
Establishment of laydown areas on site	» The laydown area will be used for the assembly of the PV panels, and the general placement/storage of construction equipment. » The laydown area will be established close to the site entrance and will cover an area less than 2ha. » Site offices and maintenance buildings, including workshop areas for maintenance and storage will also be established
Erect PV Panels, construct substation, inverters and BESS	» The construction phase involves installation of the PV solar panels, structural and electrical infrastructure required for the operation of Limestone PV1. » In addition, preparation of the soil and improvement of the access roads are likely to continue for most of the construction phase. » For array installations, vertical support posts will be driven into the ground. » Depending on the results of the geotechnical report, a different foundation method, such as screw pile, helical pile, micropile or drilled post/piles could be used. » The posts will hold the support structures (tables) on which the PV panels would be mounted. » Brackets will attach the PV panels to the tables. » Trenches are to be dug for the underground AC and DC cabling, and the foundations of the inverter enclosures and transformers will be prepared. While cables are being laid and combiner boxes are being installed, the PV tables will be erected. » Wire harnesses will connect the PV modules to the electrical collection systems. Underground cables and overhead circuits will connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure, and ultimately the onsite facility substation. This process also involves the installation of the BESS facility. The construction of the on-site facility substation will require a survey of the footprint, site clearing and levelling and construction of access road(s) (where applicable), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas, and protection of erosion sensitive

Establishment of ancillary infrastructure	» Site offices and maintenance buildings, including workshop areas for maintenance and storage will be required. » Establishment will require the clearing of vegetation, levelling, and the excavation of foundations prior to construction.
Connect facility to the power grid	» The grid connection is to comprise of a collector substation. overhead lines which will connect to the national grid at the Olien MTS. This will for part of a separate application for authorisation.
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction completed in an area, and all construction equipment is removed. » On commissioning, access points to the site not required during the operation phase will be closed and prepared for rehabilitation.
Operation Phase	
Requirements	» Duration will be 20-25 years. » Requirements for monitoring, reporting, security and maintenance of the project. » Employment opportunities relating mainly to operation activities and maintenance. Full-time employment opportunities will be available during the operation of the Solar Energy Facility and to be determined at a later stage.
Activities to be undertaken	
Operation and Maintenance	» While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. » Key elements of the Operation and Maintenance (O&M) plan include monitoring and reporting the performance of the solar energy facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security. » The PV facility will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Disposal of waste products (e.g., oil and other lubricants, etc) in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised should a laydown area be required during operation. » PV panels will be washed during operation utilising clean water or non-hazardous biodegradable cleaning products. Wastewater generated by washing can be allowed to run off under the panels.
Decommissioning Phase	
Requirements	» Decommissioning of the Limestone PV1 Solar Energy Facility infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 – 25 years (with maintenance) before decommissioning is required. » Decommissioning activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment and lifting cranes. » Preparation of the site (e.g., laydown areas and construction platform). » Mobilisation of construction equipment.

Disassemble and remove PV panels	» When the solar energy facility is ultimately decommissioned, the equipment to be removed will depend on the land use proposed for the project site at the time. » Disconnect the facility from the grid. » Dismantle all panels, mounting structures and foundations in line with all relevant legislation. » Recycle, repurpose and re-use as much of the decommissioned project components as possible in accordance with regulatory requirements. » Concrete foundations will be removed to a depth as defined by an agricultural specialist. » Backfill the mounting structure holes and rehabilitate the area appropriately. » Visible cables will be removed. » A final site walkthrough will be conducted to remove debris and/or waste generated within the site during the decommissioning process. » Rehabilitation may include top soiling, raking, and/or re-seeding (whichever is appropriate).
Future plans for the site and infrastructure after decommissioning	» It is expected that the areas of the project site affected by the Solar Energy Facility infrastructure (development footprint) will revert back to their original land use (i.e., agriculture) once the Limestone PV1 Solar Energy Facility has reached the end of its economic life and all infrastructure has been decommissioned.

Table 2.3: Photographs of the construction phase of a Solar Energy Facility similar to the Limestone PV1 Solar Energy Facility (Source:https://medium.com/@solar.dao/how-to-build-pv-solar-plant-6c9f6a01020f; https://www.shutterstock.com/video/clip-1028794-workers-mounting-panels-on-solar-power-plant-construction; https://www.esi-africa.com/renewable-energy/kenya-construction-solar-farm-gets-green-light/)

CHAPTER 3: CONSIDERATION OF ALTERNATIVES

This Chapter provides an overview of the various alternatives considered as part of the S&EIA Process. Where have been considered, motivation has been included.

3.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Environmental Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(g) a motivation for the preferred site, activity, and technology alternative	The identification and motivation for the preferred project site, the development area within the project site, the proposed activity and the proposed technology is included in **sections 3.3.1, 3.3.3 and 3.3.4**.
3(1)(h)(i) details of the alternative considered	The details of all alternatives considered as part of the Limestone PV1 Solar Energy Facility are included in **sections 3.3.1 – 3.3.5**.
3(1)(h)(ix) the outcome of the site selection matrix	The site selection process followed by the developer in order to identify the preferred project site and development area is described in **section 3.3.1**.
3(1)(h)(x) if no alternatives, including alternative locations for the activity were investigation, the motivation for not considering such	Where no alternatives have been considered, motivation has been included. This is included in **section 3.3**.

3.2 Alternatives Considered as part of the Scoping and EIA Process

In accordance with the requirements of Appendix 3 of the 2014 EIA Regulations (GNR 326), reasonable and feasible alternatives including but not limited to site and technology alternatives, as well as the "do-nothing" alternative should be considered.

The DFFE Guideline for determining alternatives states that the key criteria for consideration when identifying alternatives are that they should be "practicable", "feasible", "relevant", "reasonable" and "viable". Essentially there are two types of alternatives:

» Incrementally different (modifications) alternatives to the project.
» Fundamentally (totally) different alternatives to the project.

In this instance, 'the project' refers to Limestone PV1 Solar Energy Facility, a Solar Energy Facility with capacity of up to 150MW Maximum Export Capacity and associated infrastructure proposed to be developed by an Independent Power Producer (IPP) and intended to form part of the DMRE's REIPPP Programme.[2]

[2] If the REIPPPP does not continue, the intention is for the developer to bid into a similar programme.

3.2.1. Consideration of Fundamentally Different Alternatives

Fundamentally different alternatives are usually assessed at a strategic level and, as a result, project specific EIAs are therefore limited in scope and ability to address fundamentally different alternatives. At a strategic level, electricity-generating alternatives have been addressed as part of the DMRE's current Integrated Resource Plan for Electricity 2010 – 2030 (IRP)[3], and will continue to be addressed as part of future revisions. In this regard, the need for renewable energy power generation from solar energy facilities has been identified as part of the technology mix for power generation in the country for the next 20 years, with provision for 6000MW of large-scale PV. The fundamental energy generation alternatives were assessed and considered within the development of the IRP and the need for the development of renewable energy projects has been defined. Therefore, fundamentally different alternatives to the proposed project are not considered within this EIA process.

3.2.2. Consideration of Incrementally Different Alternatives

Incrementally different alternatives relate specifically to the project under investigation. "Alternatives", in relation to a proposed activity, means different ways of meeting the general purposes and requirements of the activity, which may include alternatives for:

- The properties on which, or location where the activity is proposed to be undertaken.
- The type of activity to be undertaken.
- The design or layout of the activity.
- The technology to be used in the activity.
- The operational aspects of the activity.

In addition, the option of not implementing the activity (i.e., the "do-nothing" alternative) must also be considered.

The sections below describe the incrementally different alternatives being considered as part of the Limestone PV1 Solar Energy Facility. Where no alternative is being considered, a motivation has been provided as required by the EIA Regulations, 2014.

3.3 Project Alternatives under Consideration for the Limestone PV1 Solar Energy Facility

3.3.1. Property or Location Alternatives

The development site identified for the Limestone PV1 Solar Energy Facility is located ~16km south-east of the town of Danielskuil. The placement of a solar PV facility is dependent on several factors including land suitability, climatic conditions (solar irradiation levels), topography, the location and extent of the study area, availability of grid connection infrastructure and the need and desirability of the project. K2022578784 (SOUTH AFRICA) (Pty) Ltd considers the preferred development area placed within the study area as being highly favourable and suitable for the establishment of a solar PV facility due to the following site-specific characteristics:

[3] The Integrated Resource Plan (IRP) is legislated policy which regulates power generation planning.

» **Solar resource**: Solar resource is the first main driver of site selection and property viability when considering the development of solar PV facilities. The economic viability of a solar PV facility is directly dependent on the annual direct solar irradiation values of the area within which it will operate. The Northern Cape has the highest estimated solar potential of all areas within South Africa. The Global Horizon Irradiation (GHI) for the study area is in the region of approximately 2 240 kWh/m^2/annum (refer to **Figure 3.1**). The Northern Cape Province is considered to have the highest solar irradiation values of the country and therefore enables the development of solar energy projects and the successful operation thereof.

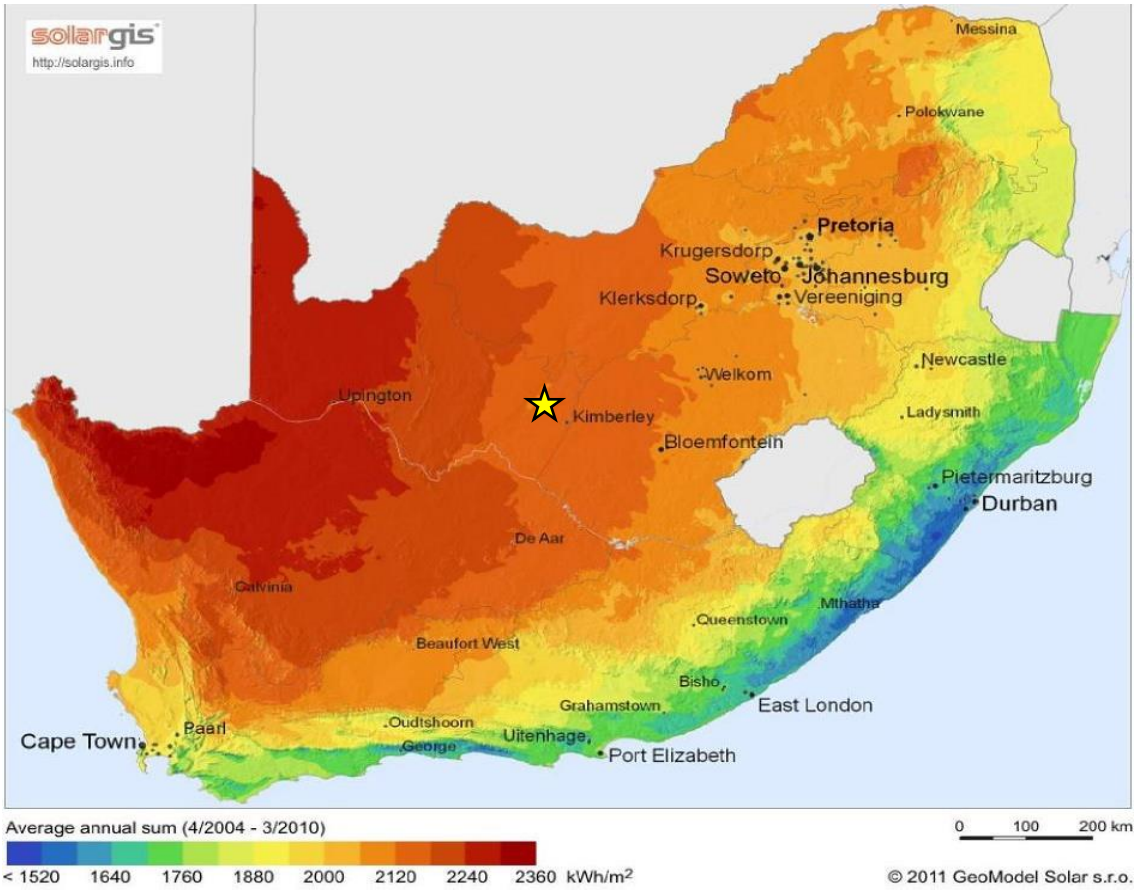


Figure 3.1: Solar irradiation map for South Africa; the proposed Limestone PV1 Solar Energy Facility position is shown by the yellow star on the map. (Source: adapted from GeoModel Solar, 2011).

» **Site extent:** In order to develop the Limestone PV1 Solar Energy Facility with an up to 150MW Maximum Export Capacity, sufficient space is required. The preferred project site was identified within the Northern Cape Province and in the Danielskuil area following a specialist screening study. The combination of the affected properties has an extent of ~1 842ha, which was considered by the developer as sufficient for the development of the Limestone PV1 Solar Energy Facility. A development footprint within the project site and development area for the placement of infrastructure has been identified and assessed within the EIA process considering environmental constraints and sensitivities, as well as technical criteria.

» **Landowner support**: The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The landowner does not view the development as a conflict with their current land use practices. The land rights for the properties included

in the project site were secured through agreement with the landowners and are deemed technically feasible by the project developer for such development to take place.

» **Topography**: The region within which the project site is located can be described as flat and homogenous. Elevation across the area ranges from 1 430m above sea level in the west to 1 450m above sea level in the east. There are no prominent hills within the project site with the highest areas of elevation situated to the east-northeast of the project site. The flat topography of the study area under investigation is considered as beneficial in terms of the construction activities that will be required.

» **Geographic location**: The proposed project site is located within an area which has become a node for renewable energy projects, with both PV and CSP solar facilities authorised on and/or in close proximity to the project site. The proposed project site is in close proximity to a planned node for solar development, and therefore compliments planned future land use.

»

» **Access to the National Electricity Grid:** A key factor in the siting of any generation project is a viable grid connection. The final grid connection solution is still to be determined, but the site is adjacent to the existing Olien MTS which may provide a suitable connection point. The grid connection solution will be subjected to a separate EIA process.

» **Site access**: Access to the project site is ample with the presence of existing roads mainly consisting of regional roads. The project site is situated close to the R31 and R385 regional roads. An unnamed dirt road provides access to the project site and development area.

» **Environmental sensitivity:** As part of the feasibility assessment for the project, an environmental screening of the site was undertaken by the developer to evaluate the main constraints and opportunities and determine whether or not there were any potential fatal flaws or significant no-go areas within the site. The screening process took place prior to the commencement of the EIA process and included specialist investigations of the broader project site. This included preliminary field investigations by the specialist appointed to undertake the EIA studies, as well as desktop consideration of environmental constraints. The purpose of the screening study was to identify areas constrained for development (i.e., no-go areas). The sensitivity spatial data compiled for the larger site was provided to the applicant prior to lodging the application for environmental authorisation. This is a common approach in the development of renewable energy projects in order to inform the placement of infrastructure for further investigation in the EIA process. Although some environmental sensitivities were identified as a result of the presence of Critical Biodiversity Areas (CBAs) on the site, no conclusive fatal flaws were identified during the screening assessment. It was concluded that a detailed assessment of the site would be required to identify suitable areas for development and recommend mitigation and management measures for the minimisation of impacts. This has been achieved through the EIA process.

Based on the above considerations, the Limestone PV1 Solar Energy Facility project site was identified by the developer as being the most technically feasible and viable project site within the broader area for further investigation in support of an application for authorisation. No feasible alternative development area was identified for the assessment as part of the EIA process.

3.3.2. Design and Layout Alternatives

The overall aim of the facility layout (i.e., development footprint) is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operation, and maintenance costs, social and environmental impacts. The findings of the specialist scoping assessments assisted the developer in selecting the optimum position for the PV arrays and associated infrastructures including, but not limited to, onsite substation, the BESS, access roads, and laydown areas.

An overall environmental sensitivity map has been compiled in order to illustrate the sensitive environmental features located within the project site identified at this stage in the process which needs to be considered and, in some instances completely avoided by the development footprint. Through the process of determining constraining factors and environmentally sensitive areas, the layout of the PV facility footprint and infrastructure has been planned and adjusted to ensure the avoidance of no-go areas and mitigation of sensitive environmental features. A detailed facility layout has been developed and was made available for assessment and ground-truthing by the independent specialists. Where further conflicts are predicted, a mitigation strategy has been developed to meet the objectives of the mitigation hierarchy (avoid, minimise, mitigate).

Based on the screening assessment, consideration of the total PV area was adapted to avoid, as much as possible, the Very High SEI areas as well as the identified Wooded Vaalbosveld habitat which includes the high density of *Olea europaea subsp. cuspidata*. In addition, commitment was made towards the preservation of the remainder of the site, where no development is proposed. Overall, there is an evident avoidance of the central dense woody area, and the loss of trees will be kept to a minimum.

Considering the abovementioned, the proposed layout (refer to **Figure 2.1)** avoids the following:

» All Very High SEI areas;
» Of the total 2130.56 ha PV area, 197.97 ha (9.29 %) is proposed for infrastructure.
» Of the 1208.35 ha Wooded Vaalbosveld, 59.63 ha (4.93 %) will be cleared of woody plants only;
» Of the total 525.41 ha of High SEI areas (excluding Wooded Vaalbosveld),113.15 ha (21.53 %) is planned for infrastructure.

i. Infrastructure location alternatives

Two alternatives have been identified for the placement of the on-site IPP substation (refer **Figure 3.2**).

» **Substation:**
- Alternative 1 (preferred from a technical perspective):
  Substation Alternative 1, which is the technically preferred alternative (subject to Eskom confirmation), entails locating the on-site IPP substation directly adjacent to the eastern portion of the main PV array. This alternative is considered preferable as there is already an existing access road and because it is closer to the point of connection to the national grid at Olien MTS. This substation is planned to act as a collector substation for Limestone PV2 (an up to 150MWac PV facility that will form part of the Limestone PV cluster). Alternative 1 is also preferred in terms of access to the substation as it requires a shorter access road than Alternative 2.
- Alternative 2:
  Substation Alternative 2 entails locating the on-site IPP substation directly adjacent to the BESS area. This alternative is considered less favourable as it would require an additional access road to be

constructed and is further away from the point of connection to the national grid at Olien MTS compared to Alternative 1.

The alternative substation is being proposed should Eskom deem the first location unfavourable for technical reasons.

Two alternatives have also been identified for the site offices.

» **Site offices:**

- Alternative 1 (preferred from a technical perspective):
  Site Office Alternative 1, which is the technically preferred alternative, entails locating the site office within the existing farmhouse located onsite. This option is preferred as it does not require the construction of new infrastructure and was assessed as being a suitable alternative in the HIA.
- Alternative 2:
  Site office Alternative 2 entails locating the site office near an existing shed, directly to the north of the onsite farmhouse. This alternative is being proposed should the existing farmhouse not be suitable for site offices. A new site office will be constructed, and screening vegetation planted so as not to impact on the existing farmhouse. These alternatives are included in **Figure 2.1**.

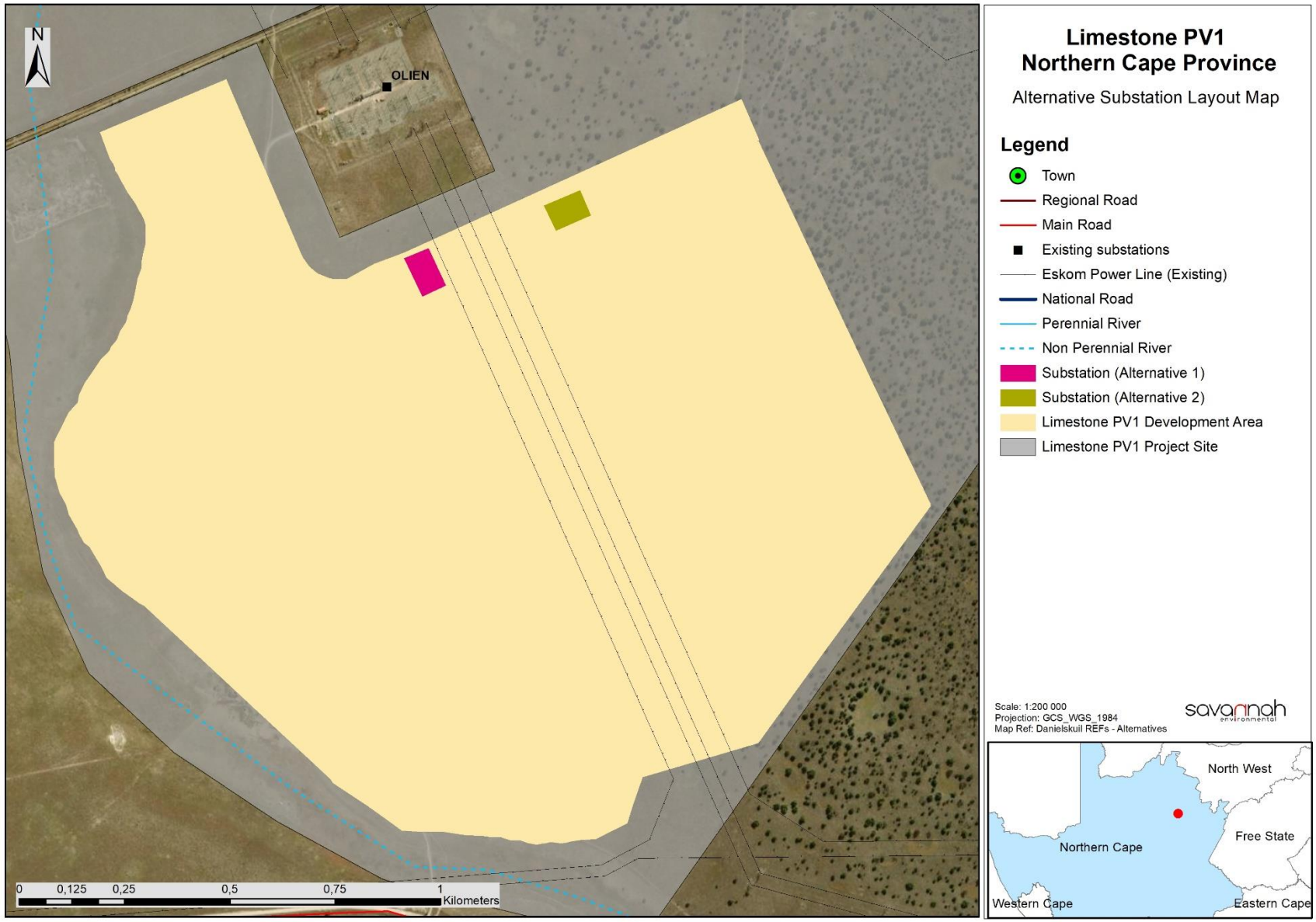


Figure 3.2: Alternative locations being considered for the Limestone PV1 on-site substation (IPP Portion).

3.3.3. Activity Alternatives

K2022578784 (SOUTH AFRICA) (Pty) Ltd is a renewable energy project developer and as such is only considering renewable energy activities in accordance with the need for such development within the IRP (refer to Chapters 5 and 6 for more detail). Considering the available renewable energy resources within the area and the current significant restrictions placed on other natural resources such as water, it is considered that solar energy is the preferred option for the development of a renewable energy facility within the identified project site. Development of a wind energy facility is also being considered in a separate application process due to the viable wind resource in the area. No other activity alternatives are being considered within this EIA process.

3.3.4. Technology Alternatives

Few technology options are available for solar facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail in the area, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this area, based on the site location, ambient conditions and energy resource availability.

Solar PV was determined as the most suitable option for further assessment. The Integrated Resource Plan (IRP) 2019, excludes the procurement of power from CSP facilities until 2030; whereas new additional capacity of approximately 6 000MW will be required from solar PV facilities. Therefore, PV technology was identified as being the preferred option for the study area. Solar PV consists of a lower visual profile and limited water requirements when compared to the CSP technology option. Therefore, considering the above, no other technology alternatives are being assessed for development on the proposed site.

When considering PV as a technology choice, several types of panels are available, including *inter alia*:

- Bifacial PV panels
- Monofacial PV panels
- Fixed-mounted PV systems (static / fixed-tilt panels).
- Single-axis tracking or double-axis tracking systems (with solar panels that rotate around a defined axis to follow the sun's movement).

The primary difference between PV technologies available relate to the extent of the facility, as well as the height of the facility (visual impacts), however the potential for environmental impacts remains similar in magnitude. Fixed mounted PV systems are able to occupy a smaller extent and have a lower height when compared to tracking PV systems, which require both a larger extent of land, and are taller in height. However, both options are considered to be acceptable for implementation from an environmental perspective. Bifacial solar PV panels offer many advantages over monofacial PV panels, as power can be produced on both sides of the module, increasing total energy generation. The preference will therefore be determined on the basis of technical considerations and the site conditions.

The preparation of the substrate beneath solar arrays depends on the panel technology alternative that is implemented. The developer will retain vegetative ground cover with no clearing for the PV footprint, most likely using Monofacial panel technology instead of Bifacial panels which removes vegetation and place white gravel underneath panels. The PV technology chosen will avoid total clearance for the PV footprint.
In addition to this the following is proposed:
Construction activities:

- Site Clearance and Grading only where necessary;
- Site clearance and excavation for internal- and access roads, specifications according to the BID document;
- Excavation for building foundations.
- Excavation for electrical cable trenches and earth mat;
- Excavation for stormwater infrastructure only where necessary;
- Excavation for mounting structures' foundations disturbing only the area being drilled for the mounting.
- Excavation for site enclosure and fences.

It is proposed that vegetation clearance will only be conducted under the following circumstances:

- The excavation for and installation of subterranean equipment such as the earth mat; electrical cables and ducting from the solar PV module installation to the power stations (inverters, transformers & switchgear) and from the power stations to the substation; and required stormwater infrastructure.
- The casting of foundations and clearing of footprints for permanent buildings, laydown areas, power station plinths and the substation.
- The footprints of foundations or piles of the site fencing posts and solar mounting structures.
- The footprints of internal- and access roads.
- Trees with heights, or potential to reach heights, of 0.5 m or higher located within the solar PV plant, and any other necessary areas.

Based on the Feasibility Geotechnical Investigation Report, the recommended anchoring and foundation of the mounting structures are pre-drilled piles. In this method, the piles are inserted into pre-drilled holes after which the holes are grouted. The footprint of these holes is slightly larger than the cross-section of the piles. The remainder of the vegetation located within the solar PV area is left untouched, apart from the above-listed circumstances.

The PV panels are designed to operate continuously for more than 20 years, mostly unattended and with low maintenance. The impacts associated with the construction, operation, and decommissioning of the facility are anticipated to be the same irrespective of the PV panel selected for implementation.

Once environmental constraining factors have been determined through the Scoping and EIA process, K2022578784 (SOUTH AFRICA) (Pty) Ltd will consider various solar panel options. The preferred option will be informed by efficiency as well as environmental impact and constraints (such as sensitive biophysical features). The PV panels proposed, will comprise solar panels which once installed, will stand around 2.2m above ground level. The Battery Energy Storage System (BESS) capacity will depend on technology to be used and total installed capacity of solar, and it is expected to be in the order of total rated power of up to 360.8 MW and an energy capacity of 656.0 MWh.

3.3.5. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing and operating the Limestone PV1 Solar Energy Facility. Should this alternative be selected, there would be no environmental impacts or benefits as a result of construction and operation activities associated with a Solar Energy Facility. The 'do-nothing' alternative will therefore likely result in minimising the cumulative impact on the land, although it is expected that pressure to develop the site for renewable energy purposes will be actively pursued due to the same factors which make the site a viable option for renewable energy development. The 'do-nothing' alternative has been assessed in Chapters 9 and 11 of this EIA Report.

CHAPTER 4: SOLAR AS A POWER GENERATION TECHNOLOGY

Environmental pollution and the emission of CO_2 from the combustion of fossil fuels through the implementation of conventional power plants constitute a threat to the environment. The use of fossil fuels is reportedly responsible for ~70% of greenhouse gas emissions worldwide. The approach to addressing climate change needs to include a shift in the way that energy is generated and consumed. Worldwide, many solutions and approaches are being developed to reduce emissions. However, it is important to acknowledge that the most cost-effective solution in the short-term is not necessarily the least expensive long-term solution. This holds true not only for direct project costs, but also indirect project costs such as impacts on the environment. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially, and economically sustainable future. The challenge however is to ensure that renewable energy projects are able to meet all economic, social and environmental sustainability criteria through the appropriate placement of these facilities.

This chapter explores the use of solar energy as a means of power generation.

4.1. Solar PV Technology

Solar energy facilities, such as those which utilise PV technology, use energy from the sun to generate electricity through a process known as the **Photovoltaic Effect**. Generating electricity using the Photovoltaic Effect is achieved through the use of the following components:

Photovoltaic Modules

PV cells are made of crystalline silicon, the commercially predominant PV technology, that includes materials such as polycrystalline and monocrystalline silicon or thin film modules manufactured from a chemical ink compound. PV cells are arranged in multiples / arrays and placed behind a protective glass sheet to form a PV module (Solar Panel). Each PV cell is positively charged on one side and negatively charged on the opposite side, with electrical conductors attached to either side to form a circuit. This circuit captures the released electrons in the form of an electric current (i.e., Direct Current (DC)). When sunlight hits the PV panels, free electrons are released and flow through the panels to produce direct electrical (DC) current. DC then needs to be converted to alternating current (AC) using an inverter before it can be directly fed into the electrical grid.

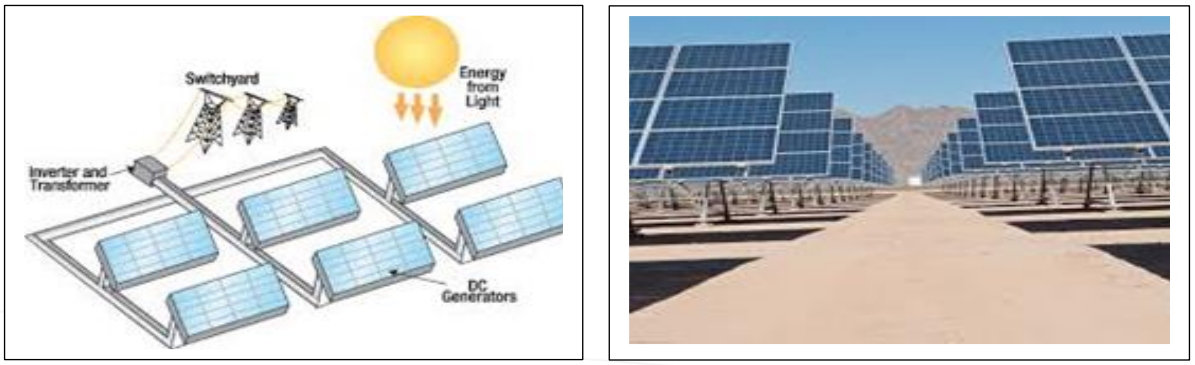


Figure 4.1: Overview of a PV cell, module, and array / panel (Source: pveducation.com)

Inverters

Inverters are used to convert electricity produced by the PV panels from DC into AC, to enable the facility to be connected to a grid connection point. In order to connect a large solar facility such as the one being proposed to a grid connection point, numerous inverters will be arranged in several arrays to collect, and convert power produced by the facility.

Support Structures

PV panels will be fixed to a support structure. PV panels can either utilise fixed / static support structures, or alternatively, they can utilise single or double axis tracking support structures. PV panels which utilise fixed / static support structures are set at an angle (fixed-tilt PV system) so as to optimise the amount of solar irradiation. With fixed / static support structures, the angle of the PV panel is dependent on the latitude of the proposed development and may be adjusted to optimise for summer and winter solar radiation characteristics. PV panels which utilise tracking support structures track the movement of the sun throughout the day so as to receive the maximum amount of solar irradiation.

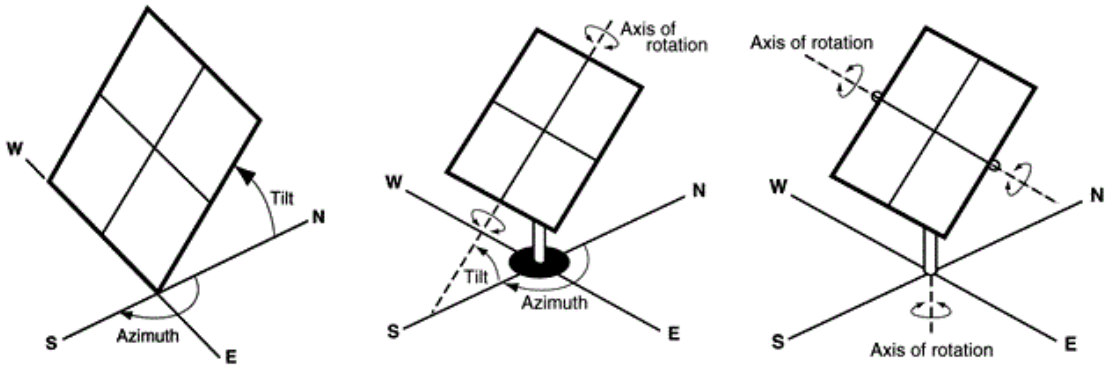


Figure 4.2: Overview of different PV tracking systems (from left to right: fixed-tilt, single-axis tracking, and double-axis tracking (Source: pveducation.com))

PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

Bifacial Solar Panel Technology

Bifacial ("two-faced") modules produce solar power from both sides of the panel. Traditional solar panels capture sunlight on one light-absorbing side. The light energy that cannot be captured is simply reflected away. Bifacial solar panels have solar cells on both sides, which enables the panels to absorb light from the back and the front (refer to **Figure 4.3**). Practically speaking, this means that a bifacial solar panel can absorb light reflected off the ground or another material. In general, more power can be generated from bifacial modules for the same area, without having to increase the development footprint.

The optimum tilt for a bifacial module has to be designed so as to capture a big fraction of the reflected irradiation. Use of trackers is recommended so the modules can track the sun's movement across the sky, enabling them to stay directed to receive the maximum possible sunlight to generate power.

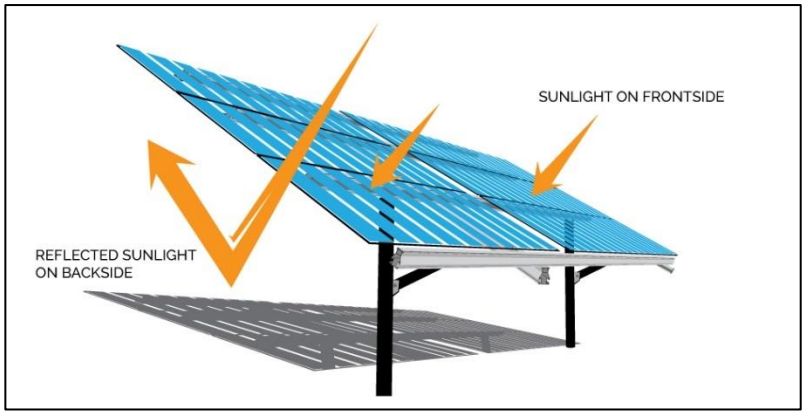


Figure 4.3: Diagram showing how bifacial Solar PV panels work (Source: https://sinovoltaics.com/learning-center/solar-cells/bifacial-solar-modules/)

4.2. Battery Energy Storage System (BESS)

The need for a BESS stems from the fact that electricity is only produced by the Solar Energy Facility while the solar resource is available, while the peak demand may not necessarily occur during the daytime or as the resource is available. Therefore, the storage of electricity and supply thereof during peak-demand will mean that the facility is more efficient, reliable and electricity supply more constant.

The BESS will:

- Store and integrate a greater amount of renewable energy from the Solar Energy Facility into the electricity grid.
- This will assist with the objective to generate electricity by means of renewable energy to feed into the National Grid which will be procured under either the REIPPPP or other government run procurement programmes or for sale to private entities if required.
- Proposed footprint of battery storage area: 6ha.
- Proposed capacity of battery storage: up to 250MWac.
- Proposed technology to be used: Lithium-ion batteries (LFP/NMC or others) (Li-Ion), Lithium capacitors/Electrochemical capacitors (LiC), and/or Redox-flow batteries (RFB)

Figure 4.4 below illustrates a typical utility scale BESS system (a Lithium-Ion BESS).

Figure 4.4: Li-Ion BESS containerised modules located within the BESS enclosure footprint (Source: Tesla).

CHAPTER 5: POLICY AND LEGISLATIVE CONTEXT

This Chapter provides an overview of the policy and legislative context within which the development of a Solar Energy Facility, such as the Limestone PV1 Solar Energy Facility, is proposed. It identifies environmental legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process which may be applicable to or have bearing on the proposed project.

5.1 Legal Requirements as per the EIA Regulations, 2014 (as amended) for the undertaking of an Environmental Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports

Requirement	Relevant Section
3(1)(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.	Chapter 5 as a whole provides an overview of the policy and legislative context which is considered to be associated with the development of the Limestone PV1 Solar Energy Facility. The regulatory and planning context has been considered at national, provincial and local levels.

5.2. Strategic Electricity Planning in South Africa

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Mineral Resources and Energy (DMRE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as the Limestone PV1 Solar Energy Facility is illustrated in **Figure 5.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed project.

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As Solar PV developments are a multi-sectoral issue (encompassing economic, spatial, biophysical, and cultural dimensions), various statutory bodies are likely to be involved in the approval process of a Solar PV project and the related statutory environmental assessment process.

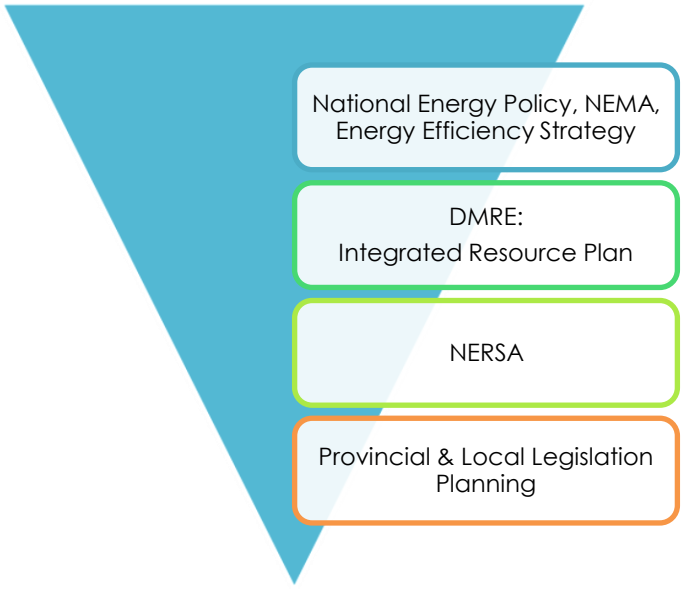


Figure 5.1: Hierarchy of electricity and planning documents

At **National Level**, the main regulatory agencies are:

- **Department of Mineral Resources and Energy (DMRE):** This Department is responsible for policy relating to all energy forms and for compiling and approving the Integrated Resource Plan (IRP) for electricity. Furthermore, the Department is also responsible for granting approvals for the use of land which is contrary to the objects of the Mineral and Petroleum Resource Development Act (Act No. 28 of 2002) (MPRDA) in terms of Section 53 of the Act. Therefore, in terms of the Act, approval from the Minister is required to ensure that the proposed activities do not sterilise mineral resources that may occur within the project site and development area.
- **National Energy Regulator of South Africa (NERSA):** NERSA is responsible for regulating all aspects of the electricity sector and will ultimately issue licenses for IPP projects to generate electricity.
- **Department of Forestry, Fisheries and the Environment (DFFE):** This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations, 2014 (GN R326) as amended. DFFE is the Competent Authority for this project (as per GN R779 of 01 July 2016), and is charged with granting the EA for the project under consideration. The Department is also responsible for issuing permits for the disturbance or destruction of protected tree species listed under Section 15 (1) of the National Forest Act (No. 84 of 1998) (NFA).
- **The South African Heritage Resources Agency (SAHRA):** SAHRA is a statutory organisation established under the National Heritage Resources Act (No. 25 of 1999) (NHRA), as the national administrative body responsible for the protection of South Africa's cultural heritage.
- **South African National Roads Agency Limited (SANRAL):** This Agency is responsible for the regulation and maintenance of all national road routes.
- **Department of Water and Sanitation (DWS):** This Department is responsible for effective and efficient water resource management to ensure sustainable economic and social development. This Department is also responsible for evaluating and issuing licenses pertaining to water use (i.e., Water Use License (WUL) and General Authorisation).
- **The Department of Agriculture, Land Reform and Rural Development (DALRRD):** This Department is the custodian of South Africa's agricultural resources and is primarily responsible for the formulation and implementation of policies governing the agriculture sector.

At **Provincial Level**, the main regulatory agencies are:

» **Provincial Government of Northern Cape – Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR):** This Department is the commenting authority for the EIA process for the project and is responsible for issuing of biodiversity and conservation-related permits.
» **Northern Cape Department of Roads and Public Works:** This Department provides effective co-ordination of crime prevention initiatives, provincial police oversight, traffic management and road safety towards a more secure environment.
» **Ngwao-Boswa Ya Kapa Bokone (NBKB):** This Department identifies, conserves and manages heritage resources throughout the Northern Cape Province.

At the **Local Level,** the local and district municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape Province, both the local and district municipalities play a role. The project site is located across the **Kgatelopele Local Municipality** within the **ZF Mgcawu District Municipality**. In terms of the Municipal Systems Act (No. 32 of 2000), it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.

5.3. International Policy and Planning Context

A brief review of the most relevant international policies relevant to the establishment of the Limestone PV1 Solar Energy Facility are provided below in **Table 5.1**. The Limestone PV1 Solar Energy Facility is considered to be aligned with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 5.1: International policies relevant to the Limestone PV1 Solar Energy Facility

Relevant policy	Relevance to the Limestone PV1 Solar Energy Facility
United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Party (COP)	The Conference of the Parties (COP), established by Article 7 of the UNFCCC, is the supreme body and highest decision-making organ of the Convention. It reviews the implementation of the Convention and any related legal instruments and takes decisions to promote the effective implementation of the Convention. The Conference of the Parties (COP) 21 was held in Paris from 30 November to 12 December 2015. From this conference, an agreement to tackle global warming was reached between 195 countries. South Africa signed the Agreement in April 2016 and ratified the agreement on 01 November 2016. The Agreement was assented to by the National Council of Provinces on 27 October 2016, and the National Assembly on 1 November 2016. The Paris Agreement set out that every 5 years countries must set out increasingly ambitious climate action. This meant that, by 2020, countries needed to submit or update their plans for reducing emissions, known as nationally determined contributions (NDCs). The COP26 summit held on 2021 brought parties together to accelerate action towards the goals of the Paris Agreement and the UN Framework

Relevant policy	Relevance to the Limestone PV1 Solar Energy Facility
	Convention on Climate Change. On 13 November 2021, COP26 concluded in Glasgow with all countries agreeing the Glasgow Climate Pact to keep 1.5˚C alive and finalise the outstanding elements of the Paris Agreement. South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and then decline in absolute terms thereafter, and based on this the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. The policy provides support for the Limestone PV1 Solar Energy Facility which will contribute to managing climate change impacts, supporting the emergency response capacity, as well as assist in reducing GHG emissions in a sustainable manner.
The Equator Principles IV (October 2020)	The Equator Principles (EPs) IV constitute a financial industry benchmark used for determining, assessing, and managing project's environmental and social risks when financing projects. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are applicable to large infrastructure projects (such as the Limestone PV1 Solar Energy Facility) and apply globally to all industry sectors. Such an assessment should propose measures to minimise, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the Limestone PV1 Solar Energy Facility. In terms of the EPs, South Africa is a non-designated country, and as such the assessment process for projects located in South Africa evaluates compliance with the applicable IFC Performance Standards on Environmental and Social Sustainability, and Environmental Health and Safety (EHS) Guidelines. The Limestone PV1 Solar Energy Facility is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended (GN R326), published in terms of Section 24(5) of the National Environmental Management Act (No. 107 of 1998) (NEMA), which is South Africa's national legislation providing for the authorisation of certain controlled activities. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed.
International Finance Corporation (IFC) Performance Standards and Environmental and Social Sustainability (January 2012)	The International Finance Corporation's (IFC) Performance Standards (PSs) on Environmental and Social Sustainability were developed by the IFC and were last updated on 1 January 2012. Performance Standard 1 requires that a process of environmental and social assessment be conducted, and an Environmental and Social

Relevant policy	Relevance to the Limestone PV1 Solar Energy Facility
	Management System (ESMS) appropriate to the nature and scale of the project, and commensurate with the level of its environmental and social risks and impacts, be established and maintained. The above-mentioned standard is the overarching standard to which all the other standards relate. Performance Standards 2 through to 8 establish specific requirements to avoid, reduce, mitigate, or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, the standards 2 and 8 describe potential social and environmental impacts that require particular attention specifically within emerging markets. Where social or environmental impacts are anticipated, the developer is required to manage them through its ESMS consistent with Performance Standard 1. Performance Standards 1, 2, 3, 4, 6, and 8 may be applicable to the project (see box below). • Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts • Performance Standard 2: Labour and Working Conditions • Performance Standard 3: Resource Efficiency and Pollution Prevention • Performance Standard 4: Community Health, Safety and Security • ~~Performance Standard 5: Land Acquisition and Involuntary Resettlement~~ – N/A • Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources • ~~Performance Standard 7: Indigenous Peoples~~ – N/A • Performance Standard 8: Cultural Heritage

5.4. National Policy and Planning Context

National policies have to be considered for the construction and operation of the solar PV facility to ensure that the development is in line with the planning of the country. A brief review of the most relevant national policies is provided below in **Table 5.2**. The development of Limestone PV1 Solar Energy Facility is considered to align with the aims of these policies, even where contributions to achieving the goals therein are only minor.

Table 5.2: Relevant national legislation and policies for Limestone PV1 Solar Energy Facility

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development, and use of natural resources while promoting justifiable economic and social development.

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts. The undertaking of an EIA process for the proposed project in terms of the requirements of the EIA Regulations, 2014 (as amended) aims to minimise any impacts on the natural and social environment.
National Environmental Management Act (No. 107 of 1998) (NEMA)	The NEMA is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. The NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being as contained within the Bill of Rights. The national environmental management principles state that the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment. The Project is currently being assessed in accordance with the requirements of the 2014 EIA Regulations, as amended, published in terms of Section 24(5) of NEMA. Through this assessment, all potential social and environmental risks are identified and assessed, and appropriate mitigation measures proposed. The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within the NEMA.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is 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, while taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The National Energy Act also provides for energy planning, increased generation and consumption of renewable energies, contingency energy supply, holding of strategic energy feedstocks and carriers, adequate investment in, appropriate upkeep and access to energy infrastructure. The Act provides measures for the furnishing of certain data and information regarding energy demand, supply, and generation, and for establishing an institution to be responsible for promotion of efficient generation and consumption of energy and energy research. The Act provides the legal framework which supports the development of power generation facilities. The Act also provides for licences and registration as the manner in which generation, transmission, distribution, trading and the import and export of electricity are regulated. The development of Limestone PV1 will have to ensure compliance with this Act
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of renewable energy and encouraging new entries into the generation market. The policy states that the advantages of renewable energy include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.
White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)	The White Paper on Renewable Energy Policy supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of renewable energy and aims to create the necessary conditions for the development and commercial implementation of renewable energy technologies. The White Paper on Renewable Energy sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. The country relies heavily on coal to meet its energy needs due to its abundant, and fairly accessible and affordable coal resources. However, massive renewable energy resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The development of additional renewable energy projects will promote the use of the abundant South African renewable energy resources and contribute to long-term energy security and diversification of the energy mix.
The Electricity Regulation Act (No. of 2006)	The Electricity Regulation Act of 2006 replaced the Electricity Act (No. 41 of 1987), as amended, with the exception of Section 5B, which provides funds for the energy regulator for the purpose of regulating the electricity industry. The Act establishes a national regulatory framework for the electricity supply industry and introduces the National Energy Regulator (NERSA) as the custodian and enforcer of the National Electricity Regulatory Framework. The Act also provides for licences and registration as the manner in which the generation, transmission, distribution, trading, and import and export of electricity are regulated.
National Development Plan 2030	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. In terms of the Energy Sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: » Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. » Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. » Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. In formulating its vision for the energy sector, the NDP took the IRP 2010 as its point of departure. Therefore, although electricity generation from coal is still seen as part of the energy mix within the NDP, the plan sets out steps that aim to ensure that, by 2030, South Africa's energy system will look very different to the current situation: coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources – especially wind, solar, and imported hydroelectricity – will play a much larger role. The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The development of Limestone PV1 Solar Energy Facility

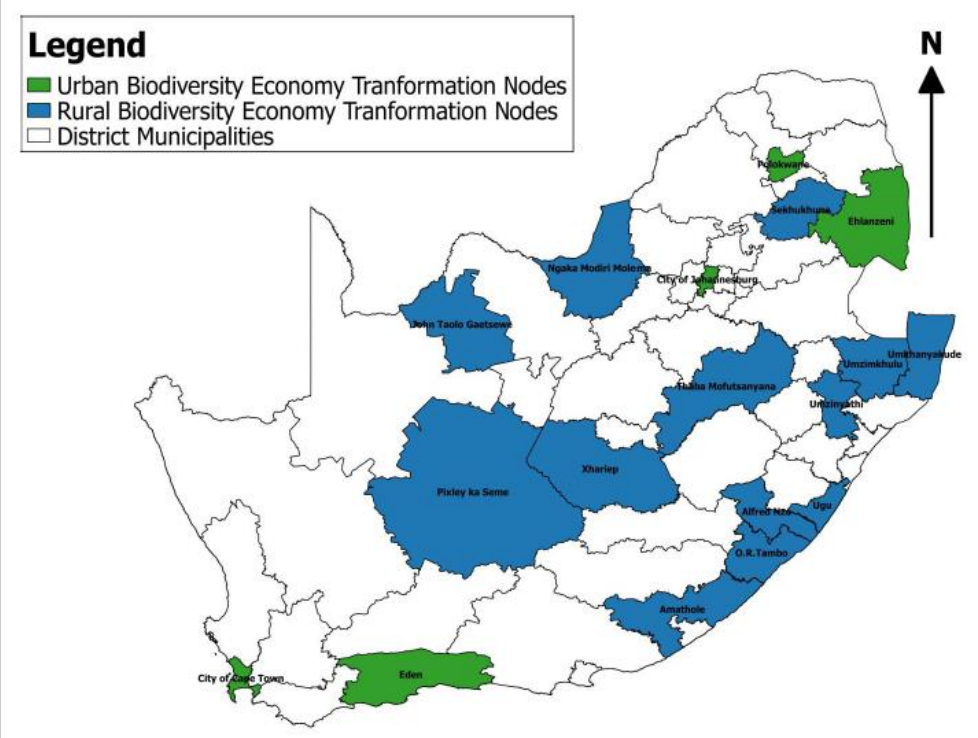
Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	supports the NDP through the development of energy-generating infrastructure which will not lead to the generation of GHGs and will result in economic development and growth of the area surrounding the development area.
Integrated Energy Plan (IEP), November 2016	The purpose and objectives of the Integrated Energy Plan (IEP) are derived from the National Energy Act (No. 34 of 2008). The IEP takes into consideration the crucial role that energy plays in the entire economy of the country and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple aims, some of which include: » To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. » To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). » To guide investment in and the development of energy infrastructure in South Africa. » To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors. A draft version of the IEP was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to take into account changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others. The 8 key objectives of the integrated energy planning process are as follows: » Objective 1: Ensure security of supply. » Objective 2: Minimise the cost of energy. » Objective 3: Promote the creation of jobs and localisation. » Objective 4: Minimise negative environmental impacts from the energy sector. » Objective 5: Promote the conservation of water. » Objective 6: Diversify supply sources and primary sources of energy. » Objective 7: Promote energy efficiency in the economy. » Objective 8: Increase access to modern energy.
Integrated Resource Plan for Electricity (IRP) 2010-2030	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. The promulgated IRP 2010–2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. The need for a Just Transition to a sustainable, low carbon and equitable energy system is also recognised.

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	Following the promulgation of the IRP 2010–2030, implementation followed in line with Ministerial Determinations issued under Section 34 of the Electricity Regulation (Act No. 4) of 2006. The Ministerial Determinations give effect to planned infrastructure by facilitating the procurement of the required electricity capacity. According to the IPP Procurement Programme overview report (2021), as at 31 March 2021, a total of 6 422MW has been procured under the REIPPP Programme from 112 IPPs in seven bid rounds, with 5 078MW being currently operational and made available to the grid. IPPs have commissioned 1005MW from two (2) Open Cycle Gas Turbines (OCGT) peaking plants. Under the Eskom Build Programme, 1 332MW has been procured from the Ingula Pumped Storage Project, 1 588MW and 800MW from the Medupi and Kusile power stations and 100MW from the Sere Wind Farm. Provision has been made for the following new capacity by 2030: » 1 500MW of coal » 2 500MW of hydro » 6 000MW of solar PV » 14 400MW of wind » 1 860MW of nuclear » 2 088MW of storage » 3 000MW of gas/diesel » 4 000MW from other distributed generation, co-generation, biomass and landfill technologies Based on the IRP 2019, 6 000MW has been allocated for solar PV facilities from 2022 to 2030. Therefore, the development of the Limestone PV1 Solar Energy Facility is supported by the IRP 2019.
New Growth Path (NGP) Framework, 23 November 2010	The purpose of the New Growth Path (NGP) Framework is to provide effective strategies towards accelerated job-creation through the development of an equitable economy and sustained growth. The target of the NGP is to create 5 million jobs by 2020; with economic growth and employment creation as the key indicators identified in the NGP. The framework seeks to identify key structural changes in the economy that can improve performance in terms of labour absorption and the composition and rate of growth. To achieve this, government will seek to, amongst other things, identify key areas for large-scale employment creation, as a result of changes in conditions in South Africa and globally, and to develop a policy package to facilitate employment creation in these areas.
National Climate Change Bill, 2018	On 08 June 2018, the Minister of Environmental Affairs published the National 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. Limestone PV1 Solar Energy Facility is a renewable energy generation facility and would not result in the generation or release of emissions during its operation.
National Climate Change Response Policy, 2011	South Africa's National Climate Change Response Policy (NCCRP) establishes South Africa's approach to addressing climate change, including adaptation and mitigation responses. The NCCRP formalises Government's vision for a transition to a low carbon economy, through the adoption of the 'Peak, Plateau and Decline' (PPD) GHG emissions trajectory whereby South Africa's emissions should peak between 2020 and 2025, plateau for approximately a decade, and

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	then decline in absolute terms thereafter, and based on this, the country has pledged to reduce emissions by 34% and 42% below Business As Usual (BAU) emissions in 2020 and 2025, respectively. As an integral part of the policy, a set of near-term priority flagship programmes will be implemented to address the challenges of climate change, one of which includes the Renewable Energy Flagship Programme. This flagship programme includes a scaled-up renewable energy programme, based on the current programme specified in the IRP 2010, and using the evolving South African Renewables Initiative led by the Department of Public Enterprise and Department of Trade and Industry (DTI), as a driver for the deployment of renewable energy technologies. The programme will be informed by enhanced domestic manufacturing potential and the implementation of energy efficiency and renewable energy plans by local government. The development of the Limestone PV1 Solar Energy Facility is aligned with the Renewable Energy Flagship Programme identified under South Africa's NCCRP and could therefore be argued to be aligned with the country's approach to addressing climate change.
National Climate Change Response Strategy for South Africa, 2004	The need for a national climate change policy for South Africa was identified as an urgent requirement during the preparations for the ratification of the UNFCCC in 1997. A process to develop such a policy was thus instituted under the auspices of the National Committee for Climate Change (NCCC), a non-statutory stakeholder body set up in 1994 to advise the Minister on climate change issues and chaired by the then Department of Environmental Affairs and Tourism (DEAT). It was determined that a national climate change response strategy will promote integration between the programmes of the various government departments involved to maximise the benefits to the country as a whole, while minimising negative impacts. Further, as climate change response actions can potentially act as a significant factor in boosting sustainable economic and social development, a national strategy specifically designed to bring this about is clearly in the national interest, supporting the major objectives of the government, including poverty alleviation and the creation of jobs. A number of principles and factors guided the conception of the strategy and are required to be implemented. These are: » Ensuring that the strategy is consistent with national priorities, including poverty alleviation, access to basic amenities including infrastructure development, job creation, rural development, foreign investment, human resource development and improved health, leading to sustainable economic growth. » Ensuring alignment with the need to consistently use locally available resources. » Ensuring compliance with international obligations. » Recognizing that climate change is a cross cutting issue that demands integration across the work programmes of other departments and stakeholders, and across many sectors of industry, business, and the community. » Focussing on those areas that promote sustainable development. » Promoting programmes that will build capacity, raise awareness, and improve education in climate change issues. » Encouraging programmes that will harness existing national technological competencies. » Reviewing the strategy constantly in the light of national priorities and international trends. » Recognizing that South Africa's emissions will continue to increase as development is realised.

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	The strategy was devised through an integrated approach and considers policies and programmes of other government departments and the fact that South Africa is a developing country. This will ensure that the principles of sustainable development are adequately served and do not conflict with existing development policies.
Just Transition Framework for South Africa (June 2022) - A Presidential Climate Commission Report	The Presidential Climate Commission (PCC) is a multi-stakeholder body established by the President of the Republic of South Africa to (1) advise on the country's climate change response and (2) support a just transition to a low-carbon climate-resilient economy and society. The PCC facilitates dialogue between social partners on these issues—defining the type of economy and society the country wants to achieve, and detailed pathways for how to get there. One of the first tasks of the PCC was to design a just transition framework for South Africa. In December 2020, President Cyril Ramaphosa created the PCC to oversee and facilitate a just transition to a low-emissions and climate-resilient economy. The just transition framework is the first building block towards this objective, bringing coordination and coherence to just transition planning in the country. The just transition framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition. The Just Transition Framework builds on research, policies, and consultations on the just transition in South Africa, as well as international best practice guidelines. The Just Transition Framework sets out a shared vision for the just transition, principles to guide the transition, and policies and governance arrangements to give effect to the transition from an economy that is predominantly reliant on fossil-fuel based energy, towards a low-emissions and climate-resilient economy. The framework is a planning tool for achieving a just transition in South Africa, setting out the actions that the government and its social partners will take to achieve a just transition, and the outcomes to be realised in the short, medium, and long term.
Strategic Integrated Projects (SIPs)	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: » 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. » SIP 9: Electricity generation to support socio-economic development: The proposed Limestone PV1 Solar Energy Facility 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 Mineral Resources and Energy. SIP 9 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.

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	The Limestone PV1 Solar Energy Facility could be registered as a SIP project once it is selected as a Preferred Bidder project and is under development. The project would then contribute to the above-mentioned SIPs.
National Biodiversity Economy Strategy (NBES) (March 2016)	The biodiversity economy of South Africa encompasses the businesses and economic activities that either directly depend on biodiversity for their core business or that contribute to conservation of biodiversity through their activities. The commercial wildlife and the bioprospecting industries of South Africa provide cornerstones for the biodiversity economy and are the focus of this strategy. Both the wildlife and bioprospecting sub-sectors of the biodiversity economy have already demonstrated the potential for significant future development and growth. In the study commissioned on the situational analysis of the biodiversity economy, the contribution of the biodiversity economy to the national economy can be measured in terms of Gross Domestic Product (GDP), with the wildlife and bioprospecting industries contributing approximately R3 billion to GDP in 2013. Growth in the wildlife and bioprospecting industries can make a significant impact on the national economy, while contributing to national imperatives such as job creation, rural development and conservation of our natural resources. The Wildlife Industry value chain is centred on game and wildlife farming/ranching activities that relate to the stocking, trading, breeding, and hunting of game, and all the services and goods required to support this value chain. The key drivers of this value chain include domestic hunters, international hunters and a growing retail market demand for wildlife products such as game meat and taxidermy products. This sector is therefore characterised by an interesting combination of agriculture, eco-tourism and conservation characteristics. Over the period 2008-2013, the total Wildlife Industry market grew by more than 14% per year. This growth comprised an average annual growth exceeding 6% in domestic hunting, a decrease in international hunting, and an exponential growth in live auction sales. It is considered likely that the consolidated Wildlife Industry has the potential to experience a weighted average annual growth rate of between 4 %-14 % per year up to 2030. In order for the wildlife and bioprospecting sub-sectors of the biodiversity economy to achieve its full potential, a strategic partnership between the state, private sector and communities is required. To this end, a National Biodiversity Economy Strategy (NBES) is required to guide the sustainable growth of the wildlife and bioprospecting industries and to provide a basis for addressing constraints to growth, ensuring sustainability, identifying clear stakeholder's responsibilities and monitoring progress of the Enabling Actions. The Vision of NBES is to optimise the total economic benefits of the wildlife and bioprospecting industries through its sustainable use, in line with the Vision of the Department of Environmental Affairs. The purpose of NBES is to provide a 14-year national coordination, leadership and guidance to the development and growth of the biodiversity economy. NBES has set an industry growth goal stating that by 2030, the South African biodiversity economy will achieve an average annualised GDP growth rate of 10% per annum. This envisioned growth curve extends into the year 2030 and is aligned to the efforts of the country's National Development Plan, Vision 2030. The NBES seeks to contribute to the transformation of the biodiversity economy in South Africa through inclusive economic opportunities, reflected by a sector which is equitable - equitable access to resources, equitable and fair processes and

Relevant legislation or policy	Relevance to Limestone PV1 Solar Energy Facility
	procedures and equitable in distribution of resources (i.e. business, human, financial, indigenous species, land, water) in the market. To address these transformation NBES imperatives, NBES has the principles of: » Conservation of biodiversity and ecological infrastructure » Sustainable use of indigenous resources » Fair and equitable beneficiation » Socio-economic sustainability » Incentive driven compliance to regulation » Ethical practices » Improving quality and standards of products. The NBES provides the opportunity to redistribute South Africa's indigenous biological/ genetic resources in an equitable manner, across various income categories and settlement areas of the country. The NBES has prioritised nodes in the country for biodiversity economy transformation, referred to as BET nodes. NBES prioritises 18 BET nodes, 13 rural and 5 urban districts across the nine provinces of the country, with communities having been prioritised for development of small and medium size enterprises and community-based initiatives which sustainably use of indigenous biological and/or genetic resources. The ZF Mgcawu District municipality within which the Limestone PV1 Solar Energy Facility is proposed is not identified as a priority area. 

5.5. Provincial Policy and Planning Context

A brief review of the most relevant provincial policies is provided below in **Table 5.3**. The proposed development is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

Table 5.3: Relevant provincial legislation and policies for Limestone PV1 Solar Energy Facility

Relevant legislation or policy	Relevance to the Limestone PV1 Solar Energy Facility
Northern Cape Provincial Spatial Development Framework (PSDF) 2012	The Northern Cape Provincial Spatial Development Framework (PSDF) 2012 states that the overarching goal for the province is to enable sustainability through sustainable development. The province considers social and economic development as imperative in order to address the most significant challenge facing the Northern Cape, which is poverty. The PSDF identifies key sectoral strategies and plans which are considered to be the key components of the PSDF. Sectoral Strategy 19 refers to a provincial renewable energy strategy. Within the PSDF a policy has been included which states that renewable energy sources (including the utilisation of solar energy) are to comprise 25% of the province's energy generation capacity by 2020. The overall energy objective for the province also includes promoting the development of renewable energy supply schemes which are considered to be strategically important for increasing the diversity of domestic energy supply and avoiding energy imports, while also minimising the detrimental environmental impacts. The implementation of sustainable renewable energy is also to be promoted within the province through appropriate financial and fiscal instruments. The development of Limestone PV1 Solar Energy Facility supports the overall energy objective of the province to have 25% of its electricity from renewable energy sources.
Northern Cape Provincial Spatial Development Framework (PSDF) 2018 Review - Executive Summary	The review of the Northern Cape PSDF (2018) refers to infrastructure investment and that a balance must be maintained between investments aimed at meeting the social needs of communities and investment aimed at promoting economic development and job creation. The Spatial Development Strategy identified in the PSDF for basic infrastructure includes the achieving the provision of green infrastructure which includes renewable energy. As part of the Vision 2040 of the PSDF key opportunities are identified for the Province. The strengthening of the development triangle that is formed by the linking of Kimberley, Vryburg, Upington and De Aar. The development triangle sustains a diverse economy with strong mining, agricultural and renewable energy sectors. It is stated in the PSDF that a sustainable and viable economic network must be driven within the development triangle to improve the return of public investment in the Province. The development of Limestone PV1 Solar Energy Facility will contribute to the economic network of the province specifically in terms of the renewable sector, albeit it does not fall within the development triangle.
The Northern Cape Climate Change Response Strategy	The key aspects of the Northern Cape Climate Change Response Strategy (NCCCRS) Report are summarised in the MEC's (NCPG: Environment and Nature Conservation) 2011 budget speech: "*The Provincial Climate Change Response Strategy will be*

Relevant legislation or policy	Relevance to the Limestone PV1 Solar Energy Facility
	underpinned by specific critical sector climate change adaptation and mitigation strategies that include the Water, Agriculture and Human Health sectors as the 3 key Adaptation Sectors, the Industry and Transport alongside the Energy sector as the 3 key Mitigation Sectors with the Disaster Management, Natural Resources and Human Society, livelihoods and Services sectors as 3 remaining key. Sectors to ensure proactive long-term responses to the frequency and intensity of extreme weather events such as flooding and wildfire, with heightened requirements for effective disaster management". Key points from the MEC address include the NCPG's commitment to develop and implement policy in accordance with the National Green Paper for the National Climate Change Response Strategy (2010), and an acknowledgement of the Northern Cape Province's extreme vulnerability to climate-change driven desertification. The development and promotion of a provincial green economy, including green jobs, and environmental learnership is regarded as an important provincial intervention in addressing climate change. The renewable energy sector, including solar and wind energy (but also biofuels and energy from waste), is explicitly indicated as an important element of the Provincial Climate Change Response Strategy. The development of Limestone PV1 Solar Energy Facility will assist in achieving (although only to a limited extent) the promotion of the provincial green economy of the Northern Cape.

5.6. Local Policy and Planning Context

The local tiers of government relevant to the Limestone PV1 Solar Energy Facility is the Kgatelopele Local Municipality which falls within the ZF Mgcawu District Municipality. Instruments and/or policies at both the district and local level contain objectives which align with the development of Limestone PV1 Solar Energy Facility. These include, economic growth, job creation, community upliftment and poverty alleviation.

Table 5.4: Relevant local legislation and policies for Limestone PV1 Solar Energy Facility

<table>
<tr><th>Relevant policy</th><th>Relevance to Limestone PV1 Solar Energy Facility</th></tr>
<tr><td>ZF Mgcawu District Municipality IDP 2021</td><td>The vision for the ZF Mgcawu District Municipality as contained within its IDP 2017 – 2022 (2020 / 2021) is as follows:

"Quality support to deliver quality services."

The mission of the ZF Mgcawu DM is:

"Centre of excellence in providing quality basic services through support to local municipalities."

The following strategic objectives and development objectives have been identified for the ZF Mgcawu DM:

<table>
<tr><th>Strategic Objective</th><th>Development Objective</th></tr>
<tr><td rowspan="2">(i) To monitor and determine the housing backlogs in the district as well as to eradicate</td><td>01. Maintain and report on the housing requirements</td></tr>
<tr><td>02. Provide project management support to B-Municipalities</td></tr>
</table>
</td></tr>
</table>

Relevant policy	Relevance to Limestone PV1 Solar Energy Facility	
	sanitation & infrastructure backlogs	
	(ii) To assess and provide targeted support improving institutional capacity and service delivery capabilities of category B-municipalities	03. Assess and report on the institutional capacity of B-municipalities to fulfil their statutory mandates
		04. Assess and report on the service delivery capabilities of B-municipalities to fulfil their statutory mandates
		05. Provide targeted support to B-municipalities (e.g. including legal support to B-municipalities regarding land use matters)
	(iii) To promote environmental health and safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of environmental health services, fire and disaster risks	06. Providing environmental health services to B-municipalities
		07. Implement special programmes (e.g. HIV /Aids)
	(iv) To promote safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of fire and disaster risks	08. Establish disaster management mechanisms and programmes in the ZF Mgcawu District
	(v) To Facilitate the Development of Sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy	09. Establish a vehicle to ensure all businesses are co-operating (i.e. District LED Forum)
		10. Create investment opportunities in sectoral development (i.e. investment activities; Entrepreneurial business support programme)
		11. Enable an environment for business establishment and support initiatives (i.e. Increase the number of businesses; entrepreneurial support)
	(v) To market, develop and co-ordinate tourism in the ZF Mgcawu District	12. Promote the Green Kalahari tourism brand in the ZF Mgcawu district

Relevant policy	Relevance to Limestone PV1 Solar Energy Facility	
	(vi) To assess and monitor the status of infrastructure needs and requirements of B Municipalities	13. Establish and provide selected infrastructure needs to targeted B Municipalities
	(vii) To ensure efficient business operations and to fulfils the assurance statutory requirements of the ZF Mgcawu District Municipality	14. Enable and improve financial viability and management through well structured budget processes, financial systems, and MFMA compliance (i.e. promote good budget and fiscal management; Unqualified audits)
		15. Enable efficient and effective administrative support and Planning processes (i.e. Maintaining sound labour relations, practices and overall administrative support, IDP planning etc.
	The implementation of Limestone PV1 Solar Energy Facility would contribute positively towards the strategic objective of supporting and guiding the development of a diversified, resilient and sustainable district economy, and the development objectives of creating investment opportunities in sectoral development (i.e. investment activities; Entrepreneurial business support programme), and enabling an environment for business establishment and support initiatives (i.e. Increase the number of businesses; entrepreneurial support) through its local content and local economic development requirements as prescribed under the REIPPP Programme.	
Kgatelopele Local Municipality Integrated Development Plan Review for 2018 – 2019.	The Kgatelopele Local Municipality Integrated Development Plan for 2018 – 2019 (further referred to as the Plan) is a strategic document that outlines the community's development objectives. It also includes a policy framework which guides management in the decision-making process of the financial planning for the municipal area. This Local Municipality according to the Plan is committed to strengthening and extending the public participation in its work. The Plan identifies six performance areas, which have to be aligned to the strategic objectives of the municipal area. The first key performance area identified below, is the area, which relates to the proposed Life SPP. The six (6) key performance areas (KPA) are: » KPA 1: Basic Services This KPA refers to the physical infrastructure and energy efficiency to ensure efficient infrastructure and energy supply that will contribute to the improvement of quality of life for all citizens of the Kgatelopele local municipality. » KPA 2: Spatial consideration/ Environment KPA 2 refers to Special planning and land use management and has been proposed as a tool to effect spatial transformation	

Relevant policy	Relevance to Limestone PV1 Solar Energy Facility
	» KPA 3: Economic Growth and development KPA 3 refers to Economic Growth and Development to facilitate sustainable economic empowerments for all communities within the Kgatelopele local municipality and enabling a viable and conducive economic environment through the development of related initiatives including job creation and skills development. » KPA 4: Financial Sustainability This KPA refers to financial sustainability to ensure the financial sustainability of the municipality to adhere to statutory requirements. » KPA 5: Institutional transformation. This KPA refers to institutional transformation to provide an effective and efficient workforce by aligning our institutional arrangements to our overall strategy in order to deliver quality services. » KPA 6: Good Governance and Public Participation KPA 5 refers to governance and stakeholder participation to promote proper governance and public participation. » KPA 6: Spatial Development This KPA gives direction for the municipality in terms of its land use and its potential and direction for growth.

CHAPTER 6: NEED AND DESIRABILITY

Appendix 3 of the 2014 EIA Regulations (GNR 326) requires that an EIA Report includes a motivation for the need and desirability of the proposed development, including the need and desirability of the activity in the context of the preferred location. The need and desirability of the development needs to consider whether it is the right time and the right place for locating the type of land-use/activity being proposed. The need and desirability of a proposed development is, therefore, associated with the Informed use of land, and should be able to respond to questions such as, but not limited to, what the most sustainable use of the land may be.

This Chapter provides an overview of the need and desirability, and perceived benefits of the project specifically.

6.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

This chapter includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(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.	The need and desirability for the development of the Limestone PV1 Solar Energy Facility is included and discussed as a whole within this chapter. The need and desirability for the development of the solar energy facility has been considered from an international, national, regional, and site-specific perspective.

6.2. Need and Desirability from an International Perspective

The need and desirability of the Limestone PV1 Solar Energy Facility, from an international perspective, can be described through the project's alignment with internationally recognised and adopted agreements, protocols, and conventions. South Africa is a signatory to a number of international treaties and initiatives, including the United Nation's Development Programme's (UNDP's) Sustainable Development Goals (SDGs). The SDGs address global socio-economic challenges such as poverty, hunger, health, education, climate change, gender equality, water, sanitation, energy, urbanisation, environment, and social justice. The SDGs consist of 17 global goals set by the United Nations. The 17 SDGs are characterised by 169 targets, and 304 indicators.

Goal 7 of the SDGs relates to "Affordable and Clean Energy", with the aim of the goal being to ensure access to affordable, reliable, sustainable, and modern energy for all. The following targets and indicators have been set for Goal 7:

Targets		Indicators	
7.1	By 2030, ensure universal access to affordable, reliable and modern energy services.	7.1.1 7.1.2	Proportion of population with access to electricity. Proportion of population with primary reliance on clean fuels and technology.
7.2	By 2030, increase substantially the share of renewable energy in the global energy mix.	7.2.1	Renewable energy share in the total final energy consumption.
7.3	By 2030, double the global rate of improvement in energy efficiency.	7.3.1	Energy intensity measured in terms of primary energy and GDP.
7.A	By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology.	7.A.1	Mobilised amount of United States dollars per year starting in 2020 accountable towards the $100 billion commitment.
7.B	By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.	7.B.1	Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The development of the Limestone PV1 Solar Energy Facility would contribute positively towards Goal 7 (and specifically 7.2.1) of the SDGs through the following means:

- By generating up to 150MW of affordable and clean energy.
  - A study published by the CSIR on 14 October 2016 ("Cost of new power generators in South Africa Comparative analysis based on recent Independent Power Producer (IPP) announcements", Dr Tobias Bischof-Niemz and Ruan Fourie) which took into consideration the results of the cost prices bid successfully under the Department of Mineral Resources and Energy's Renewable Energy (RE) IPP and Coal Baseload IPP Procurement Programmes, found that solar PV and wind were 40% cheaper than new baseload coal (i.e. R0.62/kWh for PV and wind vs R1.03 for coal).
  - Solar power technology is one of the cleanest electricity generation technologies, as it does not result in the release of emissions during its operation.
- By contributing towards South Africa's total generation capacity, specifically through the utilisation of renewable energy resources.

The Kyoto Protocol (1997) and more recent Paris Agreement (2015) are also relevant to the need for the development of the Limestone PV1 Solar Energy Facility from an international perspective. These call for the reduction of South Africa's greenhouse gas emissions through actively cutting down on using fossil fuels, or by utilising more renewable resources. The development of the Limestone PV1 Solar Energy Facility will add capacity to the renewable energy sector of the country and strengthen the commitment and action plan to achieve the requirements, as set out in the protocol, through the generation of energy without the emission of greenhouse gasses.

6.3. Need and Desirability from a National Perspective

South Africa has experienced 15 years of intermittent black-outs and in the recent months, the country has yet again faced a considerable shortage in the availability and stability of electricity supply. Following the energy crisis in 2008, South African Government started to introduce renewable energy developments on a large scale and further enhanced the promotion of energy efficiency in all sectors to meet the demand of energy while reducing CO_2 emissions and creating jobs[4]. As a consequence, significant investment in renewable energy and energy efficient is required. Increasing the diversity of South Africa's electricity mix is important, not only for enhancing the crucially important security of supply of the country, but also to support job creation and mitigate climate change.

The National Development Plan (NDP) envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution. Historically, coal has provided the primary fuel resource for baseload electricity generation in South Africa. Consequently, Eskom, who is the main electricity generating company in the country, generates approximately 85% of the country's electricity from coal resources (Stats SA, 2016), resulting in a large carbon footprint. Taking into consideration the need to ensure adequate supply of electricity and meet international obligations in terms of addressing climate change, Government has identified the need to diversify the energy mix within the country.

The Limestone PV1 Solar Energy Facility is proposed in specific response to a National Government initiative, the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), or a similar programme. This programme was initiated in order to give effect to the requirements of the IRP with regards to renewable energy targets. As a result, the need and desirability of the Limestone PV1 Solar Energy Facility from a national perspective can largely be linked from the project's alignment with national government policies, plans, and programmes which have relevance to energy planning and production (as discussed in detail in **Chapter 5**). The following key plans have been developed by National Government to consider South Africa's current energy production, projected future demands, and provides the necessary framework within which energy generation projects can be developed:

» Integrated Energy Plan (IEP)
» Integrated Resource Plan (IRP)

The above-mentioned energy plans have been extensively researched and are updated on an on-going basis to take into consideration changing scenarios, new information, developments in new technologies, and to reflect updated demands and requirements for energy production within the South African context. These plans form the basis of South Africa's energy generation sector and dictate national priorities for energy production.

The IEP is intended to provide a roadmap of South Africa's future energy landscape and guide future energy infrastructure investments and policy development. The Plan considered the three pillars of sustainable development, and list the following as the eight key energy planning objectives:

[4] https://energypedia.info/wiki/South_Africa_Energy_Situation

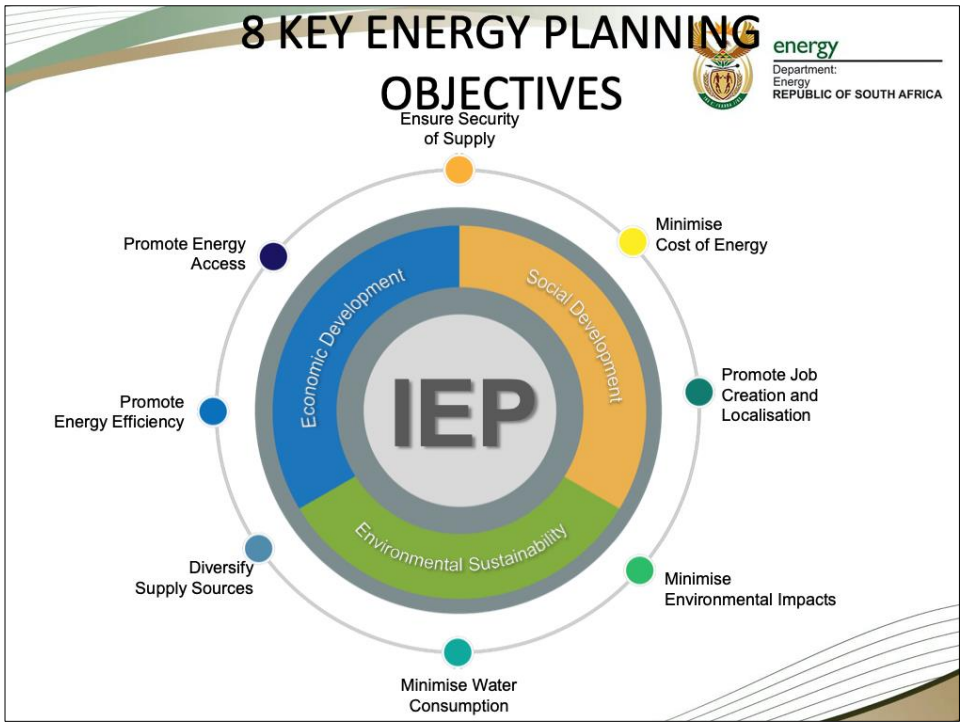


Figure 6.1: Eight key energy objectives as listed in the IEP, 2016 (extract from DOE presentation, December 2016)

In terms of electricity generation, the IEP states that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources, and includes the following statement regarding solar energy's contribution to the diversified energy mix:

- *Solar should play a much more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV. Solar PV includes large scale installations for power generation which supply to the grid and individual, off-grid solar home systems and rooftop panels.*
- *Several interventions which could enhance the future solar energy landscape are recommended as follows: –Large scale CSP projects with proven thermal storage technologies and hybridisation / industrial steam application projects should be incentivised in the short to medium term. In the long term, the existing incentives could be extended to promote locally developed CSP technology storage solutions and large-scale solar fuel projects.*
- *A thorough solar resource assessment for South Africa should continue to be undertaken in the Northern Cape Province and extended to other provinces deemed to have high solar radiation levels.*
- *Investments should be made to upgrade the grid in order to accommodate increasing solar and other renewable energy contributions.*

The IRP for Electricity 2010 – 2030 (gazetted in 2019) is a subset of the IEP and constitutes South Africa's current gazetted energy plan. The purpose of the plan is to ensure sustainable electricity development which takes into consideration technical, economic, and social constraints, and identifies investments in the electricity sector which are required to meet the country's forecasted electricity demands at minimum costs. This plan provides for the development of 8288MW of capacity from Solar Photovoltaic energy facilities by 2030, with an annual contribution of 1000MW from 2022 (refer to **Figure 6.2**).

	Coal	Cost (Decommissioning)	Nuclear	Hydro	Storage	PV	Wind	CSP	GAS/ Diesel	Other (Distributed Generation, Cogeri, Biomass, Landfill
Current	31715		1860	2100	2912	1474	1980	300	3830	499
2019	2155	-2372	-	-	-	-	244	300	-	Allocation to the intent of the short term capacity and energy gap
2020	1433	-557	-	-	-	114	300	-	-	
2021	1433	-1403	-	-	-	300	818	-	-	
2022	755	-344	-	-	513	400 1000	1600	-	-	
2023	750	-555	-	-	-	1000	1600	-	-	500
2024	1 000	-	1660	-	-	-	1600	-	1000	500
2025	7 000	-	-	-	-	1000	1600	-	-	500
2026	-	-1734	-	-	-	-	1600	-	-	500
2027	750	-547	-	-	-	-	1600	-	2000	500
2028	-	-475	-	-	-	1000	1600	-	-	500
2029	-	-1654	-	-	1575	1000	1600	-	-	500
2030	-	-1656	-	1500	-	1000	1600	-	-	500
Total Installed Capacity by 2030 (MW)	33164		1660	4600	5000	8288	17742	600	6380	-
% Total Installed Capacity (% of MW)	43		2.36	5.84	6.35	10.52	22.53	0.76	8.1	-
% Annual Energy Contribution (% of MWh)	58.3		4.5	0.3	1.2	6.3	17.8	0.6	1.3	-

Figure 6.2: A snapshot of the updated Energy Mix as per the IRP 2019

A number of IPP Procurement Programmes have been initiated to secure electricity generated from a range of resources from the private sector (i.e., from Independent Power Producers, or IPPs). Under these Programmes, IPPs are invited to submit proposals for the finance, construction, operation, and maintenance of electricity generation facilities for the purpose of entering into an Implementation Agreement with the DMRE and a Power Purchase Agreement (PPA) with Eskom as the buyer.

Between 2011 and 2021, the South African Government, through its IRP 2010 -2020, have successfully launched and completed five bidding windows under the REIPPPP[5] (refer to Table **Figure 6.3**[6]).

[5]https://www.pv-magazine.com/2021/09/30/reippp-one-of-the-worlds-best-renewable-energy-tenders-but-theres-room-for-improvement/

[6] 2 583 MW of renewable energy capacity was awarded to IPPs in the REIPPPP bid window 5 in October 2021. 1000MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 6 in December 2022 and April 2023.

REIPPPP Bid Windows	1	2	3	3.5	4	4 (additional)	4.5 (expedited)	5	[...13] (up to 2030)	Total
Bid Date	04-Nov-11	05-Mar-12	19-Aug-13	03-Mar-14	17-Aug-14	17-Aug-14	11-Nov-15	16-Aug-21	TBD	-
Pref. Bidders ("PB") announced	07-Dec-11	21-May-12	31-Dec-13	14-Dec-14	16-Apr-15	07-Jun-15		TBD	TBD	-
Financial Close ("FC") - from	19-Jun-12	13-Dec-12	30-Jul-14	01-May-21	30-Apr-18	30-Apr-18		TBD	TBD	-
Years betwen PB annoucement & FC	0.54	0.57	0.58	6.39	3.05	2.90		TBD	TBD	-
Projects Bid	53	79	93	3	74	-	CANCELLED	102	TBD	**404.0**
Projects awarded	28	19	17	2	13	13		TBD	TBD	**92.0**
Capacity offered (MW)	3,625	1,275	1,473	300	1,105	1,170		2,600	[29,000*]	**11,548.0**
Capacity awarded (MW)	1,426	1,040	1,457	200	1,121	1,084		TBD	TBD	**6,327.9**
Total investment ($bn)	6.2	4.2	4.5	1.8	2.0	1.9		TBD	TBD	**20.5**
Avg. Real IRR (ZAR)	17.0%	15.5%	11.0%	13.75%	9.5%	9.5%		[3%-7%*]	TBD	-

*Estimation; TBD – To be Determined

Source: Finergreen

Figure 6.3: Overview of bid windows 1 to 5

Figure 6.3 shows that between 2011 and 2015 (excluding bid window 5), 302 bids were submitted, with around 30% (92) of the projects receiving approval. From those 92 projects, close to 70% (4.41GW) are already in operation, with wind and solar PV projects compromising most of the projects awarded (roughly 86%). In addition, of the 11.5GW of total capacity offered, 6.3GW (roughly 71%) was allocated, with wind and solar PV projects comprising the majority of projects.

Preferred bidders identified under any IPP Procurement Programme, including the REIPPPP, are required to satisfy a number of economic development requirements, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply, IPP Procurement Programmes also contribute positively towards the socio-economic development of a region, over and above job creation.

In addition to government procurement programmes, various private procurement initiatives have been undertaken by various industries that are electricity intensive which have identified a need to diversify their energy mix and to change their reliance on State-provided electricity. In 2021, the South African government acknowledged that aging state-owned electricity infrastructure and a demand far surpassing supply, is hampering the country and economy's growth. On 10 June 2021, President Ramaphosa announced the government's approval of an increase in the generation license exemption threshold for embedded generation facilities from 1MW to 100MW. This allows industry to not only generate electricity for self-consumption but allows them to develop facilities with a more realistic capacity response to their demand requirements without the need to obtain a Generation License from NERSA. This in turn aims to reduce generation demands on the national grid and to alleviate residential, commercial, and industrial electricity supply constraints.

In addition to the policy considerations detailed above, Government has prioritised post COVID-19 turnaround plans in terms of renewable energies within the Just Energy Transition (JET), coupled with key development objectives of the various spheres of government. Eskom's JET Office was established in 2020 with a vision of achieving "Net Zero" carbon emissions by 2050, with an increase in sustainable jobs. Some of the additional benefits of moving towards lower carbon technologies, is the positive impact on air quality and water usage, the potential to create exciting new jobs, and a greater preservation of biodiversity in South Africa.

These policies share the same ideals, such as:

» The utilisation, application, and investment in renewable energy resources in South Africa is considered to be an essential means of reducing the carbon footprint of the country,
» Diversifying the national economy,
» Reducing poverty, and
» Providing critical additional energy to that of Eskom.

Eskom's Transmission Development Plan (TDP) is a development plan produced annually by Eskom Transmission detailing how the network will develop in the next 10 years. The 2022-2031 TDP projects that renewable generation will reach 32 098MW by 2031, with wind generation expected to contribute 19 348MW.

Government has compiled an Economic Reconstruction and Recovery Plan which was presented to Parliament in October 2020. According to this plan, the economic survey will rely on a massive investment in infrastructure, including energy, telecommunications, ports and rail. The core elements of the Economic Reconstruction and Recovery Plan are as follows:

1. Priority interventions for economic recovery: the plan sets out eight priority interventions that will ignite South Africa's recovery and reconstruction effort. These are the flagship initiatives that all of society will rally around to build a new economy (**Figure 6.4**).
2. Enabling conditions for growth: these are growth-enhancing reforms and other preconditions for an inclusive, competitive, and growing economy.
3. Macroeconomic framework: economic reconstruction and recovery requires careful mobilisation of resources to ensure fiscal sustainability.
4. Institutional arrangements: the plan focuses on execution and is supported by enhanced institutional arrangements to ensure implementation and accountability.

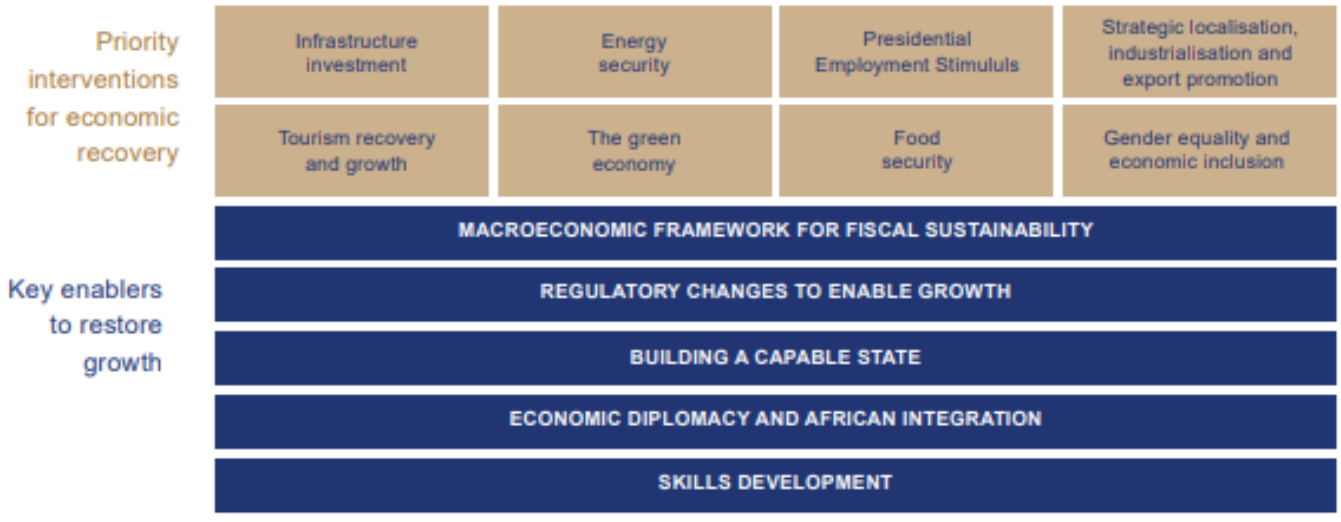


Figure 6.4: Core elements of the Economic Reconstruction and Recovery Plan (source: Building a new economy - Highlights of the Reconstruction and Recovery Plan, Presidency of the Republic of South Africa)

The plan recognises energy security as the most important prerequisite for the recovery agenda and states that renewed investment in a diversified energy mix can be achieved within a short time horizon, while

alleviating a crippling energy crisis and facilitating a necessary transition to a less carbon-intensive economy. One of the key commitments of the plan is therefore to implement the IRP 2019 without delay to provide a substantial increase in the contribution of renewable energy sources by 2030, alongside other sources including battery storage, gas and clean coal. The transition to green energy is recognised as contributing towards the realisation of the low-carbon, climate-resilient and inclusive economy envisaged by the National Development Plan. The development of the Limestone PV1 Solar Energy Facility is identified as a mechanism for securing additional power generation capacity for input to the national grid, reducing the reliance for electricity on Eskom.

The South African government has identified the green economy as one of 12 job drivers that could help contribute to creating 460 000 additional jobs by 2025. The New Growth Path, in which the sectoral jobs targets are disaggregated, envisages that as many as 300 000 new direct jobs could be created in the areas of natural resource management and renewable energy construction (Department of Energy, 2019). Whilst the project is currently being considered as forming part of the REIPPP programme, the Applicant will implement similar social and economic development strategies, including amongst others, job creation, local content, skills development, enterprise and supplier development, and socio-economic development. In addition to electricity generation and supply the project will therefore also contribute positively towards socio-economic development of a region, over and above job creation.

The need for new power generation from solar energy facilities has been identified and assessed by government at a national scale considering the national energy requirements as well as international commitments under the Paris Agreement; therefore, provision has been made for the inclusion of new solar power generation capacity in South Africa's energy mix. The implementation of the Limestone PV1 Solar Energy Facility has the potential to contribute positively towards the identified need, while simultaneously contributing to job creation and socio-economic development, identified as a need for the country within the National Development Plan (NDP).

Limestone PV1 Solar Energy Facility will make use of renewable energy technology and would contribute positively towards reducing South Africa's GHG emissions and ensure compliance with all applicable legislation and permitting requirements. In addition, by making use of PV technology, Limestone PV1 Solar Energy Facility would have reduced water requirements when compared with some other generation technologies in alignment with one of the vision 2030 themes of the Department of Water and Sanitation's National Water Resource Strategy 2 (2013) (i.e., transitioning to a low carbon economy through stimulating renewable energy and retrofitting buildings).

6.3.1. Benefits of Renewable Energy and the Need and Desirability in the South African Environment

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

Socio-economic upliftment of local communities: The Limestone PV1 Solar Energy Facility has the potential to create much needed employment for unskilled locals during the construction phase. Training opportunities will also be afforded to qualified local people who can be upskilled to undertake certain roles during the construction and operation phases. Some of the challenges facing the Local and District municipalities, as detailed in the IDPs include High rates of unemployment, high levels of poverty, and low levels of development despite the strategic local in terms of the national transport corridors. The Local and District municipalities are therefore in need to economic development, sustainable employment

opportunities and growth in personal income levels. A study undertaken by the DMRE, National Treasury and the Development Bank of Southern Africa (DBSA) in June 2017 found that employment opportunities created during the construction phase of renewable energy projects implemented to date had created 40% more jobs for South African citizens than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned, confirming the potential benefits for local communities associated with the implementation of renewable energy projects.

Since inception of the REIPPPP in 2011 up to bid window 4, approximately 109 400 job years for South African citizens to date have been created[7].

Limestone PV1 Solar Energy Facility also has the potential to make a positive contribution towards the identified community needs. In terms of the economic development requirements of the REIPPPP, the project will commit benefits to the local community in the form of job creation, localisation, and community ownership. In accordance with the DMRE's bidding requirements of the REIPPPP, a percentage of the revenue generated per annum during operation will be made available to local communities through a social beneficiation scheme. Therefore, the potential for creation of employment and business opportunities, and the opportunity for skills development for local communities is significant. Secondary social benefits can be expected in terms of additional spend in nearby towns due to the increased demand for goods and services. These socio-economic benefits would include an increase in the standard of living for local residents within the area as well as overall financial and economic upliftment.

Increased energy security: Given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive distribution losses. According to CSIR's power sector statistics[8], South Africa experienced loadshedding for 1 169 hours in 2021 (~13% of the time) wherein 2 521GWh of estimated energy was shed (mostly stage 2 load shedding). This is a 40% increase on the total loadshedding experienced during 2020. It is important to note that although extensive load shedding continued during 2021, record relative variable renewable energy contributions were recorded, with solar PV contributing 5.1 TWh.

Resource saving: It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability. Renewable energy also translates into revenue savings, as fuel for renewable energy facilities is free, while compared to the continual purchase of fuel for conventional power stations.

According to the IPP Procurement Programme overview report dated 31 December 2021, water savings of 85.3 million kilolitres has been realised by the programme from inception to the date of this publication, of which 5.2 million kilolitres were from reporting quarter 3 of 2021.

[7] University of Cape Town. The South African Renewable Energy IPP Procurement Programme: Review, Lessons Learned & Proposals to Reduce Transaction Costs.
[8] CSIR Energy Centre. Statistics of utility-scale power generation in South Africa in 2021. April 2022

Exploitation of significant renewable energy resource: At present, valuable renewable resources, including biomass by-products, solar irradiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio in South Africa.

According to the IPP Procurement Programme overview report, as of 31 December 2021, the REIPPPP had made the following significant impacts in terms of energy supply:

- 8906 MW of electricity had been procured from 117 Renewable Energy Independent Power Producers (IPPs) in bid windows 1-4[9].
- 5 661 MW of electricity generation capacity from 85 IPP projects has been connected to the national grid.
- 71 073 GWh of energy has been generated by renewable energy sources procured under the REIPPPP since the first project became operational in November 2013. Renewable energy IPPs have proved to be very reliable. Of the 85 projects that have started operations, 77 projects have been operational for longer than a year. The electrical energy generated over the past 12-month period for the 77 projects is 14 117 GWh, which is 95% of their annual energy contribution projections of 14 924 GWh over a 12-month delivery period. Thirty-one (31) of the 77 projects (40%) have individually exceeded their projections.

Bid window 6, which concluded on 03 October 2022, attracted 56 projects amounting to 9.6 GW. Of the total, 33 projects represent 5.5 GW solar PV capacity within the range of 50 MW to 240 MW. Onshore wind energy facilities make up the remaining 23 projects offered with 4.1 GW capacity.

Economics: As a result of the excellent resource and competitive procurement processes, both wind power and solar PV power are now proven in South Africa as cheaper forms of energy generation than coal power. They offer excellent value for money to the economy and citizens of South Africa while benefitting society as a whole through the development of clean energy.

The following has been achieved by the IPP programme (December 2021) in terms of investment and economics:

- Investment (equity and debt) to the value of R209.7 billion was attracted in bid rounds 1 - 4.
- Socio-economic development contributions of R1.8 billion to date, of which R109.6 million was spent in this 2021 reporting quarter.
- Enterprise development contributions of R537.9 million to date, of which R27.2 million was spent in this 2021 reporting quarter.

The JET aims to maximise the social and economic opportunities of climate action, while minimizing and carefully managing any challenges.

Pollution reduction: The release of by-products through the burning of fossil fuels for electricity generation has a particularly hazardous impact on human health and contributes to ecosystem degradation. The use of solar irradiation or wind for power generation is a non-consumptive use of a natural resource which produces zero emissions during its operation.

[9] 1000MW of renewable energy capacity (all solar PV) was awarded to IPPs in the REIPPPP bid window 6 in December 2022 and April 2023.

The overview of the Independent Power Producers Procurement Report (December 2021) indicates that a carbon emission reduction of 72.1 Mton CO_2 has been realised by the IPP programme from inception to date, of which 4.4 Mton is in the 2021 reporting quarter 3.

The JET is expected to contribute to better and cleaner energy for all by reducing air pollution and reduce carbon emissions.

Climate friendly development: The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of GHG emissions. South Africa is estimated to currently be responsible for approximately 1% of global GHG emissions (and circa half of those for which Africa is responsible) and is ranked 12th worldwide in terms of per capita carbon dioxide emissions as of 2021. Since its inception, the REIPPPP has achieved carbon emission reductions[10] of 72.1 Mton of CO_2. The development of Limestone PV1 Solar Energy Facility, and the associated electricity generated as a result of the facility, will result in considerable savings on tons of CO_2 emissions.

Support for international agreements: The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol and the Paris Agreement, and for cementing its status as a leading player within the international community. France, Germany, UK, US, the EU and World Bank are some of the international partners involved with the Just Energy Transition.

Employment creation: The development, procurement, installation, maintenance and management of renewable energy facilities have significant potential for job creation and skills development in South Africa. The construction phase will create temporary employment opportunities and the operation phase will create limited full-time employment opportunities.

Acceptability to society: Renewable energy offers a number of tangible benefits to society, including reduced pollution concerns, improved human and ecosystem health and climate friendly development.

Support to a new industry sector: The development of renewable energy offers the opportunity to establish a new industry within the South African economy, which will create jobs and skill local communities which have potential for further renewable energy projects.

Protecting the natural foundations of life for future generations: Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change, thereby securing the natural foundations of life for generations to come; this is the basis of sustainable development.

[10] Carbon emission reduction is calculated based on a displacement of power, from largely coal-based to more environmentally friendly electrical energy generation, using a gross Eskom equivalent emissions factor of 1.015 tons CO_2/MWh.

6.4. Need and Desirability of the project from a Regional Perspective

The Northern Cape Province has been identified as an area where electricity generation from renewable resources (including solar energy) is highly feasible and a viable option. The overarching objective for the Solar Energy Facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. From a regional site selection perspective, this region is considered to be technically viable for solar energy development by virtue of its measured solar resource. The Global Horizon Irradiation (GHI) in the province is around 2 556 kWh/m^2/annum. The Northern Cape Province is ranked 1st on the list of South Africa's provinces considered to have high solar generation potential and therefore enables the development of solar energy projects and the successful operation thereof.

The Northern Cape Provincial Growth and Development Strategy identifies poverty reduction as the most significant challenge facing the government and its partners. All other societal challenges that the province faces emanate predominantly from the effects of poverty. The development of the Limestone PV1 Solar Energy Facility has the potential to create employment opportunities, promote skills development, create opportunities to promote private sector investment and the development of SMMEs in the Northern Cape Province.

The NCPGDS makes reference to the need to ensure the availability of inexpensive energy. The section notes that in order to promote economic growth in the Northern Cape the availability of electricity to key industrial users at critical localities at rates that enhance the competitiveness of their industries must be ensured. At the same time, the development of new sources of energy through the promotion of the adoption of energy applications that display a synergy with the province's natural resource endowments must be encouraged. In this regard the NCPGDS notes "*the development of energy sources such as solar energy, the natural gas fields, bio-fuels, etc., could be some of the means by which new economic opportunity and activity is generated in the Northern Cape*". The Northern Cape Provincial Spatial Development Framework (NCSDF) (2012) lists a number of sectoral strategies and plans that are to be read and treated as key components of the PSDF. Section C8.2.3, Energy Objectives, sets out the energy objectives for the Northern Cape Province. The section makes specific reference to renewable energy, including to "*Promote the development of renewable energy supply schemes. Large-scale renewable energy supply schemes are strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports while minimizing detrimental environmental impacts*". The location of the study area and project site within the Northern Cape Province is therefore considered to support the Province/Region's generation targets.

District and local municipality policies and plans include energy development and upliftment of the area as a result of such development as part of their priorities. Basic services, economic growth and sustainability are key considerations within local planning policies. The implementation of Limestone PV1 Solar Energy Facility would contribute positively towards the specific goals and objectives in this regard.

6.5. Receptiveness of and desirability of the project site to develop the Limestone PV1 Solar Energy Facility

As detailed in Chapter 3, the placement of a Solar Energy Facility is strongly dependent on several factors including climatic conditions (solar irradiation), topography, the location of the site, availability of grid connection, the extent of the site and the need and desirability for the project. From a local level perspective, the project site and development area have specifically been identified by the proponent as being highly desirable from a technical perspective for the development of a PV facility.

The development area within which the facility footprint is proposed is sufficient in extent for the installation of a solar PV facility with a development footprint of ~250ha, while allowing for the avoidance of environmental site sensitivities. This consideration is in line with the mitigation strategy and enables the achievement of the objectives of the mitigation hierarchy (i.e., avoid, minimise, mitigate).

6.6. Conclusion

From the detail presented in this chapter, it is clear that the need and desirability for the project is supported from a planning and policy perspective on a national, provincial, district, and local level, as well as from a technical perspective when considering solar resource. It is however important to also consider the potential impacts and benefits that the proposed solar facility may have for the affected site and surrounding area from both a biodiversity sustainability perspective and a socio-economic perspective. Therefore, it is imperative for the assessment being undertaken for the project to consider this project not only from a policy (national, provincial, and local level) perspective, but also from a biodiversity and socio-economic perspective. The aim of the EIA process is to ensure a balance between these three spheres and to ensure that conclusions made regarding the proposed project draw on both the positive and negative consequences of the proposed development, as well as the potential for impacts to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments (i.e. cumulative impact). The potential impacts associated with the project are identified and described within this EIA Report.

CHAPTER 7: APPROACH TO UNDERTAKING THE EIA PROCESS

In terms of the EIA Regulations of December 2014 (as amended) published in terms of the NEMA (Act No. 107 of 1998) as amended, the construction and operation of the Limestone PV1 Solar Energy Facility is a listed activity requiring Environmental Authorisation (EA). The application for EA is required to be supported by an Environmental Impact Assessment (EIA) process based on the contracted capacity of the facility being up to 150MW Maximum Export Capacity and Activity 1 of Listing Notice 2 (GNR 325) being triggered.

An EIA process refers to the process undertaken in accordance with the requirements of the 2014 EIA Regulations (GNR 326), as amended, which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e., **Scoping** and **EIA Phase**, and is illustrated in **Figure 7.1**. Public participation forms an important component of the process and is undertaken throughout both phases.

Figure 7.1: The Phases of an Environmental Impact Assessment (EIA) Process

7.1 Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

This chapter includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(d)(i) a description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for and (ii) a description of the activities to be undertaken, including associated structures and infrastructure.	All listed activities triggered and applied for are included in **Section 7.2**.
3(1)(g)(ii) details of the public participation process undertaken in terms of Regulation 41 of the Regulations, including copies of the supporting documents and inputs.	The public participation process followed throughout the EIA process for the Limestone PV1 Solar Energy Facility is included in **Section 7.5.2** and copies of the supporting documents and inputs are included in **Appendix C**.

Requirement	Relevant Section
3(1)(g)(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.	The main issues raised through the undertaking of the public participation process, including consultation with I&APs are included in the Comments and Responses Report in **Appendix C8**.
3(1)(h)(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks.	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives are included in **Section 7.5.3**.
3(1)(p) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	The assumptions and limitations of the EIA process being undertaken for the Limestone PV1 Solar Energy Facility is included in **Section 7.6**.

7.2 Relevant legislative permitting requirements

The legislative permitting requirements applicable to the Limestone PV1 Solar Energy Facility, as identified at this stage in the process and considered within this EIA process, are described in more detail under the respective sub-headings. Additional permitting requirements applicable to the project are detailed within **Section 7.8**.

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

NEMA is South Africa's key piece of national environmental legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of the NEMA, the potential impact on the environment associated with listed activities must be considered, investigated, assessed, and reported on to the Competent Authority (the decision-maker) charged by NEMA with granting of the relevant Environmental Authorisation (EA). Since the Limestone PV1 Solar Energy Facility is a power generation project and therefore relates to the IRP for Electricity 2010 – 2030, the National Department of Forestry, Fisheries, and the Environment (DFFE) has been determined as the Competent Authority (CA) in terms of GNR 779 of 01 July 2016. The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR) is the Commenting Authority on the project.

The need to comply with the requirements of the EIA Regulations published under NEMA ensures that developers are provided the opportunity to consider the potential environmental impacts of their activities early in the project development process, and also allows for an assessment to be made as to whether environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the Competent Authority with sufficient information in order for an informed decision to be taken regarding the application for EA.

The EIA process being conducted for the Limestone PV1 Solar Energy Facility is undertaken in accordance with Section 24(5) of the NEMA, which defines the procedure to be followed in applying for EA, and requires that the potential consequences for, or impacts of, listed or specified activities on the environment be considered, investigated, assessed, and reported on to the competent authority. Listed Activities are activities identified in terms of Section 24 of the NEMA which are likely to have a detrimental effect on the environment, and which may not commence without an EA from the competent authority subject to the completion of an environmental assessment process (either a Basic Assessment (BA) or full Scoping and EIA).

Table 7.1 details the listed activities in terms of the EIA Regulations, 2014 (as amended) that apply to the Limestone PV1 Solar Energy Facility, and for which an application for Environmental Authorisation has been submitted to the DFFE. The table also includes a description of the specific project activities that relate to the applicable listed activities.

Table 7.1: Listed activities as per the EIA Regulations that are triggered by the Limestone PV1 Solar Energy Facility

Notice Number	Activity Number	Description of listed activity
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	11(i)	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 275kV. ***Internal electrical infrastructure required to connect the Limestone PV1 Solar Energy Facility to the grid connection infrastructure will consist of 33kV cabling (buried or overhead) and a 33/132kV onsite substation. The site is located outside an urban area.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	12(ii)(a)(c)	The development of – (ii) Infrastructure or structures with a physical footprint of 100 square metres or more Where such development occurs- (a) within a watercourse; or (c) within 32 metres of a watercourse. ***The construction and operation of the Limestone PV1 Solar Energy Facility and associated infrastructure will occur within freshwater/ drainage features, as well as within 32m of these features. The infrastructure will have a physical footprint of more than 100 square metres.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	14	The development and related operation of facilities and 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. ***The development of the Limestone PV1 Solar Energy Facility will require the construction and operation of facilities and infrastructure for the storage and handling of dangerous goods (combustible and flammable liquids, such as oils, lubricants, solvents) associated with the onsite substation, where such storage will occur inside containers with a combined capacity exceeding 80 cubic meters but not exceeding 500 cubic meters.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a Watercourse. ***The site for the Limestone PV1 Solar Energy Facility is associated with the presence of freshwater/drainage features. Therefore, during the construction phase, 10 cubic metres of rock will be removed from the***

Notice Number	Activity Number	Description of listed activity
		watercourses for the development of the Limestone PV1 Solar Energy Facility and associated infrastructure where this encroaches on such features.
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	24(ii)	The development of a road – (ii) with a reserve wider than 13.5m, or where no reserve exists where the road is wider than 8m. ***The construction of the Limestone PV1 Solar Energy Facility will require the construction of new access roads. Roads are generally 5-6m but may exceed 8m in width where necessary.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	28(ii)	Residential, mixed, retail, commercial, industrial, or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1ha. ***The total area to be developed (i.e., the development footprint) for the Limestone PV1 Solar Energy Facility is greater than 1ha and occurs outside an urban area in an area currently zoned for agriculture.***
Listing Notice 1 (GNR 327) 08 December 2014 (as amended on 07 April 2017)	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. Access roads will be widened by more than 6 metres where necessary. ***Existing farm roads within the project site may require widening or lengthening. Access roads will be widened by more than 6 metres where necessary.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. ***The project comprises a renewable energy generation facility, which will utilise solar power technology and will have a generation capacity of up to 150MWp.***
Listing Notice 2 (GNR 325) 08 December 2014 (as amended on 07 April 2017)	15	The clearance of an area of 20ha or more of indigenous vegetation. ***The facility is located on agricultural land where the predominant land use is agriculture. The project will require the clearance of indigenous vegetation within an area in excess of 20ha for the development of infrastructure.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended on 07 April 2017)	4(g)(ii)(ee)	The development of a road wider than 4 metres with a reserve less than 13.5 metres. **g. Northern Cape** (ii) Outside urban areas**:** (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

Notice Number	Activity Number	Description of listed activity
		The development of the Limestone PV1 Solar Energy Facility and associated infrastructures will require the development of roads wider than 4m within CBAs.
Listing Notice 3 (GNR 324) 08 December 2014 (as amended on 07 April 2017)	10(g)(ii)(iii)(ee)	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. **g. Northern Cape** (ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland (iii) Outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***The development of the Limestone PV1 Solar Energy Facility and associated infrastructures will require the storage and handling of a dangerous good with a capacity of more than 30 cubic meters within CBAs.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended on 07 April 2017)	14(ii)(a)(g)(ii)(ff)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **g. Northern Cape** (ii) Within critical biodiversity areas identified in bioregional plans. ***The development of the Limestone PV1 Solar Energy Facility and associated infrastructures will result in the clearance of more than 300m² of indigenous vegetation within CBAs.***
Listing Notice 3 (GNR 324) 08 December 2014 (as amended on 07 April 2017)	18(g)(ii)(ee)	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 **g. Northern Cape** (ii) Outside urban areas (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

Notice Number	Activity Number	Description of listed activity
		The construction and operation of the Limestone PV1 Solar Energy Facility and associated infrastructure will occur within freshwater/drainage features, as well as within 32m of these features. The infrastructure will have a physical footprint of more than 10 square metres. The site is located outside an urban area and within CBAs.
Listing Notice 3 (GNR 324) 08 December 2014 (as amended on 07 April 2017)	4(g)(ii)(ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. **g. Northern Cape** (ii) Outside urban areas (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. ***Existing roads will require widening by more than 4 m and/or lengthening by more than 1km, to accommodate the movement of heavy vehicles and cable trenching activities.***

7.2.2 National Water Act (No. 36 of 1998) (NWA)

In accordance with the provisions of the National Water Act (No. 36 of 1998) (NWA), all water uses must be licensed with the Competent Authority (i.e., the Regional Department of Water and Sanitation (DWS) or the relevant Catchment Management Agency (CMA)). Water use is defined broadly, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.

Table 7.2 contains Water Uses associated with the proposed project and identified in terms of the NWA which require licensing either in the form of a General Authorisation (GA), or in the form of a Water Use License (WUL). The table also includes a description of those project activities which relate to the applicable Water Uses.

Table 7.2: List of Water Uses published under Section 21 of NWA, as amended.

Notice No.	Activity No.	Description of Water Use
NWA (No. 36 of 1998)	Section 21 (c)	Impeding or diverting the flow of water in a watercourse ***The site considered for the establishment of the Limestone PV1 Solar Energy Facility is associated with the presence of freshwater/drainage features. Activities pertaining to the establishment of the Solar Energy Facility will encroach on freshwater/drainage features which will lead to an impediment and diversion of the flow in the watercourses.***
NWA (No. 36 of 1998)	Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse. ***The site considered for the establishment of the Limestone PV1 Solar Energy Facility is associated with the presence of***

Notice No.	Activity No.	Description of Water Use
		freshwater/drainage features. Activities pertaining to the establishment of the Solar Energy Facility will encroach on freshwater/drainage features which will lead to the altering of the characteristics of the watercourses.

In the event that the flow of water in the freshwater/drainage features is affected and the bed, banks or course characteristics are altered, then a water use authorisation would be required. This will need to be in accordance with the requirements of the Regulations Regarding the Procedural Requirements for Water Use License Applications and Appeals (GNR 267), or a GA registered in accordance with the requirements of the Revision of General Authorisation. The process of applying for a WUL or GA registration will only be completed once a positive EA has been received and the project selected as Preferred Bidder under the REIPPPP[11]. This is in line with the requirements of the Department of Water and Sanitation (DWS).

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

The National Heritage Resources Act (No. 25 of 1999) (NHRA) provides an integrated system which allows for the management of national heritage resources, and to empower civil society to conserve heritage resources for future generations. Section 38 of NHRA provides a list of activities which potentially require the undertaking of a Heritage Impact Assessment.

Section 38: Heritage Resources Management

1). Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as –

- *a. the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- *b. the construction of a bridge or similar structure exceeding 50m in length;*
- *c. any development or other activity which will change the character of a site –*
  - *i). exceeding 5 000m² in extent; or*
  - *ii). involving three or more existing erven or subdivisions thereof; or*
  - *iii). involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
  - *iv). the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority.*

Must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed development, a permit is required to be obtained prior to disturbing or destroying such resources

[11] If the REIPPPP does not continue, the intention is for the developer to bid into a similar programme.

as per the requirements of Section 48 of the NHRA, and the South African Heritage Resources Agency (SAHRA) Permit Regulations (GNR 668).

7.3 Overview of the Scoping Phase

The final Scoping Report was submitted to the DFFE on **16 February 2023** and subsequently accepted on **29 March 2023**. This report documented the evaluation of potential environmental impacts associated with the Limestone PV1 Solar Energy Facility and forms part of the EIA process being conducted in support of an application for EA for the project. The Scoping Phase was conducted in accordance with the requirements of the 2014 EIA Regulations (GNR 326), as amended, and therefore aimed to:

- Identify and evaluate potential environmental (biophysical and social) impacts and benefits of all phases of the proposed development (including design, construction, operation, and decommissioning) within the broader project site through a review of existing baseline data, including specialist studies which were undertaken within the project area.
- Identify potentially sensitive environmental features and areas within the broader project site in order to inform the preliminary design process of the facility.
- Define the scope of studies to be undertaken during the EIA process.
- Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA Phase, as well as regarding the scope and extent of specialist studies that will be required to be undertaken.

Within this context, the objectives of the Scoping Phase were to, through a consultative process:

- Identify the policies and legislation relevant to the project.
- Motivate the need and desirability of the proposed project, including the need and desirability of the activity in the context of the preferred project location.
- Identify and confirm feasible alternatives for the project.
- Identify and describe potential impacts associated with the undertaking of the identified activities and proposed technology.
- Identify areas of high sensitivity to be avoided by the project infrastructure.
- Identify and list key issues associated with the project to be addressed during the EIA Phase through further detailed study and ground-truthing.
- Agree on the level of assessment, including the methodology to be applied, the expertise required, and the extent of further consultation to be undertaken in the EIA Phase of the process, with the aim of determining the extent of impacts associated with the activities through the life cycle of the project (i.e., construction, operation, and decommissioning).
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Key tasks undertaken within the Scoping Phase include:

- Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- Submission of the completed application for EA to the competent authority (i.e., the DFFE) in terms of Regulations 5 and 16 of the 2014 EIA Regulations (GNR 326), as amended.

- Undertaking a public participation process in accordance with Chapter 6 of GNR 326 and the Department of Environmental Affairs (2017) Public Participation guidelines in terms of the NEMA EIA Regulations (hereinafter referred to as "the Guidelines") in order to obtain comments on and identify issues and concerns associated with the proposed project.
- Undertaking of independent specialist studies in accordance with Appendix 6 of the EIA Regulations, 2014 (GNR 326), as amended, and the requirements of the Specialist Protocols published in Regulation GNR 320, issued on 20 March 2020 and GNR 1150 of 30 October 2020, where relevant, as well as other relevant guidelines.
- Preparation of a Scoping Report and Plan of Study for the EIA in accordance with the requirements of Appendix 2 of the 2014 EIA Regulations (GNR 326).
- Provision of a 30-day public and authority review period for the Scoping Report.
- Preparation of a Comments and Response (C&R) Report detailing all comments raised by I&APs and responses provided as part of the Scoping Phase.
- Submission of a Final Scoping Report, including a Plan of Study for the EIA, to the DFFE for review and acceptance on **16 February 2023.**

Table 7.3 Summary of the public participation process undertaken during the Scoping Phase

Activity	Date
Initial advert advising release date for the scoping report and requesting I&APs to register for comment in the NoordkaapBulletin (in Afrikaans and English)	15 December 2022
Announcement of the EIA process and the availability of the Scoping Report for a 30-day review and comment period, including details on how to access the Scoping Report via the online stakeholder engagement platform	06 January 2023
Reminder advert placed in the NoordkaapBulletin (in Afrikaans and English) during the review period	26 January 2023
Distribution of the BID, process notification letters and stakeholder reply form announcing the EIA process and inviting I&APs to register on the project database. The BID and electronic reply form was also made available on the online stakeholder engagement platform.	06 January 2023
Placement of site notices at the project site, and surrounding areas.	09 November 2022
Distribution of notification letters announcing the availability of the Scoping Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	06 January 2023
30-day review and comment period of the Scoping Report.	Friday, 06 January 2023 to Monday, 06 February 2023
Meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations). » Where an I&AP does not have access to a computer and/or internet to participate in a virtual meeting telephonic discussions (including WhatsApp video call) will be set-up and minuted for	» A Focus group meeting was held with key stakeholders on Thursday, 26 January 2023 at 09h00 via a virtual platform. » A public meeting was held with key stakeholders on Thursday, 26 January 2023 at 11h00 via a virtual platform.

Activity	Date
inclusion. The preferred language of the I&AP has been considered when setting up these discussions.	
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

Table 7.4: DFFE requirements and response/ reference to section in the EIA Report

DFFE Requirement for EIA	Response/Location in this EIA Report
1. Application form: » Kindly clarify the reason this Department is the Competent Authority in terms of S24 C of NEMA. State clearly if the applicant intends to bid the project in terms of the IRP and update this information in the amended application form.	The developer intends to submit a bid in terms of a regulated power purchase procurement process (e.g., REIPPPP) evacuate the generated power into the national grid. This forms part of the Integrated Resources Plan (IRP). In terms of GN R779 of 1 July 2016, the Minister of the Department of Forestry, Fisheries and the Environment (DFFE) is the Competent Authority for all activities relating to the Integrated Resources Plan (IRP) of 2010 – 2030 (and any updates thereto) that require environmental authorisation. As the application for environmental authorisation relates to the proposed solar facility and associated infrastructure, which is related to the IRP and national energy provision, the Minister is the Competent Authority. The intention of the application has been further clarified in the EIA Report as detailed in **Chapter 1**. The applicant intents to bid the solar PV facility into a regulated power purchase procurement process, such as the REIPPPP.
2. <u>Listed Activities</u> a) It is noted that certain activities may be no longer relevant or necessary after the outcome of specialist studies. Ensure that only listed activities that are triggered by this development are applied for in the Please EIAR for the proposed project. The EIAR must assess the correct sub-listed activity for each listed activity applied for and include thresholds. The onus is on the EAP and applicant to ensure that no other activities are triggered, and the correct activities are applied for, are specific and can be linked to the development activity or infrastructure (including thresholds) as described in the project description. b) The listed activities represented in the EIAR and the application form must be the same and correct. Currently, the incorrect sub-activities are referred to. Please reconsider the sub regulation for Listing Notice 1, Activity 19 and all of the Listing Notice 3 activities. Ensure that you are using the latest version of the Regulations when including the correct reference to listed activities	All relevant listed activities are applied for, are specific and can be linked to the development activity or infrastructure as described in the project description. Only activities applicable to the development have been applied for and assessed. All listed activities applied for are indicated in **Section 7.2** of the EIA Report. The sub-activities that were incorrectly referred to have now been corrected. The activities applied for in the application form differ to the activities mentioned in the EIA Report, therefore an amended application form will be submitted. All impacts and mitigations are included in Chapter 9 and 10 of this EIA Report.

DFFE Requirement for EIA	Response/Location in this EIA Report
c) The EIAR must provide an assessment of the impacts and mitigation measures for each of the listed activities applied fo	
3. <u>Public Participation</u> a) Please ensure that comments from all relevant stakeholders are submitted to the Department with the EIAR. This includes but is not limited to the provincial Department of Agriculture, the local and district Municipality, the Department of Water and Sanitation (DWS), the South African Heritage Resources Agency (SAHRA), BirdLife SA, the Department of Mineral Resources and Energy, the Department of Rural Development and Land Reform, and the Department of Environment, Forestry and Fisheries: Directorate Biodiversity and Conservation (BCAdmin@dffe.gov.za, for the attention of Mr Seoka Lekota). b) Please ensure that all issues raised and comments received during the circulation of the FSR and draft EIAR from registered I&APs and organs of state which have jurisdiction in respect of the proposed activity are adequately addressed in the final EIAR. Proof of correspondence with the various stakeholders must be included in the final EIAR. Should you be unable to obtain comments, proof should be submitted to the Department of the attempts that were made to obtain comments. c) A Comments and Response trail report (C&R) must be submitted with the final EIAR. The C&R report must incorporate all comments for this development. The C&R report must be a separate document from the main report and the format must be in the table format as indicated in Appendix 1 of this comments letter in chronological order. Please refrain from summarising comments made by I&APs. All comments from I&APs must be copied verbatim and responded to clearly. Please note that a response such as "noted" is not regarded as an adequate response to I&AP's comments. d) Comments from I&APs must not be split and arranged into categories. Comments from each submission must be responded to individually. e) The Public Participation Process must be conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations, 2014, as amended.	All comments received to date have been included within the Comments and Responses Report **Appendix C8**, and have been responded to, as required. Where comments have not been obtained, proof that attempts were made to obtain comments have been included in **Appendix C4** and **Appendix C5**. The database detailing registered I&APs is included as **Appendix C1** to the EIA Report. Copies of all written comments received from organs of state are included in **Appendix C6: Comments Received** of the EIA Report. Proof of correspondence with the various stakeholders and proof of attempts to obtain comments from the stakeholders on the project database are included in **Appendix C5: Stakeholder Correspondence** of the EIA Report. Proof of correspondence with organs of state and proof of attempts to obtain comments are included in **Appendix C4: Organs of State Correspondence** of the EIA Report. A comments and response report has been included in **Appendix C8** Comments form I&APs have not been split into categories and all have been individually responded to. The Public Participation Process has been conducted in terms of Regulation 39, 40, 41, 42, 43 & 44 of the EIA Regulations 2014, as amended (GNR 326) as follows:

DFFE Requirement for EIA	Response/Location in this EIA Report
f) Note that Appendix C8 is corrupt. Please correct the formatting and ensure that the document submitted has visible and not overlapping text. g) Kindly include a timeline of the Public Participation Processes that have been conducted for the proposed project.	» Site notices were placed on the boundaries of the development site (refer to **Appendix C2: Site Notices & Newspaper Advertisements** of the EIA Report) » An advertisement announcing the EIA process and availability of the EIA Report for review and comment was placed in the NoordkaapBulletin on the 15 May 2023 published in Afrikaans and English (word text as submitted to the newspaper and tearsheet are in **Appendix C2: Site Notices &Newspaper Advertisements** of the EIA Report » The availability of the EIA report for review and comment was announced by a notification letter, accompanied by the BID, sent to all registered I&APs and organs of state on the project database (refer to **Appendix C4: Organs of State Correspondence** and **Appendix C5: Stakeholder Correspondence** of the EIA Report.) Appendix C8 has been updated and reuploaded. This has been checked to make sure that it is legible. A timeline of the PP process taken to date has been included in Chapter 7.
4. <u>Layout & Sensitivity Maps</u> a) The EIAR must provide the following: • The envisioned area for Limestone PV1 Solar Energy Facility (SEF), i.e., PV array and all associated infrastructure including the BESS, must be mapped at an appropriate scale, supporting infrastructure, main substation, operation and maintenance office, weather station, internal roads, parking, offices, staff ablutions and all associated infrastructure should be mapped at an appropriate scale. • The maps must be provided in high resolution and be clear and legible. Ensure to use a definitive icon or colour which contrasts against the background information and colours of the maps provided. • Clear description of all associated infrastructure. This description must include, but is not limited to the following: o BESS	An appropriate facility layout map indicating the proposed layout of the Solar PV Facility and associated infrastructure has been included as **Figure 11.2** of the EIA Report. The grid connection will be a separate process, and that Eskom will determine the final connection plan. The layout map has also been overlaid with site sensitivities including all buffers and "no-go" areas. Based on the sensitivity data that will be obtained from suitably qualified specialists during the EIA Phase the layout map may be updated and included in the EIA report.

DFFE Requirement for EIA	Response/Location in this EIA Report
o Internal roads infrastructure; and; o All supporting onsite infrastructure such as laydown area, guard house and control room etc. b) A copy of the final preferred layout map must be provided which includes all available biodiversity information used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g., roads. The layout map must indicate the following: • Permanent laydown area footprint; • PV array; • Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible); • Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used; • The location of sensitive environmental features on site e.g., CBAs, heritage sites, wetlands, drainage lines etc. that will be affected by the facility and its associated infrastructure; • All necessary details regarding all possible locations and sizes of the main substation and internal power lines. • All supporting onsite infrastructure such as laydown areas (temporary and permanent), guard house, control room, and buildings, including and accommodation, Collector Substation (SS), internal access roads, etc. • Substation(s) and/or transformer(s) sites including their entire footprint; • Location of access and service roads; • All existing infrastructure on the site, especially railway lines and roads; • Buffer areas; • Buildings, including accommodation; and • All "no-go" areas. c) An environmental sensitivity map indicating environmental sensitive areas and features identified during the assessment process. d) The above layout map must be overlain with the sensitivity map and a cumulative map which shows neighbouring energy developments and existing grid infrastructure.	

DFFE Requirement for EIA	Response/Location in this EIA Report
5. Specialist Assessments to be conducted in the EIA Phase a) The EAP must ensure that the terms of reference for all the identified specialist studies must include the following: • A detailed description of the study's methodology; indication of the locations and descriptions of the development footprint, and all other associated infrastructures that they have assessed and are recommending for authorisations. • Provide a detailed description of all limitations to the studies. All specialist studies must be conducted in the right season and providing that as a limitation will not be allowed. • Please note that the Department considers a 'no-go' area, as an area where no development of any infrastructure is allowed; therefore, no development of associated infrastructure including access roads is allowed in the 'no-go' areas. • Should the specialist definition of 'no-go' area differ from the Departments definition; this must be clearly indicated. The specialist must also indicate the 'no-go' area's buffer if applicable. • All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA. • Should a specialist recommend specific mitigation measures, these must be clearly indicated. • Regarding cumulative impacts: i. Clearly defined cumulative impacts and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land. ii. A detailed process flow to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project. iii. Identified cumulative impacts associated with the proposed development must be rated with the significance rating methodology used in the process.	Specialist studies have been conducted as part of the EIA Phase and have included in the EIA Report as **Appendix G to M.** The Specialist studies will include a detailed description of the methodology followed as well as an indication of the location and description of the development and all other associated infrastructure. All specialist reports compiled for the EIA report include a detailed description of the limitations of the studies. All specialist studies have been conducted in the correct season. No contradicting recommendations were provided by the specialists as part of the EIA process. This comment is noted and will be taken into consideration during the EIA Phase of the process. The specialist studies have been conducted in accordance with Government Notice No. 320 of 20 March 2020 (i.e., "the protocols"), and Government Notice No. 1150 of 30 October 2020 (i.e., protocols for terrestrial plant and animal species). Specialist assessments will be undertaken by suitably qualified SACNASP registered specialist. The Specialist Assessments will be included in the EIA Report. Cumulative impacts have been assessed and included in Chapter 11. The Ecology Impact Assessment has been revised to include additional information in this regard. The following is stated in the revised report: Following the screening assessment, consideration of total PV area was adapted to avoid, as much as possible, the Very High SEI areas as well as the identified Wooded Vaalbosveld habitat which includes the high density of Olea europaea subsp. cuspidata. Following the screening assessment, the Limestone PV1 layout was proposed. The layout in relation to the SEI can be seen in Figure 5 3 of the Ecology Report

DFFE Requirement for EIA	Response/Location in this EIA Report
iv. The significance rating must also inform the need and desirability of the proposed development. v. A cumulative impact environmental statement on whether the proposed development must proceed. vi. Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and were necessary, include further expertise advice b) The following Specialist Assessments will form part of the EIAR: • Terrestrial and Freshwater Ecology Impact Assessment • Avifauna Impact Assessment • Heritage (including Cultural Landscape, Archaeology and Palaeontology) • Soils and Agricultural Impact Assessment • Visual Impact Assessment • Social Impact Assessment c) It is noted that an offset is potentially recommended, according to the Terrestrial Ecology and Freshwater Scoping Report (Appendix G). The issue of offset is also a concern raised by the Provincial Department in the Comments and Responses Report attached in Appendix C8. Ensure that the specialist report, adequately addresses the issue of offsets, should they be required. The offset plan produced must take cognisance of the Draft National Biodiversity Offset Guideline (25 March 2022) and must include stakeholder engagement, definitive goals, timeframes, budget responsibilities and management requirements. It must also include a monitoring and reporting plan to assess the effectiveness of the offset. d) Please include motivation for not including a traffic impact assessment e) It is further brought to your attention that Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation, which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols"), and in Government Notice No. 1150 of 30 October 2020 (i.e. protocols for terrestrial plant	included in Appendix G of the EIAR. In addition, commitment was made towards the preservation of the remainder of the site, where no development is proposed. Overall, there is an evident avoidance of the central dense woody area, and the loss of trees will be kept to a minimum. Considering the abovementioned, the following was avoided: • All Very High SEI areas; • Of the total 2130.56 ha PV area, 197.97 ha (9.29 %) is proposed for infrastructure. • Of the 1208.35 ha Wooded Vaalbosveld, 59.63 ha (4.93 %) will be cleared of woody plants only; • Of the total 525.41 ha of High SEI areas (excluding Wooded Vaalbosveld),113.15 ha (21.53 %) is planned for infrastructure. The terrestrial ecology assessment (Appendix G of the EIAR) concluded "The overall medium cumulative low residual impact does not present a fatal flaw for the development, and the project may be favoured for authorisation. Due to the low residual impacts expected for the project, no biodiversity offset strategy is required." In terms of the guideline for interpreting Site Ecological Importance in the context of the development, it is indicated that "Offset mitigation may be required for high impact activities". Renewable energy projects can be considered low intensity developments with the correct implementation of the mitigation hierarchy. Referring to the mitigation hierarchy, the project will achieve avoidance by means of revised and reduced spatial planning, suggested seasonal constraints for construction to prioritise the dry season period and also the 'avoidance' of vegetation clearing beneath the panels. The overall residual impacts are expected to be low, and this will be achieved though reduced durations for selected aspects, minimised footprint areas and supporting measures to reduce the expected impact intensities. Furthermore, rehabilitation has been prescribed to improve degraded habitats stemming from impacts that could not be completely avoided or mitigated.

DFFE Requirement for EIA	Response/Location in this EIA Report
and animal species), have come into effect. Please note that specialist assessments must be conducted in accordance with these protocols. f) The screening tool output: • The screening tool and the gazetted protocols (GN R320 of 20 March 2020 and GN R 1150 of 30 October 2020) require a site sensitivity verification to be completed to either confirm or dispute the findings and sensitivity ratings of the screening too • It is the responsibility of the EAP to confirm the list of identified specialist reports and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation. The site sensitivity verification for each of the recommended studies, as per the protocols, must be compiled and attached. g) Site sensitivity verifications for all the identified specialist studies (according to the screening tool) must be provided. h) Additionally, the protocols specify that an assessment must be prepared by a specialist who is an expert in the field and is SACNASP registered for e.g.an aquatic assessment must be prepared by a specialist registered with SACNASP, with expertise in the field of aquatics sciences i) Should the appointed specialists specify contradicting recommendations, the EAP must clearly indicate the most reasonable recommendation and substantiate this with defendable reasons; and where necessary, include further expert advice. j) Please include a table that shows the proposed studies and the relevant specialists conducting the study. In addition, a summary should be included of the specialist's recommendations in terms of the alternatives that are preferred based on the findings of their study. k) All specialist studies must be final, and provide detailed/practical mitigation measures for the preferred alternative and recommendations, and must not recommend further studies to be completed post EA.	Independent specialist shave been appointed to identify and assess the impacts the proposed development will have on terrestrial biodiversity and aquatic sensitivities. The specialist in their report has noted that the aquatic sensitivity features identified will have an overall anticipated risk of low residual impact significance provided that the mitigation measures are implemented. In terms of the proposed layout, the very high SEI areas have been avoided which includes the watercourse / river. In addition, the specialist notes that: of the 1208.35 ha Wooded Vaalbosveld, 59.63 ha (4.93 %) will be cleared of woody plants; and of the total 525.41 ha of High SEI areas (excluding Wooded Vaalbosveld),113.15 ha (21.53 %) is planned for infrastructure. Furthermore, the specialist notes the applicant's commitment "towards the preservation of the remainder of the site, where no development is proposed. Overall, there is an evident avoidance of the central dense woody area, and the loss of trees will be kept to a minimum". The proposed layout as discussed in Section 5.1.2.2 of the EIAR notes the alternatives considered, especially the design alternatives, and has been considered in the assessment of the identified impacts. The impact significance after mitigation in the construction and operation phases are assessed as low impact significance. The specialist notes that: "The expected cumulative impact of PV development as a whole is expected to be of a 'Moderate' significance, however, the contribution of the project development footprint itself (173.89 ha) is calculated at 0.96% of the total (PV Development Projects), with overall low significance when considering the contribution in isolation. The overall medium cumulative residual impact does not present a fatal flaw for the development, and the project may be favoured for authorisation." Considering that complete clearance is not proposed, or recommended, no offsets are required for the proposed development. This considers the alternatives discussed in Section 5.1.2.2 of the EIAR. It should be noted that no vegetation will be removed without the necessary permits first being obtained.

DFFE Requirement for EIA	Response/Location in this EIA Report
	In terms of the need for an offset and in relation to the National Draft Biodiversity Offset Guideline an offset is only required when an unavoidable significant residual negative impact on biodiversity is evident. Furthermore, the management outcomes for biodiversity are outlined in the specialist report which does not conclude that an offset would be required. This is in consideration of the mitigation measures recommended and assessed by the specialist. An offset is also required when the mitigation hierarchy cannot be implemented to counterbalance the impact of the proposed development. In the instance of this environmental assessment process, the mitigation hierarchy has been implemented and considered as outlined in Chapter 5 of the EIAR: • avoidance of the Very High SEI areas; • development in the high SEI areas will not result in the clearance of all vegetation since vegetation clearance will only be conducted under the following circumstances (extracted from the specialist report in Section 5.1.2): - "The excavation for and installation of subterranean equipment such as the earth mat; electrical cables and ducting from the solar PV module installation to the power stations (inverters, transformers & switchgear) and from the power stations to the substation; and required stormwater infrastructure. - The casting of foundations and clearing of footprints for permanent buildings, laydown areas, power station plinths and the substation. - The footprints of foundations or piles of the site fencing posts and solar mounting structures. - The footprints of internal- and access roads. - Trees with heights, or potential to reach heights, of 0.5 m or higher located within the solar PV plant, and any other necessary areas." Section 6.2 of the National Draft Biodiversity Offset Guideline which states that:

DFFE Requirement for EIA	Response/Location in this EIA Report
	"Where residual negative biodiversity impacts are evaluated to be of medium or high significance, a biodiversity offset would be required. Biodiversity offsets are unlikely to be required when the residual negative impacts of a proposed activity, or activities, on biodiversity are evaluated to be of low significance." In terms of the need for an offset, the specialist is clear that through the mitigation hierarchy and the recommended mitigation measures which respond to the management outcomes, the project's residual impacts are expected to be low. The cumulative residual impact assessed as medium significance is not presented as a fatal flaw. There will be no significant loss of sensitive and significant aquatic features. In addition to the above, the proposed development site is not located within a protected area, and rather is considered in an expansion strategy. The intention of the environmental assessment process, and the appointment of an independent specialist is to ensure a process that identifies and assesses the potential impacts of the proposed development on the environment. Subsequent to this process, and the specialist noting no fatal flaws, and because of the mitigation measures proposed, which the Applicant will implement, and that the development has been through an iterative public process noting and subsequently addressing the issues highlighted, the proposed development will not result in high negative significant impact after mitigation. A Traffic Impact Assessment has been included as **Appendix M** A table including all specialists and the studies done is included in **Chapter 7, Table 7.7.**

DFFE Requirement for EIA	Response/Location in this EIA Report
General a) The EIAR must provide the technical details for the proposed facility in a table format as well as their description and/or dimensions. A sample for the minimum information required is listed under Annexure 2 below. b) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR. EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR. c) A construction and operational phase EMPr that includes mitigation and monitoring measures must be submitted with the final EIAR. d) It is drawn to your attention that for substation and overhead electricity transmission and distribution infrastructure, when such facilities trigger activity 11 or 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and any other listed and specified activities necessary for the realisation of such facilities, the generic Environmental Management Programme, must be used and submitted with the final report over and above the EMPr for the facility. i.e. there needs to be an EMPr for the facility and for the onsite substation. e) The comments issued by this Department on 27 January 2023, during the draft scoping report are still valid and must be all addressed throughout the EIA process.	A table that provides the technical details for the facility is included in Chapter 2, Table 2.1. An EMPr is included as **Appendix N1 and N2**

7.5 Overview of the EIA Phase

As per the EIA Regulations (GNR 326), the objectives of the EIA Phase are 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 development footprint on the approved site as contemplated in the accepted Scoping Report.
- Identify the location of the development footprint within the approved site as contemplated in the accepted Scoping Report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process 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 development footprint for the activity within the project site as contemplated in the accepted Scoping Report based on the lowest level of environmental sensitivity identified during the assessment.
- Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted Scoping Report through the life of the activity.
- Identify suitable measures to avoid, manage or mitigate identified impacts.
- Identify residual risks that need to be managed and monitored.

This EIA Report assesses potential positive and negative, direct, indirect, and cumulative impacts associated with all phases of the project life cycle including pre-construction, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

The following subsections outline the activities within the EIA process that have been undertaken to date.

7.5.1 Authority Consultation and Application for Environmental Authorisation in terms of the 2014 EIA Regulations (as amended)

In terms of GNR 779 of 1 July 2016, the National DFFE is the competent authority for all projects which relate to the IRP and any updates thereto. As the project is proposed within the Northern Cape Province, the Northern Cape DAEARDLR is the provincial commenting authority for the project. Consultation with these authorities, as well as other relevant Organs of State will continue throughout the EIA process. To date, this consultation has included the following:

- Submission of a pre-application form to the DFFE providing details of the project and the process to be undertaken was completed on **12 October 2022**. It was confirmed by the case officer via email on **17 October 2022** that no pre-application meeting would be required for the project.

- Submission of the application for Environmental Authorisation to the DFFE via the DFFE Novell File System on **10 January 2023.**
- Submission of the final Scoping Report on **16 February 2023.**
- Receipt of acceptance of the Scoping Report and approval of the Plan of Study for the EIA Phase on **29 March 2023.**

The following steps have been undertaken as part of the EIA Phase of the process:

- Make the EIA Report available for a 30-day public review and comment period from **18 May 2023** to **19 June 2023.**
- Notification and consultation with stakeholders, I&Aps and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
- Incorporating comments received during the 30-day public review and comment period into the revised EIA Report.
- Notification to the DFFE in terms of Regulation 23(1) that the Final EIA Report will be submitted within 156 days of the Acceptance of Scoping.

The following steps are still to be undertaken as part of the EIA Phase of the process:

- Make the Revised EIA Report available for a 30-day public review and comment period from **21 July 2023 to 21 August 2023.**
- Notification and consultation with stakeholders, I&APs and Organs of State that may have jurisdiction over the project, including provincial and local government departments, and State-Owned Enterprises.
- Incorporating comments received during the 30-day public review and comment period into the final EIA Report.
- Submission of the final EIA Report to DFFE for decision-making.

The submissions, as listed above, were undertaken electronically, as required by the DFFE. A record of all authority correspondence undertaken during the EIA process is included in **Appendix B**.

7.5.2 Public Participation Process

Public participation is an essential and regulatory requirement for an Environmental Authorisation process and is guided by Regulations 41 to 44 of the EIA Regulations 2014 (GNR 326), as amended. The purpose of public participation is clearly outlined in Regulation 40 of the EIA Regulations 2014 (GNR 326, as amended, and is being followed for this proposed project.

The Public Participation Process for Limestone PV1 has been run concurrently with the public consultation for Limestone PV2, located on the same property and forming part of the Limestone PV cluster. The benefit to the stakeholder is that all information relevant to all related applications has been made available for review together, and not only for comments to be raised across the two (2) applications at one time, but also provided a complete picture of the potential for impacts and/or benefits related to the suite of projects located in close proximity to one another.

The sharing of information forms the basis of the public participation process and offers the opportunity for I&APs to become actively involved in the EIA Process from the outset. The public participation process is designed to provide sufficient and accessible information to I&APs in an objective manner. The public

participation process affords I&APs opportunities to provide input into and receive information regarding the EIA process in the following ways:

During the **Scoping Phase**:
» Provide an opportunity to submit comments regarding the project.
» Assist in identifying reasonable and feasible alternatives, where required.
» Contribute relevant local information and knowledge to the environmental assessment.
» Allow registered I&APs to verify that their comments have been recorded, considered, and addressed, where applicable, in the environmental investigations.
» Foster trust and co-operation.
» Generate a sense of joint responsibility and ownership of the environment.
» Comment on the findings of the Scoping Phase results.
» Identify issues of concern and suggestions for enhanced benefits.

During the **EIA Phase**:
» Contribute relevant local information and knowledge to the environmental assessment.
» Verify that issues have been considered in the environmental investigations as far as possible as identified within the Scoping Phase.
» Comment on the findings of the environmental assessments.
» Attend a Focus Group Meeting to be conducted for the project.

During the **decision-making phase**:
» To advise I&APs of the outcome of the competent authority's decision, and how and by when the decision can be appealed.

The Public Participation process therefore aims to ensure that:
» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs for their review.
» The information presented during the public participation process is presented in such a manner, i.e., local language and technical issues, that it avoids the possible alienation of the public and prevents them from participating.
» Public participation is facilitated in such a manner that I&APs are provided with a reasonable opportunity to comment on the project.
» A variety of mechanisms are provided to I&APs to correspond and submit their comments i.e., fax, post, email, telephone, text message (SMS and WhatsApp).
» An adequate review period is provided for I&APs to comment on the findings of the Scoping and EIA Reports.

The following sections detail the tasks undertaken as part of the public participation process within the EIA Phase.

i. Stakeholder identification and Register of Interested and Affected Parties

As required in terms of Regulation 42 of the EIA Regulations, I&APs have been identified through a process of networking and referral, obtaining information from Savannah Environmental's existing stakeholder database, liaison with potentially affected parties in the greater surrounding area and a registration process involving the completion of a reply form. Key stakeholders and affected and surrounding landowners have

been identified and registered on the project database. Other stakeholders are required to formally register their interest in the project through either directly contacting the Savannah Environmental Public Participation team via phone, text message (SMS and WhatsApp), email or fax, or registering their interest via the online stakeholder engagement platform. An initial list of key stakeholders identified and registered is included in **Table 7.3**.

Table 7.3: List of Stakeholders identified for the inclusion in the project database during the public participation process for the Limestone PV1 Solar Energy Facility

Organs of State
National Government Departments
Department of Forestry, Fisheries and the Environment (DFFE)
Department of Mineral Resources and Energy (DMRE)
Department of Agriculture, Land Reform and Rural Development (DALRRD)
Department of Water and Sanitation (DWS)
Government Bodies and State-Owned Companies
Eskom Holdings SOC Limited
National Energy Regulator of South Africa (NERSA)
South African Civil Aviation Authority (CAA)
Air Traffic Navigation Services (ATNS)
South African Heritage Resources Agency (SAHRA)
South African National Roads Agency Limited (SANRAL)
South African Defence Force - Northern Cape
South African Radio Astronomy Observatory (SARAO)
Telkom SA SOC Limited
Transnet SA SOC Limited
Provincial Government Departments
Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (NC DAEARDLR)
Northern Cape Department: Transport, Safety and Liaison
Ngwao Boswa Kapa Bokone (NBKB) – provincial Heritage Authority
Local Government Departments
ZF Mgcawu District Municipality
Kgatelopele Local Municipality – including the Ward Councillor, ward committee members, community representative or local community forum members
Commenting Stakeholders
BirdLife South Africa
Endangered Wildlife Trust (EWT)
SENTECH
Landowners
Affected landowners, tenants and occupiers
Neighbouring landowners, tenants and occupiers

As per Regulation 42 of the EIA Regulations, 2014, as amended, all relevant stakeholder and I&AP information has been recorded within a register of I&APs (refer to **Appendix C1** for a listing of the recorded parties). In addition to the above-mentioned EIA Regulations, point 4.1 of the Public Participation Guidelines has also been followed. The register of I&APs contains the names[12] of:

- All persons who requested to be registered on the database through the use of the online stakeholder engagement platform or in writing and disclosed their interest in the project.
- All Organs of State which hold jurisdiction in respect of the activity to which the application relates.
- All persons who submitted written comments or attended virtual meetings (or in-person consultation) and viewed the narrated presentations on the Savannah Environmental online platform during the public participation process.

I&APs have been encouraged to register their interest in the EIA process from the onset of the project, and the identification and registration of I&APs will be on-going for the duration of the EIA process. The database of I&APs will be updated throughout the EIA process and will act as a record of all I&APs involved in the public participation process.

ii. Advertisements and Notifications

The availability of the EIA Report for review and comment was announced to the Organs of State, potentially affected and adjacent landowners, tenants and occupiers, and the general public via the following:

- Notification letter distributed to all registered I&APs advising them of the availability of the EIA Report for review on comment on **16 May 2023.**
- An advertisement announcing the availability of and inviting comment on the EIA Report in the *NoordkaapBulletin* (English and Afrikaans advertisement) on **18 May 2023**. A copy of the newspaper adverts as sent to the newspaper is included an **Appendix C2** of the EIA Report. The advert tearsheet is included in the final EIA Report as **Appendix C2**.
- The EIA Report was made available for review and comment by I&APs for a 30-day period from **18 May 2023** to **19 June 2023.** The EIA Report was made available on the Savannah Environmental website (https://savannahsa.com/public-documents/energy-generation/LimestonePV1). I&APs have been encouraged to review the EIA Report and submit written comment. The EIA Report will be circulated to Organs of State via electronic transfer (Dropbox, WeTransfer, etc), or CD and/or hardcopy as per individual request. Evidence of distribution of the EIA Report will be included in the final EIA Report as **Appendix C4** and **Appendix C5**.
- Placement of an advertisement in the *NoordkaapBulletin* (English and Afrikaans advertisement) prior to the commencement of the 30-day review and comment period for the Revised EIA Report. This advert announced the availability of the revised EIA Report. A copy of the newspaper adverts as published in the *NoordkaapBulletin* is included in **Appendix C4** of the revised EIA Report.
- Notification letter distributed to all registered I&APs advising them of the availability of the revised EIA Report for review on comment on **21 July 2023.**
- The revised EIA Report has been made available for review by I&APs for a 30-day review period from **21 July 2023** to **21 August 2023**. The revised EIA Report is available on the Savannah Environmental website.

[12] Contact details and addresses have not been included in the I&AP database as this information is protected by the Protection of Personal Information Act (No 4 of 2013).

The evidence of distribution of the revised EIA Report will be included in the final EIA Report, which will be submitted to the DFFE for review and decision-making.

iii. Public Involvement and Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the surrounding area, as well as capture their views, comments, issues and concerns regarding the project, various opportunities will be provided to I&APs to note their comments and issues. I&APs will be consulted through the following means:

- Opportunity to review the EIA Report for a 30-day review and comment period from **18 May 2023** to **19 June 2023.**
- Comments received during this review period have been captured within a Comments and Responses Report (**Appendix C8**) and addressed in the Revised EIA Report.
- Opportunity to review the Revised EIA Report for a 30-day review and comment period from **21 July 2023 to 21 August 2023**.
- Comments received during this review period will be captured within a Comments and Responses Report (Appendix C8), which will be included in the final EIA Report.
- Public Consultation Meetings: Virtual focus group meetings with key government departments, stakeholders and landowners held during the Scoping and EIA Process. The purpose of these meetings was to provide an overview of the findings of the EIA studies in order to facilitate comments on the EIA process and the content of the EIA Report, as well as to record any issues or concerns raised by stakeholders regarding the project, environmental studies and mitigation measures. Where necessary or required, face-to-face meetings were held. The minutes of these meetings have been included in the revised EIA Report as **Appendix C7**. Where required, further meetings will be held during the review period of the Revised EIA Report, specifically with the Competent and commenting authorities.
- Telephonic consultation sessions.
- Written, faxed or e-mail correspondence.

Table 7.5: Public involvement during EIA Phase

Activity	Date
Advertising of the availability of the EIA Report for a 30-day review and comment period in the NoordkaapBulletin Newspaper (English advertisement).	16 May 2023
Distribution of notification letters announcing the availability of the EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	18 May 2023
30-day review and comment period of the EIA Report.	18 May 2023 to 19 June 2023
Virtual meetings through the use of virtual platforms as determined through discussions with the relevant stakeholder group: » Landowners » Authorities and key stakeholders (including Organs of State, local municipality and official representatives of community-based organisations).	A Virtual Focus Group Meeting was held with I&APs and key stakeholders on 19 June 2023
Advertising of the availability of the Revised EIA Report for a 30-day review and comment period in the *NoordkaapBulletin* Newspaper (English advertisement).	20 July 2023

Activity	Date
Distribution of notification letters announcing the availability of the Revised EIA Report for a 30-day review and comment period. These letters were distributed to Organs of State, Government Departments, Ward Councillors, landowners within the surrounding area (including neighbouring landowners), registered I&APs and key stakeholder groups.	21 July 2023
30-day review and comment period of the revised EIA Report.	21 July 2023 to 21 August 2023
On-going consultation (i.e., telephone liaison; e-mail communication) with all I&APs.	Throughout the EIA process

iv. Registered I&APs entitled to Comment on the EIA Report

I&APs registered on the database were notified by means of a notification letter of the release of the EIA Report and Revised EIA Report for a 30-day review and comment period, invited to provide comment on these Reports, and informed of the manner in which, and timeframe within which such comment must be made. The reports were made available in English in soft copies to I&APs. Hard copies can be made available on request.

The EIA Report was made available on the Savannah Environmental website https://savannahsa.com/public-documents/energy-generation/ LimestonePV1/). A notification letter to all registered I&APs was distributed on **18 May 2023**. Where I&APs were not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions and face-to-face discussions will be used.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period have been recorded and included in **Appendix C6** and **Appendix C7** of the revised EIA Report and addressed in the Revised EIA Report.

The Revised EIA Report has been made available on the Savannah Environmental website https://savannahsa.com/public-documents/energy-generation/ LimestonePV1/). A notification letter to all registered I&APs was distributed on **21 July 2023**. Where I&APs are not able to provide written comments (including SMS and WhatsApp), other means of consultation, such as telephonic discussions and face-to-face discussions will be used.

All comments raised as part of the discussions and written comments submitted during the 30-day review and comment period for the Revised EIA Report will be recorded and included in **Appendix C6** and **Appendix C7** of the Final EIA Report which will be submitted to DFFE.

v. Identification and Recording of Comments

Comments raised by I&APs to date have been included into a Comments and Responses (C&R) Report, which is included in **Appendix C8** of this EIA Report. The C&R Report includes detailed responses from members of the EIA project team and/or the project proponent to the issues and comments raised. The C&R Report has been updated with all comments received during the 30-day review and comment period and is included as **Appendix C8** in the revised EIA Report. The CRR will be updated with any further comments received during the review period for the Revised EIA Report and will be submitted to the DFFE for review and decision-making.

Notes of all the telephonic discussions, virtual meetings, and face-to-face meetings conducted during the 30-day review and comment period of the EIA Report have been included in **Appendix C7** of the revised EIA Report. Notes of any further meetings held during the review period for the Revised EIA Report will be included in **Appendix C7** of the Final EIA Report.

7.6. Outcomes of the DFFE Web-Based Screening Tool

In terms of GNR 960 (promulgated on 5 July 2019) and Regulation 16(1)(b)(v) of the 2014 EIA Regulations (as amended), the submission of a Screening Report generated from the national web based environmental screening tool is compulsory for the submission of applications in terms of Regulations 19 and 21 of the EIA Regulations.

The requirement for the submission of a Screening Report (included as **Appendix P** of the Scoping Report) for the Limestone PV1 Solar Energy Facility is applicable as it triggers Regulation 19 of the EIA Regulations, 2014, as amended. **Table 7.5** provides a summary of the specialist assessments identified in terms of the screening tool and responses to each assessment from the project team considering the project site under consideration. A Site Sensitivity Verification Report is included in **Appendix O**.

Table 7.5: Sensitivity ratings from the DFFE's web-based online Screening Tool associated with the development of the Limestone PV1 Solar Energy Facility

Environmental Theme/Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
Agriculture	Medium	A Soils, Land Use and Agricultural Potential compliance statement is included in this EIA Report as **Appendix I**. The study found that the site was of low-medium sensitivity. A compliance statement was required as per the protocol.
Animal Species	High	A Terrestrial Ecology Assessment (including fauna) has been undertaken for the solar energy facility and is included as **Appendix G** of the EIA Report. The specialists found the site to be mostly comprised of high sensitivity with areas of very high sensitivity and some areas of very low sensitivity also present.
Landscape (Solar))	Very High	A Visual Impact Assessment has been undertaken for the solar energy facility and is included in this EIA Report as **Appendix K.** Sensitive visual receptors within the project area have been identified and considered in the assessment.
Archaeological and Cultural Heritage	Very high	A Heritage Impact Assessment has been undertaken for the solar energy facility and is included in this EIA Report as **Appendix J**. The specialists found that sensitive cultural

Environmental Theme/Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
		landscape and archaeological resources are present in the study area.
Palaeontology	Very High	A Heritage Impact Assessment has been undertaken for the solar energy facility and is included in this EIA Report as **Appendix J**. The specialists found that significant palaeontological resources are present in the area.
Terrestrial Biodiversity	Very High	A Terrestrial Ecology Assessment has been undertaken for the solar energy facility and is included as **Appendix G** of the EIA Report. The specialists found the site to be mostly comprised of high sensitivity with areas of very high sensitivity and some areas of very low sensitivity also present.
Aquatic Biodiversity	Very High	A Terrestrial Ecology Assessment (which includes a freshwater component) has been undertaken for the solar energy facility and is included as **Appendix G** of the EIA Report. The specialists found the site to be mostly comprised of high sensitivity with large areas of very high sensitivity and some areas of very low sensitivity.
Avian	Low	An Avifauna Assessment Report has been undertaken for the solar energy facility and included as **Appendix H** of the EIA Report. The specialists have found the site to have high to very high avian sensitivity. A Regime 2 monitoring survey - Two surveys over a 6-months period to cover the wet and dry periods – has been completed to inform the assessment of impacts.
Civil Aviation (Solar PV)	Low	A Compliance Statement has been compiled by the EAP and is included in **Appendix P**. The Civil Aviation Authority (CAA) and Air Traffic Navigation Services (ATNS) will be consulted throughout the EIA process to obtain input and details of any requirements for further studies. No objections regarding the project have been received to date.
Defence	Low	A Compliance Statement has been compiled by the EAP and is included in **Appendix Q**. The project site is not located within close proximity of any military base. The South African Defence Force Northern

Environmental Theme/Specialist Assessment	Sensitivity Rating as per the Screening Tool (relating to the need for the study)	Project Team Response
		Cape will be consulted throughout the EIA process to obtain input and details of any requirements for further studies. No objections regarding the project have been received to date.
RFI	Low	A Compliance Statement has been compiled by the EAP and is included in **Appendix R**. The project site is located not located close to any RFI sensitive areas. Telkom and SENTECH will be consulted throughout the EIA process to obtain input and details of any requirements for further studies. In addition, SARAO will be consulted regarding any specific requirements in terms of the SKA.
Plant Species	Medium	A Terrestrial Ecology Assessment (including flora) has been undertaken for the solar energy facility and is included as **Appendix G** of the EIA Report. The specialists found the site to be mostly comprised of high sensitivity with areas of very high sensitivity and some areas of very low sensitivity also present.
Social Assessment	The screening report does not indicate a rating for this theme.	A Social impact Assessment has been undertaken and is included in the EIA Report as **Appendix L**.
Traffic	The screening report does not indicate a rating for this theme.	A Social impact Assessment has been undertaken and is included in the EIA Report as **Appendix M**.
Geotechnical Assessment	The screening report does not indicate a rating for this theme.	A preliminary desktop geotechnical study was undertaken as part of the pre-feasibility studies by the Applicant. This study indicated that the project was considered to meet feasibility criteria and there are no geotechnical constraints to prevent the progress to preliminary and detailed design-level investigations. This indicates a low risk for the theme. Further study is not required as part of the environmental assessment process, and no risk was assigned for this theme in the Screening Tool report. The requirements for an infield Geotechnical Assessment is to inform the infrastructure foundation designs. A detailed geotechnical study and survey will be conducted prior to construction.

7.7. Assessment of Issues Identified throughout the EIA Process

Based on the outcomes of the DFFE screening tool and the Scoping Phase evaluation of the project, the following studies were identified as requiring detailed assessment, The specialist consultants involved in the assessment of these impacts are indicated in **Table 7.7** below.

Table 7.7: Specialist studies undertaken as part of the EIA Phase

Specialist	Area of Expertise	Appendix
Andrew Husted of The Biodiversity Company	Ecology (flora and fauna)	Appendix G
	Freshwater	
Ryno Kemp of The Biodiversity Company	Avifauna	Appendix H
Matthew Mamera of The Biodiversity Company	Soils	Appendix I
Jenna Lavin of Cedar Tower Solutions (CTS)	Heritage (incl. Archaeology and Palaeontology)	Appendix J
Lourens du Plessis of LOGIS	Visual	Appendix K
Molatela Ledwaba of Savannah Environmental	Social	Appendix L
Iris Wink of Iwink	Traffic	Appendix M

Specialist studies considered direct and indirect environmental impacts associated with the development of all components of the facility. Identified impacts are assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2
  - Medium-term (5–15 years) – assigned a score of 3
  - Long term (> 15 years) - assigned a score of 4
  - Permanent - assigned a score of 5
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
  - Assigned a score of 2 is improbable (some possibility, but low likelihood)
  - Assigned a score of 3 is probable (distinct possibility)
  - Assigned a score of 4 is highly probable (most likely)
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high

- The **status**, which is described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M) P; where

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area)
- **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated)
- **60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area)

Specialist studies also considered cumulative impacts associated with similar developments within the broader project site. The purpose of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). In this regard, specialist studies considered whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

A conclusion regarding whether the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area is included in the respective specialist reports.

As the project developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the requirements of NEMA and the 2014 EIA Regulations (GNR 326)), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A facility EMPr and a generic substation EMPr that include all the mitigation measures recommended by the specialists for the management of significant impacts are included as **Appendix N1** and **N2** to this EIA Report.

7.8. Finalisation of the EIA Report

The final stage of the EIA Phase entails the recording and capturing of comments received from stakeholders and I&APs on the Scoping Report in order to finalise the EIA Report for submission to the DFFE for decision-making. All written comments received will be addressed within the C&R Report (refer to **Appendix C8**).

7.9. Assumptions and Limitations of the EIA Process

The following assumptions and limitations are applicable to the EIA process for the Limestone PV1 Solar Energy Facility:

- All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
- The project site identified by the developer represents a technically suitable site for the establishment of a Solar Energy Facility, which is based on the design undertaken by technical consultants for the project.
- The development footprint (the area that will be affected during the operation phase) will include the footprint for the Solar Energy Facility and associated infrastructure (i.e., internal access roads, onsite substation, BESS, laydown areas).
- Conclusions of the specialist studies undertaken, and this overall impact assessment assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset in accordance with the relevant recommendations made.
- This report and its investigations are project specific, and consequently the environmental team did not evaluate any other power generation alternatives.

7.10. Legislation and Guidelines that have informed the preparation of this EIA Report

The following legislation and guidelines have informed the scope and content of this EIA Report:

- National Environmental Management Act (Act No. 107 of 1998).
- EIA Regulations of December 2014, published under Chapter 5 of NEMA (as amended).
- Department of Environmental Affairs (2017), Public Participation guidelines in terms of NEMA EIA Regulations.
- Department of Environmental Affairs (2017), Integrated Environmental Management Guideline: Guideline on Need and Desirability.
- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation; and
- International guidelines – the Equator Principles, the IFC Performance Standards, the Sustainable Development Goals, World Bank Environmental and Social Framework, and the and World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines).

Several other Acts, standards or guidelines have also informed the project process and the scope of issues addressed and assessed in this Scoping Report. A review of legislative requirements applicable to the proposed project as identified at this stage in the process is provided in **Table 7.5**.

Table 7.5: Relevant legislative permitting requirements applicable to the Limestone PV1 Solar Energy Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being, and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* ∗ *Prevent pollution and ecological degradation,* ∗ *Promote conservation, and* ∗ *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (No. 107 of 1998) (NEMA)	The 2014 EIA Regulations have been promulgated in terms of Chapter 5 of NEMA. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority	DFFE – Competent Authority Northern Cape DAEARDLR – Commenting Authority	The listed activities triggered by the proposed project have been identified and are being assessed as part of the EIA process currently underway for the project. The EIA process will culminate in the submission of an EIA Report to the DFFE for review and decision-making.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	charged by NEMA with granting of the relevant environmental authorisation. Considering the capacity of the proposed Limestone PV1 Solar Energy Facility (i.e., contracted capacity of up to 150MW Maximum Export Capacity) and the triggering of Activity 1 of Listing Notice 2 (GNR 325), a full Scoping and EIA process is required in support of the Application for EA.		
National Environmental Management Act (No 107 of 1998) (NEMA)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DFFE Northern Cape DAEARDLR	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section finds application through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (No. 73 of 1989) (ECA)	The Noise Control Regulations in terms of Section 25 of the ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North-West,	DFFE Northern Cape DAEARDLR Kgatelopele Local Municipality	Noise impacts are expected to be associated with the construction phase of the project. Considering the location of the development area in relation to residential areas and provided that appropriate mitigation

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce, or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).		measures are implemented, construction noise is unlikely to present a significant intrusion to the local community. There is therefore no requirement for a noise permit in terms of the legislation.
National Water Act (No. 36 of 1998) (NWA)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses, taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation.	Regional Department of Water and Sanitation	The Limestone PV1 development area is located within the regulated area of a river. As a result, a water use authorisation for the project will be required from DWS. The process will be completed once a positive EA has been received and the project selected as Preferred Bidder by the DMRE. This is in line with the requirements from DWS.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Consumptive water uses may include taking water from a water resource (Section 21(a)) and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)), and altering of bed, banks or characteristics of a watercourse (Section 21(i)).		
Minerals and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit.	Department of Mineral Resources and Energy (DMRE)	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the project, and as a result a mining permit or EA in this regard is not required to be obtained.
	Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.		In terms of Section 53 of the MPRDA, approval is required from the Minister of Mineral Resources and Energy to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas, and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and	Northern Cape DAEARDLR / ZF Mgcawu District Municipality	In the event that the project results in the generation of excessive levels of dust the possibility could exist that a dustfall monitoring programme would be required for the project, in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report, and a dust management plan would need to be developed.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	concentrations that may exceed the dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.		
National Heritage Resources Act (No. 25 of 1999) (NHRA)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance. Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.	South African Heritage Resources Agency (SAHRA) Ngwao Boswa Kapa Bokone – provincial heritage authority	A Heritage Impact Assessment has been undertaken for the project as per the requirements of Section 38 of the NHRA. A farmhouse werf of heritage significance was present within the project site. Should a heritage resource be impacted upon, a permit may be required from SAHRA or Ngwao Boswa Kapa Bokone (NBKB) in accordance with of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and	DFFE Northern Cape DAEARDLR	Under NEM:BA, a permit would be required for any activity that is of a nature that may negatively impact on the survival of a listed protected species. A terrestrial ecology and freshwater Impact Assessment has been included as part of the EIA report as **Appendix G** to identify the presence of any listed protected species present on site which will require a permit.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species, and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA, and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	DFFE Northern Cape DAEARDLR	A terrestrial ecology and freshwater Impact Assessment has been included as part of the EIA report as **Appendix G** to identify the presence of any alien and invasive species present on site. Four Invasive and Alien Plant (IAP) species were recorded within the project site (*Schkuhria pinnata; Datura ferox; Pennisetum clandestinum* and *Polypogon monspeliensis*). Two of these species (*Datura ferox* and *Pennisetum clandestinum*) are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b.
Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA)	Section 05 of CARA provides for the prohibition of the spreading of weeds. Regulation 15 of GN R1048 published under CARA provides for the classification of categories of weeds and invader plants, and restrictions in terms of where these species may occur. Regulation 15E of GN R1048 published under CARA provides requirement and methods to	DALRRD	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. In terms of Regulation 15E (GN R1048) where Category 1, 2 or 3 plants occur a land user is required to control such plants by means of one or more of the following methods:

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	implement control measures for different categories of alien and invasive plant species.		» Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has as its object the control of plants concerned, subject to the provisions of sub-regulation 4. » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
National Forests Act (No. 84 of 1998) (NFA)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 734. The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other	DFFE	A licence is required for the removal of protected trees. It is therefore necessary to conduct a survey that will determine the number and relevant details pertaining to protected tree species present in the development footprint for the submission of relevant permits to authorities prior to the disturbance of these individuals. A terrestrial ecology and freshwater Impact Assessment has been included as part of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	manner acquire or dispose of any protected tree, except under a licence granted by the Minister".		EIA report as **Appendix G** identify the presence of any protected trees present on site which will require a permit. Two provincially protected tree species were found on site, *Prepodesma orpenii* and *Olea europaea subsp. cuspidata*
National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires, and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert	DFFE	While no permitting or licensing requirements arise from this legislation, this Act will be applicable during the construction and operation of the Limestone PV1 Solar Energy Facility, in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and trained personnel for firefighting purposes.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	the owners of adjoining land and the relevant fire protection association, if any.		
Hazardous Substances Act (No. 15 of 1973) (HAS)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger, to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product, and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.	Department of Health (DoH)	It is necessary to identify and list all Group I, II, III, and IV hazardous substances that may be on site and in what operational context they are used, stored or handled. If applicable, a license would be required to be obtained from the DoH.
National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities	DFFE – Hazardous Waste Northern Cape DAEARDLR	No waste listed activities are triggered by the project, and therefore, no Waste Management License is required to be

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise, and » Pollution of the environment and harm to health are prevented.	– General Waste	obtained. General and hazardous waste handling, storage and disposal will be required during construction and operation. The National Norms and Standards for the Storage of Waste (GNR 926) published under Section 7(1)(c) of NEM:WA will need to be considered in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Road Traffic Act (No. 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.	South African National Roads Agency (SANRAL) – national roads Northern Cape Department: Transport, Safety and Liaison	An abnormal load / vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits required for vehicles carrying abnormally heavy or abnormally dimensioned loads and transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the onsite substation and BESS components may not meet specified dimensional limitations (height and width) which will require a permit.
Astronomy Geographic Advantage Act (Act 21 of 2007)	» Preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy. » In terms of section 7(1) and 7(2) of this Act, the Minister declared core astronomy advantage areas on 20 August 2010 under	Department of Science and Technology	The study area falls within the Northern Cape. SARAO will be consulted as a key stakeholder to confirm that the project will not impact on the SKA and to determine any specific requirements.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Regulation No. 723 of Government Notice No. 33462. In this regard, all land within a 3 kilometres radius of the centre of the Southern African large Telescope dome falls under the Sutherland Core Astronomy Advantage Area. The declaration also applies to the core astronomy advantage area containing the MeerKAT radio telescope and the core of the planned Square Kilometre Array (SKA) radio telescope. The study area does not fall within the 3 km radius of SALT or within an area which could affect the MeerKAT and SKA developments. » Under Section 22(1) of the Act the Minister has the authority to protect the radio frequency spectrum for astronomy observations within a core or central astronomy advantage area. As such, the Minister may still under section 23(1) of the Act, declare that no person may undertake certain activities within a core or central astronomy advantage area. These activities include the construction, expansion or operation of any fixed radio frequency interference source, facilities for the generation, transmission or distribution of electricity, or any activity capable of causing radio frequency interference or which may detrimentally influence the astronomy and scientific endeavour.		
Provincial Policies / Legislation			

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; » The Act provides lists of protected species for the Province.	Northern Cape DAEARDLR	A collection/destruction permit must be obtained from Northern Cape DAEARDLR for the removal of any protected plant or animal species found on site. Should these species be confirmed within the development footprint during any phase of the project, permits will be required. A terrestrial ecology and freshwater Impact Assessment has been included as part of the EIA report as **Appendix G** to identify the presence of any listed species present on site which will require a permit.

7.10.1 Best Practice Guidelines Birds & Solar Energy (2017)

The Best Practice Guidelines Birds & Solar Energy (2017) proposed by the Birds and Renewable Energy Specialist Group (BARESG) (convened by BirdLife South Africa and the Endangered Wildlife Trust) contain guidelines for assessing and monitoring the impact of solar generation facilities on birds in Southern Africa. The guidelines recognise the impact that solar energy may have on birds, through for example the alteration of habitat, the displacement of populations from preferred habitat, and collision and burn mortality associated with elements of solar hardware and ancillary infrastructure; and the fact that the nature and implications of these effects are poorly understood.

The guidelines are aimed at Environmental Assessment Practitioners (EAPs), avifaunal specialists, developers and regulators and propose a tiered assessment process, including:

(i) Preliminary avifaunal assessment – an initial assessment of the likely avifauna in the area and possible impacts, preferably informed by a brief site visit and by collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary.
(ii) Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work (as specified by the preliminary assessment), intended to inform the avian impact study.
(iii) Impact assessment – a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring if this was deemed a requisite at preliminary assessment.
(iv) Monitoring – repetition of baseline data collection, plus the collection of mortality data. This helps to develop a complete before and after picture of impacts, and to determine if proposed mitigation measures are implemented and are effective or require further refinement. Monitoring may only be necessary for projects with the potential for significant negative impacts on birds (i.e. large area affected and / or vulnerable species present).

In terms of the guidelines the quantity and quality of baseline data required to inform the assessment process at each site should be set in terms of the size of the site and the predicted impacts of the solar technology in question, the anticipated sensitivity of the local avifauna (for example, the diversity and relative abundance of priority species present, proximity to important flyways, wetlands or other focal sites) and the amount of existing data available for the area.

Data collection could vary from a single, short field visit (Regime 1, for e.g. at a small or medium sized site with low avifaunal sensitivity), to a series of multi-day survey periods, including the collection of various forms of data describing avian abundance, distribution and movement and spread over 12 months (Regime 3, for e.g. at a large developments located in a sensitive habitat, or which otherwise may have significant impacts on avifauna). **Table 7.6** is taken from the best practise guidelines and provides a summary of the recommended assessment regimes in relation to proposed solar energy technology, project size, and likely risk).

Table 7.2: Recommended avian assessment regimes in relation to proposed solar energy technology, project size, and known impact risks.

Type of technology*	Size**	Avifaunal Sensitivity***		
		Low	Medium	High
All except CSP power tower	Small (< 30ha)	Regime 1	Regime 1	Regime 2
	Medium (30 – 150ha)	Regime 1	Regime 2	Regime 2
	Large (> 150ha)	Regime 2****	Regime 2	Regime 3
CSP power tower	All	Regime 3		

Regime 1: One site visit (peak season); minimum 1 – 5 days.
Regime 2: Pre- and post-construction; minimum 2 – 3 x 3 – 5 days over 6 months (including peak season); carcass searches.
Regime 3: Pre- and post-construction; minimum 4 – 5 x 4 – 8 days over 12 months, carcass searches.

* Different technologies may carry different intrinsic levels of risk, which should be taken into account in impact significance ratings

** For multi-phased projects, the aggregate footprint of all the phases should be used. At 3ha per MW, Small = < 10MW, Medium = 10 – 50MW, Large = > 50MW.

*** The avifaunal sensitivity is based on the number of priority species present, or potentially present, the regional, national or global importance of the affected area for these species (both individually and collectively), and the perceived susceptibility of these species (both individually and collectively) to the anticipated impacts of development. For example, an area would be considered to be of high avifaunal sensitivity if one or more of the following is found (or suspected to occur) within the broader impact zone:

1) Avifaunal habitat (e.g. a wetlands, nesting or roost sites) of regional or national significance.
2) A population of a priority species that is of regional or national significance.
3) A bird movement corridor that is of regional or national significance.
4) A protected area and / or Important Bird and Biodiversity Area.

An area would be considered to be of medium avifaunal sensitivity if it does not qualify as high avifaunal sensitivity, but one or more of the following is found (or suspected to occur) within the broader impact zone

1) Avifaunal habitat (e.g. a wetland, nesting or roost sites) of local significance.
2) A locally significant population of a priority species.
3) A locally significant bird movement corridor.

An area would be considered to be of low avifaunal sensitivity if it is does not meet any of the above criteria.

**** Regime 1 may be applied to some large sites, but only in instances where there is abundant existing data to support the assessment of low sensitivity.

Bird distribution patterns fluctuate widely in response to environmental conditions (e.g., local rainfall patterns, nomadism, migration patterns, seasonality), meaning that a composition noted at a particular moment in time will differ during another time period at the same locality. For this reason a regime 2 survey - i.e. 2 surveys over 6 months, has been used to inform both the development footprint as well the Avifauna Impact Assessment for the project.

7.10.2 The IFC Environmental Health and Safety (EHS) Guidelines

The IFC EHS Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). The following IFC EHS Guidelines have relevance to the proposed project:

» IFC EHS General Guidelines
» IFC Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants

The General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines, however no Industry Sector EHS Guidelines have been developed for PV solar power to date. The application of the General EHS Guidelines should be tailored to the hazards and risks associated with a project and should take into consideration site-specific variables which may be applicable, such as host country context, assimilative capacity of the environment, and other project factors. In instances where host country regulations differ from the standards presented in the EHS Guidelines, whichever is the more stringent of the two in this regard should be applied.

The General EHS Guidelines include consideration of the following:

- Environmental:
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety:
  - General Facility Design and Operation
  - Communication and Training
  - Physical Hazards
  - Chemical Hazards
  - Biological Hazards
  - Radiological Hazards
  - Personal Protective Equipment (PPE)
  - Special Hazard Environments
  - Monitoring
- Community Health and Safety:
  - Water Quality and Availability
  - Structural Safety of Project Infrastructure
  - Life and Fire Safety (L&FS)
  - Traffic Safety
  - Transport of Hazardous Materials
  - Disease Prevention
  - Emergency Preparedness and Response
- Construction and Decommissioning:
  - Environment
  - Occupational Health & Safety
  - Community Health & Safety

7.10.3 IFC's Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (2015)

While no Industry Sector EHS Guidelines have been developed for PV Solar Power, the IFC has published a Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015). Chapter 8 of the Project Developer's Guide pertains to Permits, Licensing and Environmental Considerations, and states that in order to deliver a project which will be acceptable to international lending institutions, environmental and social assessments should be carried out in accordance with the requirements of the key international standards and principles, namely the Equator Principles and IFC's Performance Standards (IFC PS).

Some of the key environmental considerations for solar PV power plants contained within the Project Developer's Guide include:

- Construction phase impacts (i.e. OHS, temporary air emissions from dust and vehicle emissions, noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation).
- Water usage (i.e. the cumulative water use requirements).
- Land matters (i.e. land acquisition procedures and the avoidance or proper mitigation of involuntary land acquisition / resettlement).
- Landscape and visual impacts (i.e. the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities).
- Ecology and natural resources (i.e. habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species).
- Cultural heritage (i.e. impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction).
- Transport and access (i.e. impacts of transportation of materials and personnel).
- Drainage / flooding (i.e. flood risk associated with the site).
- Consultation and disclosure (i.e. consulting with key authorities, statutory bodies, affected communities and other relevant stakeholders as early as possible).
- Environmental and Social Management Plan (ESMP) (i.e. compile an ESMP to ensure that mitigation measures for relevant impacts are identified and incorporated into project construction procedures and contracts).

CHAPTER 8: DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section of the EIA Report provides a description of the local environment. This information is provided in order to assist the reader in understanding the pre-construction conditions of the environment within which the proposed project is proposed. Aspects of the biophysical, social, and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data undertaken by specialist consultants and aims to provide the context within which this S&EIA process is being conducted.

8.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment

This chapter includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(g)(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	» The environmental attributes associated with the development of the Limestone PV1 Solar Energy Facility are included as a whole within this chapter. The environmental attributes that are assessed within this chapter include the following: » The regional setting of the broader study area and the project site indicates the geographical aspects associated with the Limestone PV1 Solar Energy Facility. This is included in **Section 8.2**. » The climatic conditions present within the broader study area have been included in **Section 8.3**. » The biophysical characteristics of the project site and the surrounding areas are included in **Section 8.4**. The characteristics considered are topography and terrain, geology, soils and agricultural potential and the ecological profile which includes the vegetation patterns, listed plant species, critical biodiversity areas and broad-scale processes, freshwater resources, terrestrial fauna, and avifauna. » The heritage and cultural aspects (including archaeology and palaeontology) have been included in **Section 8.5**. » The visual quality of the surrounding area and the project site has been considered in **Section 8.6**. » The socio-economic characteristics associated with the broader study area and the project site have been included in **Section 8.7**

A more detailed description of each aspect of the affected environment is included within the specialist Scoping Reports contained within **Appendices G – L**.

8.2. Regional Setting

The Limestone PV1 Solar Energy Facility is located ~16km south-east of the town of Danielskuil and 10km east of Lime Acres in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The Northern Cape Province, within which the project site is located, is situated in the north-western corner of South Africa and has a land area of 372,889 km^2, therefore occupying approximately 30% of South Africa's land area and making it the largest province in South Africa with the smallest population. The Northern Cape Province is known for its mining and agricultural sectors. The Northern Cape Province comprises of five district municipalities, namely, Frances Baard, John Taolo Gaetsewe, Namakwa, Pixley Ka Seme and ZF Mgcawu (refer **to Figure 8.1**) – which contain twenty six (26) local municipalities collectively, with the project site being located within the ZF Mgcawu District Municipality and Kgatelopele Local Municipality.

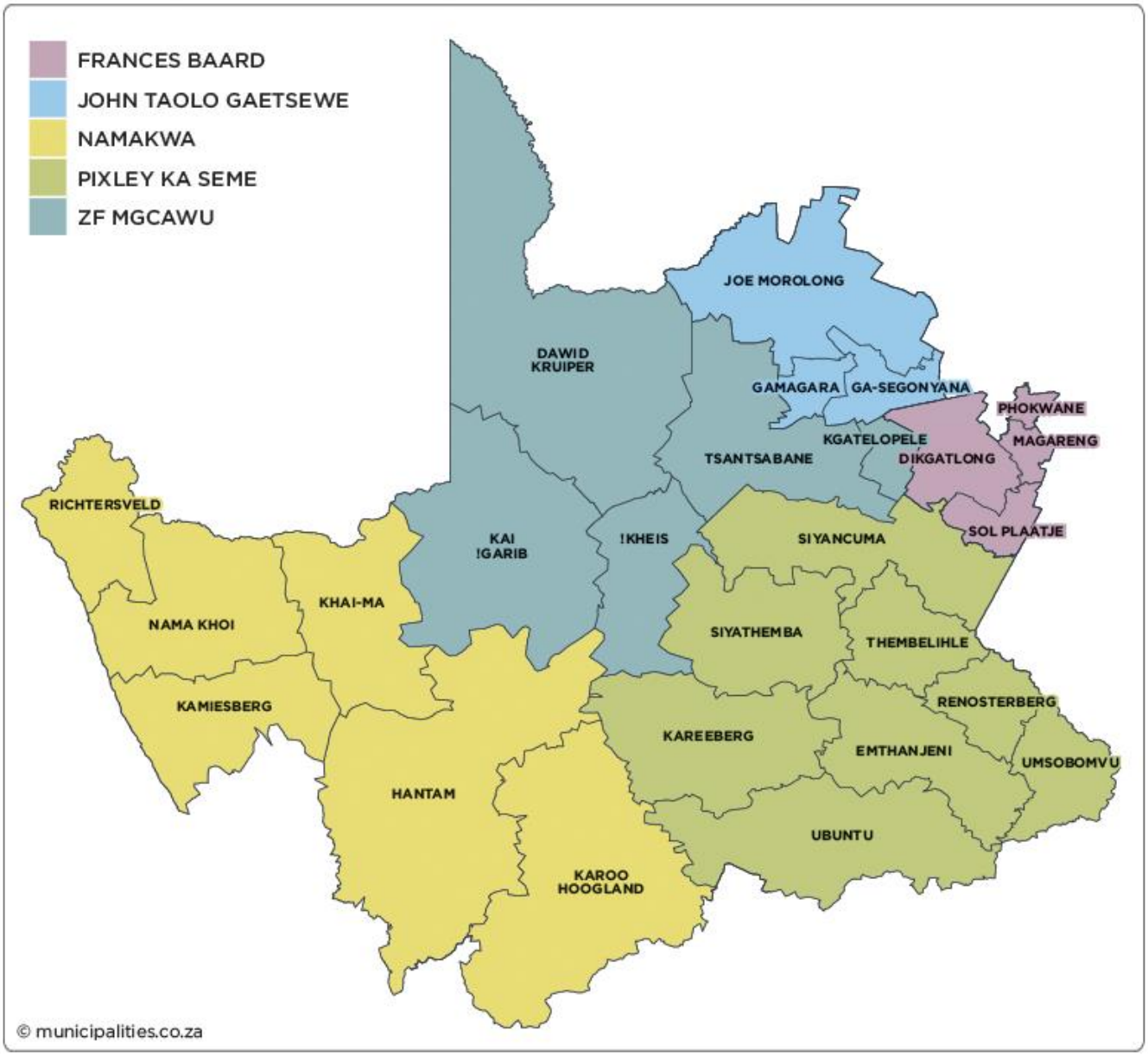


Figure 8.1: District municipalities of the Northern Cape Province (Source: Municipalities of South Africa)

The ZF Mgcawu District Municipality is a Category C municipality bordered by Botswana in the north and Namibia in the west, John Taolo Gaesewe, Frances Baard to the east and Pixley Ka Seme and Namakwa to the south. The district makes up just under a third of the province's geographical area, which mainly comprise of the vast Kalahari Desert, Kgalagadi Transfrontier Park and the former Bushmanland.

The ZF Mgcawu District Municipality comprises five local municipalities, namely, !Kheis, Dawid Kruiper, Kai !Garib, Tsantsabane and Kgatelopele (refer to **Figure 8.2**). According to Stats SA (2016 Community Survey), ZF Mgcawu's population increased from 236 783 in 2011 to 252 692 people in 2016. The economy of the ZF Mgcawu District Municipality is driven by agriculture, mining, tourism and manufacturing.

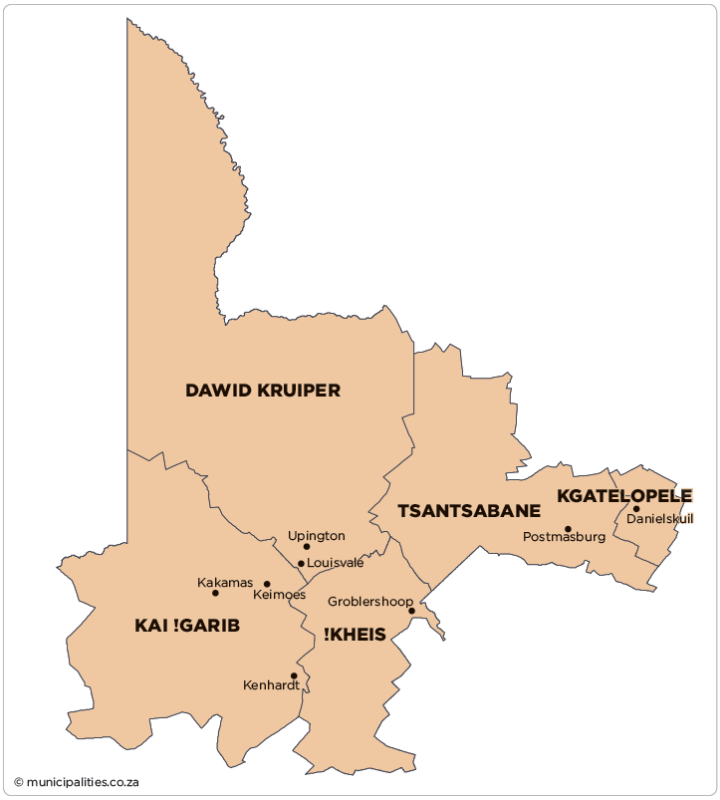


Figure 8.2: Local municipalities of the ZF Mgcawu District Municipality (Source: Municipalities of South Africa

The Kgatelopele Local Municipality covers an area of 2 478km² and is named for the Setswana name for "progress". The municipality has a population of 18 687 people according to Stats SA with the largest towns in the area being those of Danielskuil and Lime Acres. Kgatelopele Local Municipality is bordered by the John Taolo Gaetsewe District in the north, the Pixley ka Seme District in the south, the Frances Baard District in the east, and Tsantsabane in the west. It is the smallest of the five municipalities that make up the district, accounting for only 2% of its geographical area. Primary economic sectors in the municipality include mining, agriculture, manufacturing, business services.

8.3. Climatic Conditions

The region within which the project site is located is characterised as having a semi-arid climate. The area has a mean annual precipitation of 246mm with the majority of rainfall occurring during summer. The region is also characterised by high and low extreme temperatures during the summer and winter (refer to **Figure 8.3**).

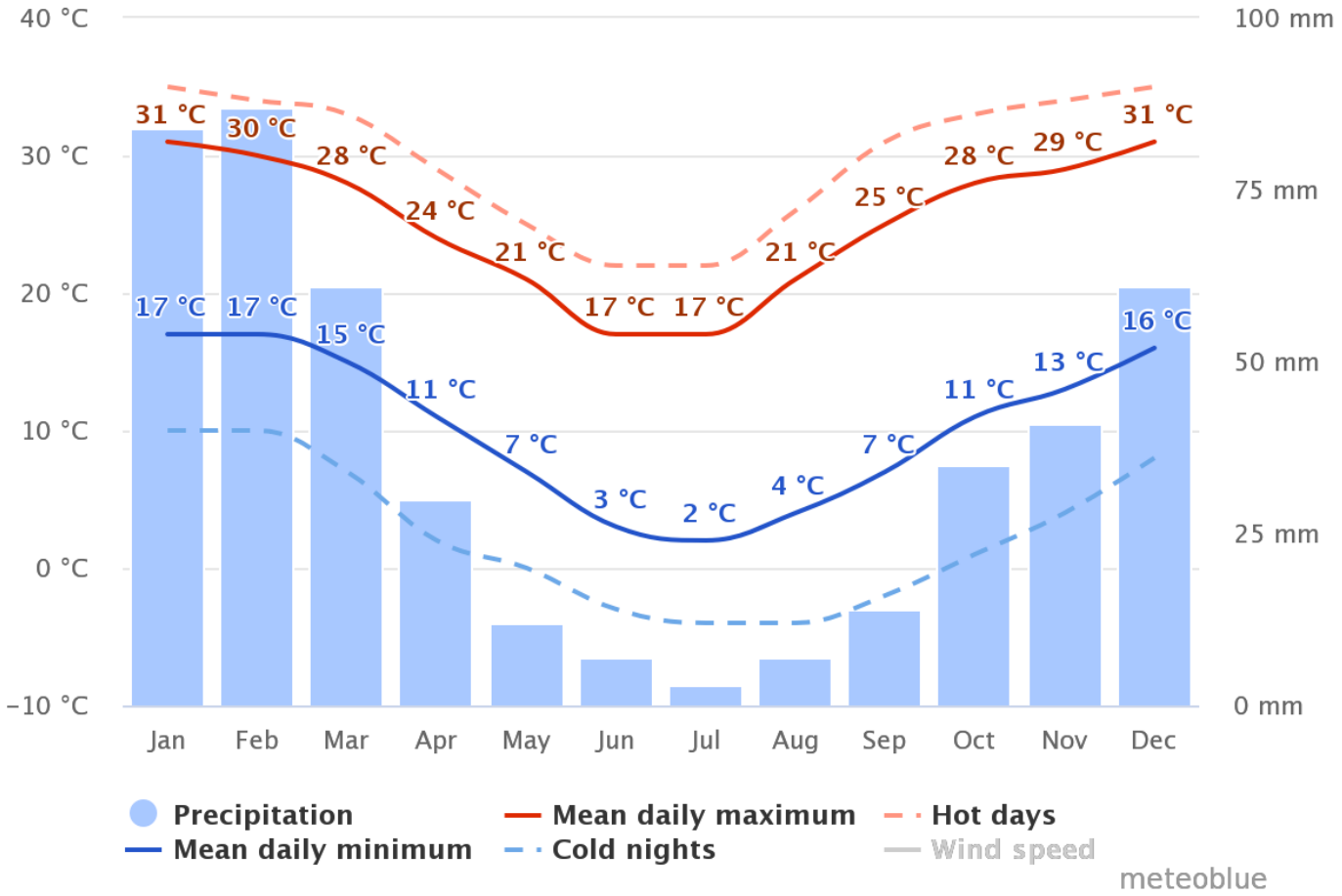


Figure 8.3: Climatic graph for the broader region within which the proposed project site is located (Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/dani%C3%ABlskuil_south-africa_1011918)

8.4. Biophysical Characteristics of the Project Site

The following section provides an overview and description of the biophysical characteristics of the study area and has been informed by specialist studies (**Appendices G – L**) undertaken for this EIA Report.

8.4.1 Topographical profile

The Project site occurs on land that ranges in elevation from approximately 1424m above sea level in the Great Pan and Rooipan in the west to 1454 metres above sea level (MASL) on the site itself and areas to the north and south west. The terrain surrounding the proposed property is generally flat. Most of the regulated area is characterised by a gentle slope percentage between 0 to 10% with some few irregularities in areas with slopes reaching 20%. This illustration indicates a more uniform topography with occurrence of some few steep sloping areas being present. The Digital Elevation Model (DEM) of the project area indicates an elevation of 1 435 to 1 500 MASL (Refer to **Figure 8.4**).

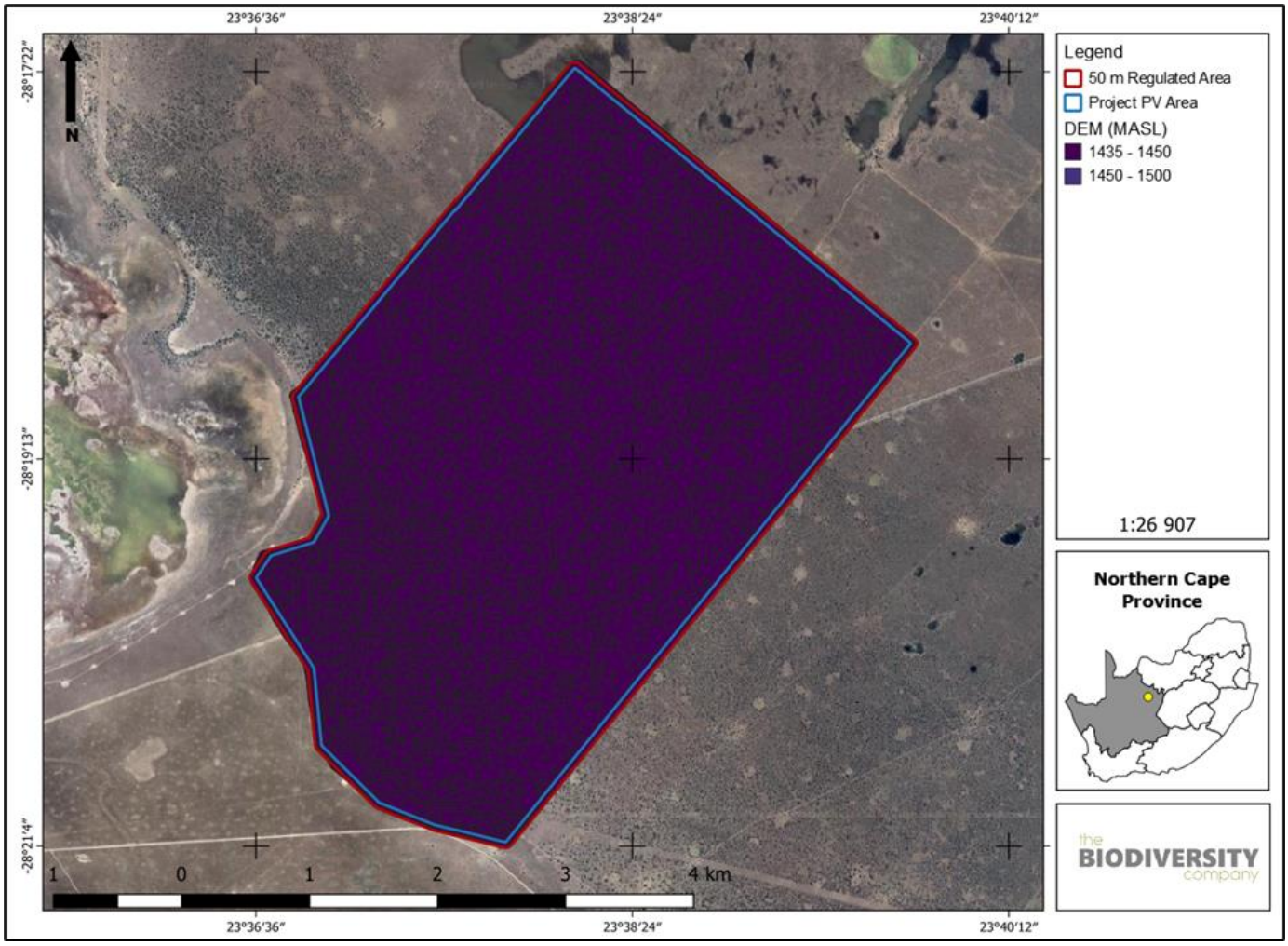


Figure 8.4: Digital Elevation Model map of the project site within which the Limestone PV1 Solar Energy Facility is proposed.

8.4.2 Geology, Soils and Agricultural Potential

Geological Setting

The proposed Limestone PV1 project site is mostly underlain by sediments of the Ongeluk Formation, Danielskuil Member, Kuruman Member of the Asbesberge Formation, Lime Acres Member of the Ghaap Plateau and Surface Limestone Quaternary Sands. The geology of the project site is indicated in **Figure 8.5**.

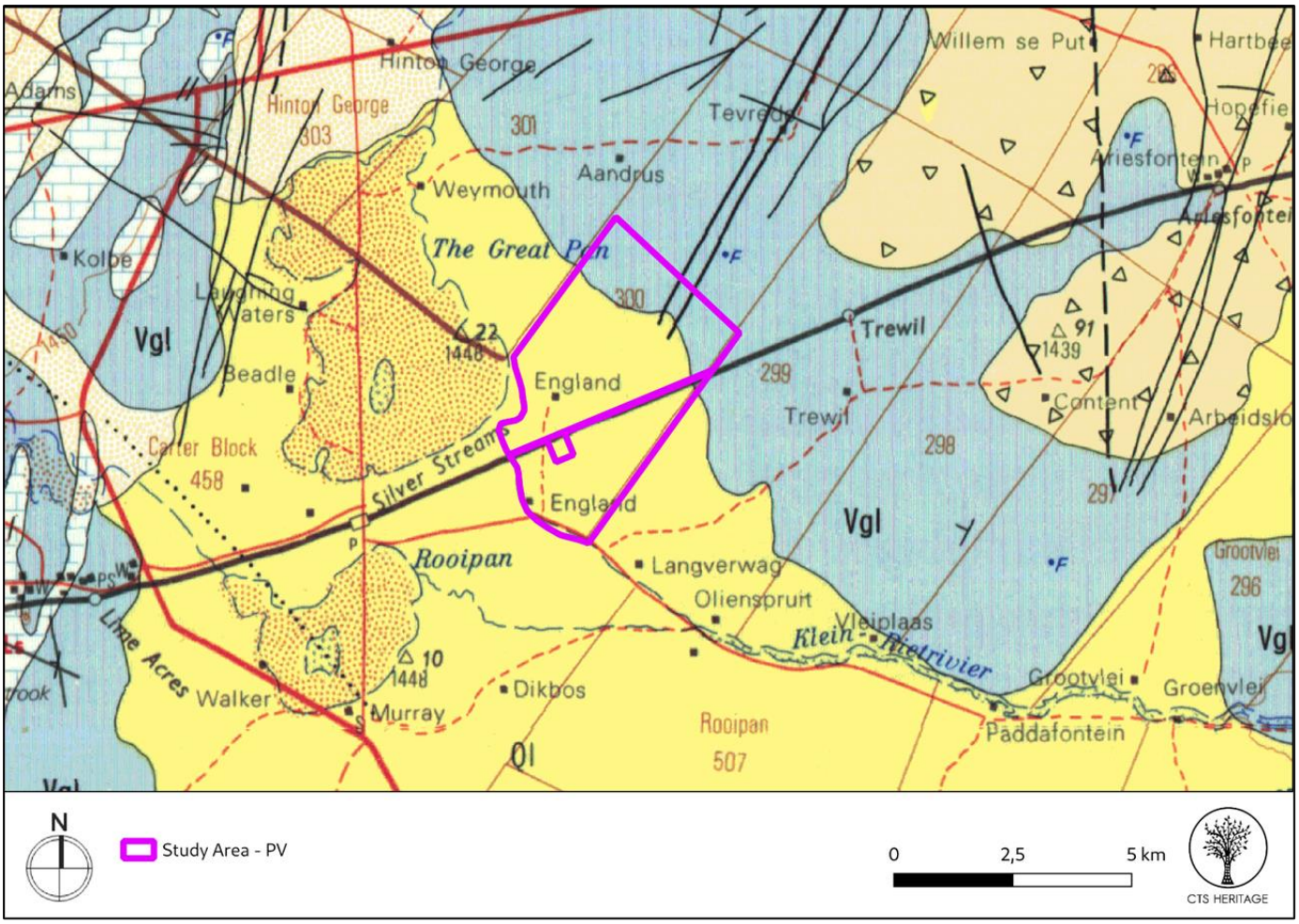


Figure 8.5: Extract from the CGS 2822 Postmasburg Map indicating the geological setting of the project site

Land Type, Soil Forms and Land Capability

According to the land type database (Land Type Survey Staff, 1972 - 2006) the proposed project site falls within the Fc 04 land type. The Fc 04 land type mostly consists of bare rocks and Mispah soil forms following the South African soil classification working group (1990) with the possibility of other soils occurring throughout the landscapes. The area is also characterised with the Glenrosa soil form and shallow soils. Lime is absent in the entire terrain landscape.

The most sensitive soil forms identified within the assessment area are the Etosha and Vaalbos soil forms, with other associated soils also occurring. The Etosha soil form has an orthic topsoil with a neocutanic subsurface horizon underlain by a soft carbonate horizon. The Vaalbos soil form consists of an orthic topsoil horizon on top of a red apedal horizon merging into a hard rock substratum below

The land capability of the above-mentioned soils has been determined to have land capability classes of "III" and "IV" with a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capability and climate capability results in land potential "L6". The "L6" land potential level is characterised by a very restricted potential. Regular and/or severe limitations occur due to soil, slope, temperatures or rainfall. These areas are non-arable. The "L6" land potential of the assessment area is characterized with an overall "Low" sensitivity following the baseline findings (refer to **Figure 8.6**).

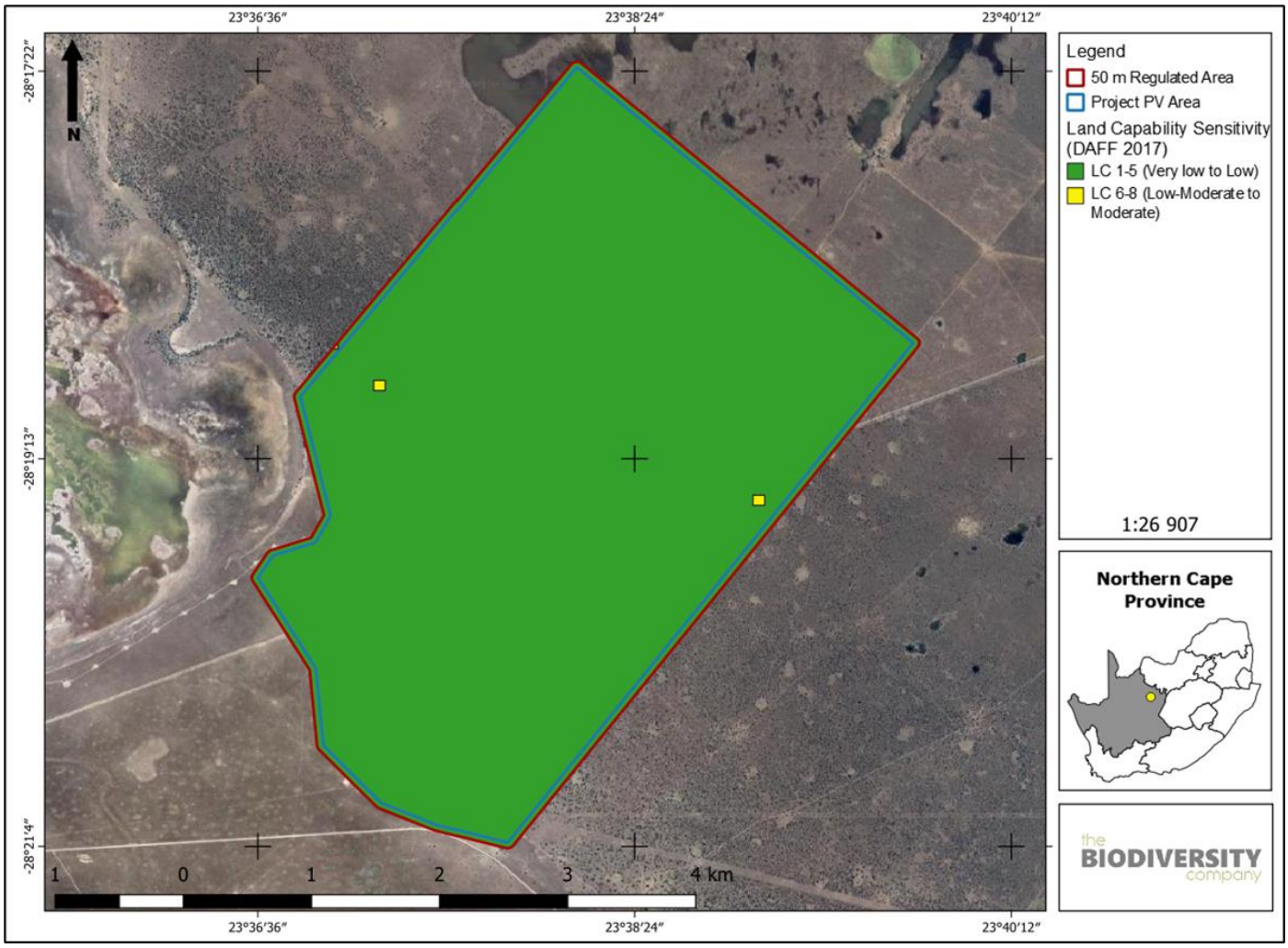


Figure 8.6: Land capacity present within the Limestone PV1 project site

8.4.3 Land Use

Land uses within the surrounding areas includes limestone mining, watercourses, livestock, and game farming activities. Historically, grazing from livestock and mismanagement has led to (limited) deterioration of the area.

The project site consists of natural grassland, low shrubland and open woodland. There are two Eskom substations (Olien and Trewill) and a homestead located within the project site. Power lines and a road traverse the site.

8.4.4 Ecological Profile of the Broader Study Area and the Project Site

i. Broad-Scale Vegetation Patterns

The study area is situated within the savanna biome. The savanna vegetation of South Africa represents the southern-most extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Most savanna vegetation communities are characterised by a herbaceous layer dominated by

grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006). Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family and a generally dense herbaceous layer (Scholes & Walker, 1993).

On a fine-scale vegetation type, the study area overlaps with two vegetation types: the Ghaap Plateau Vaalbosveld and the Southern Kalahari Mekgacha (Refer to **Figure 8.7**).

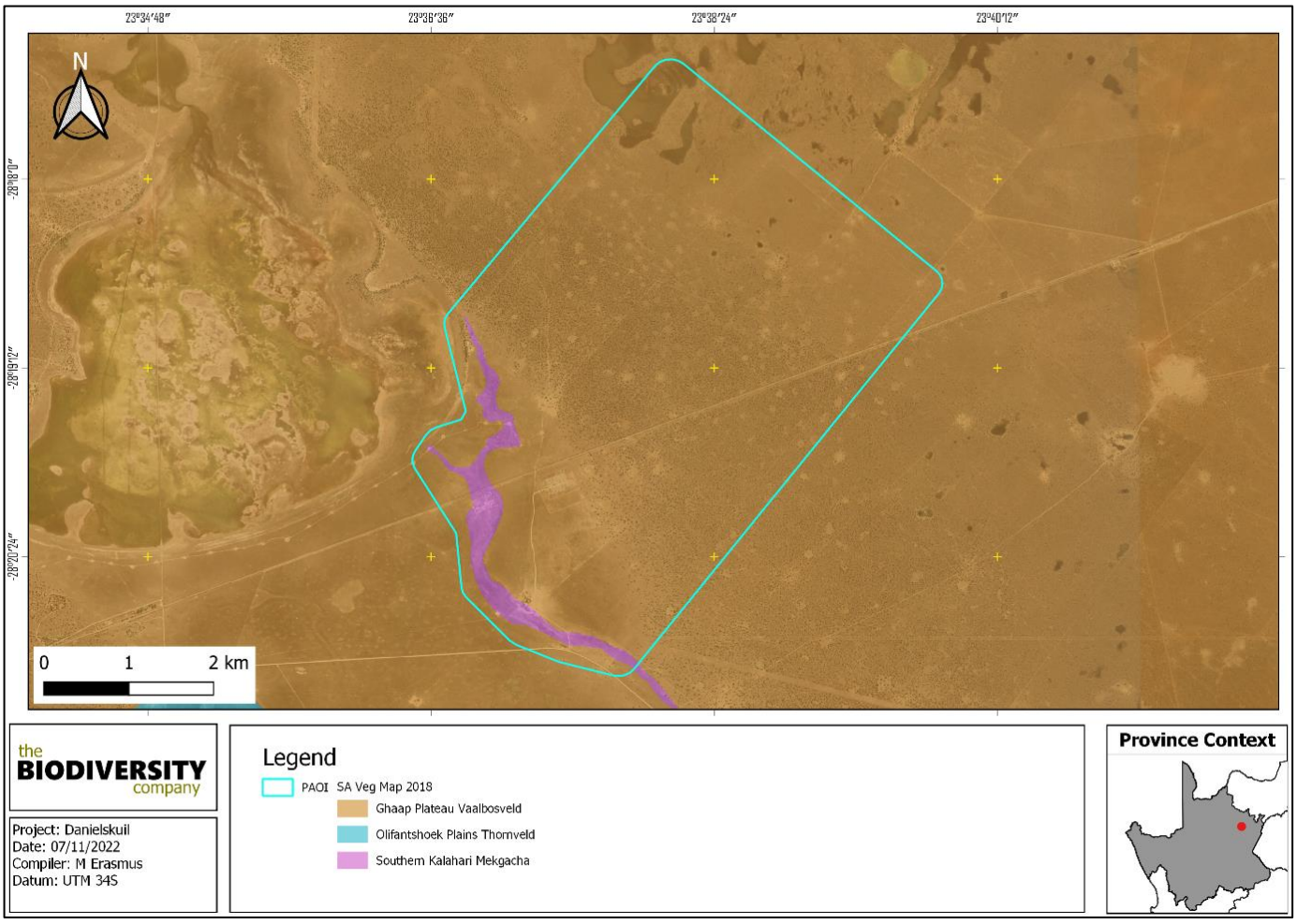


Figure 8.7: National vegetation map of the project site showing the vegetation types that comprise the Limestone PV1 project site.

Ghaap Plateau Vaalbosveld

The vegetation type is known for flat plateau areas with a well-developed shrub layer with *Tarchonanthus camphoratus* and *Vachellia karroo*. Areas may exhibit an open tree layer with *Olea europaea subsp. africana*, V. *tortilis, Ziziphus mucronata* and *Searsia lancea*. The presence of Olea is more important in the southern parts of the unit, while V. *tortilis, V. hebeclada* as well as *Senegalia mellifera* are more important in the north and part of the west of the unit. The south-central part of this unit has remarkably low cover of Thorn tree species for an arid savanna and is dominated by the non-thorny T. *camphoratus, s. lancea* and *O. europaea subsp. africana* (Mucina and Rutherford,2006).

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant); or are prominent in the landscape within a particular vegetation type. They note the following species are important taxa in the Ghaap Plateau Vaalbosveld vegetation type:

Table 8.1: Important Plant Taxa found within the Ghaap Plateau Vaalbosveld vegetation type

IMPORTANT SPECIES	
Growth Form	**Key Species**
Trees	*Vachellia erioloba.*
Small Trees	*Senegalia mellifera subsp. detinens, Searsia lancea, Vachellia karroo, V. tortilis subsp. heteracantha, Boscia albitrunca.*
Tall Shrubs	*Olea europaea subsp. cuspidata, Rhigozum trichotomum, Tarchonanthus camphoratus, Ziziphus mucronata, Diospyros austro-africana, D. pallens, Ehretia rigida subsp. rigida, Euclea crispa subsp. ovata, Grewia flava, Gymnosporia buxifolia, Lessertia frutescens, Searsia tridactyla.*
Low Shrubs	*Vachellia hebeclada subsp. hebeclada, Aptosimum procumbens, Chrysocoma ciliata, Helichrysum zeyheri, Hermannia comosa, Lantana rugosa, Leucas capensis, Melolobium microphyllum, Peliostomum leucorrhizum, Pentzia globosa, P. viridis, Zygophyllum pubescens*
Succulent Shrubs	*Hertia pallens, Lycium cinereum.*
Semi parasitic Shrub	*Thesium hystrix*
Woody Climber	*Asparagus africanus*
Graminoids	*Anthephora pubescens, Cenchrus ciliaris, Digitaria eriantha subsp. eriantha, Enneapogon scoparius, Eragrostis lehmanniana, Schmidtia pappophoroides, Themeda triandra, Aristida adscensionis, A. congesta, A. diffusa, Cymbopogon pospischilii, Enneapogon cenchroides, E. desvauxii, Eragrostis echinochloidea, E. obtusa, E. rigidior, E. superba, Fingerhuthia africana, Heteropogon contortus, Sporobolus fimbriatus, Stipagrostis uniplumis, Tragus racemosus.*
Herbs	*Barleria macrostegia, Geigeria filifolia, G. ornativa, Gisekia africana, Helichrysum cerastioides, Heliotropium ciliatum, Hermbstaedtia odorata, Hibiscus marlothianus, H. pusillus, Jamesbrittenia aurantiaca, Limeum fenestratum, Lippia scaberrima, Selago densiflora, Vahlia capensis subsp. vulgaris.*
Succulent Herb	*Aloe grandidentata.*

Southern Kalahari Mekgacha

Sparse, patchy grasslands, sedgelands and low herblands dominated by C4 grasses on the bottom of (mostly) dry riverbeds. Low shrublands in places with patches of taller shrubland on the banks of the rivers.

Based on Mucina and Rutherford's (2006) vegetation classification, important plant taxa are those species that have a high abundance, a frequent occurrence (not being particularly abundant); or are prominent in the landscape within a particular vegetation type. They note the following species are important taxa in the Southern Kalahari Mekgacha vegetation type:

Table 8.2: Important Plant Taxa found within the dry river-bottoms that make up the Southern Kalahari Mekgacha vegetation type

IMPORTANT SPECIES	
Growth Form	**Key Species**
Tall Shrubs	*Lebeckia linearifolia, Sisyndite spartea, Deverra denudata subsp. aphylla.*
Herbs	*Amaranthus dinteri subsp. dinteri, A. praetermissus, A. schinzianus, Boerhavia repens, Chamaesyce inaequilatera, Cucumis africanus, Geigeria ornativa, G. pectidea, Heliotropium lineare, Indigofera alternans, I. argyroides, Kohautia cynanchica, Lotononis platycarpa, Osteospermum muricatum, Platycarpha carlinoides, Radyera urens, Stachys spathulata, Tribulus terrestris.*
Succulent Herb	*Zygophyllum simplex. Graminoids: Cenchrus ciliaris, Chloris virgata, Enneapogon desvauxii, Eragrostis annulata, E. bicolor, Odyssea paucinervis, Panicum coloratum, Eragrostis porosa, Panicum impeditum, Sporobolus nervosus.*

Table 8.3: Important Plant Taxa found within the rocky slopes of river canals that make up the Southern Kalahari Mekgacha vegetation type

IMPORTANT SPECIES	
Growth Form	**Key Species**
Tall Trees	*Vachellia erioloba.*
Low Shrubs	*Aptosimum lineare, Pechuel-Loeschea leubnitziae*.
Graminoids	*Setaria verticillata, Enneapogon scaber, Oropetium capense, Stipagrostis uniplumis, Tragus racemosus.*
Herbs	*Dicoma capensis.*

ii. Ecosystem Threat Status of the Broad-Scale Vegetation Types

On the basis of a scientific approach used at national level by the South African National Biodiversity Institute (SANBI), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. The Ecosystem Threat Status is therefore an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the proposed project site overlaps with a LC ecosystem (Refer to **Figure 8.8**)

The Ghaap Plateau Vaalbosveld vegetation type is considered to be Least Threatened. The vegetation type has a conservation target of 16%. None of the vegetation type is conserved in statutory conservation areas. Only about 1% has already been transformed with very low erosion. (Mucina & Rutherford, 2006).

The Southern Kalahari Mekgacha is considered to be Least Threatened. This vegetation type is 18% statutorily conserved in the Kgalagadi Transfrontier Park and Molopo Nature Reserve. About 2% has been transformed by road building. The Southern Kalahari Mekgacha vegetation type are under strong utilisation pressure by domestic animals (grazing, browsing and animal penning. Invasive *Prosopis* species have encroached in certain areas (Mucina & Rutherford, 2006).

Figure 8.8: Ecosystem threat status map of the Limestone PV1 project site.

iii. Listed Plant Species and Plants Protected in terms of the National Environmental Management: Biodiversity Act and the Northern Cape Nature Conservation Act

A list was obtained from the SANBI database (POSA — Plants of Southern Africa) which indicates that 470 species of indigenous plants are expected to occur within the study area. No SCC, based on their conservation status, are expected to occur within the study area, not including potential protected tree species.

Field surveys for the area were undertaken from the 31st of October to the 3rd of November 2022 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). Effort was made to cover all the different habitat types, within the limits of time and access. A total of 55 tree, shrub and herbaceous plant species were recorded in the project site during the field assessment. Notably, this is not a complete list of indigenous flora recorded within the survey area, but floristic analysis conducted to date is regarded as a sound representation of the local flora for the project site. Two provincially protected trees were found within the project area:

- *Prepodesma orpenii*
- *Olea europaea* subsp. *cuspidata*

Four Invasive and Alien Plant (IAP) species were recorded within the project site (*Schkuhria pinnata*; *Datura ferox; Pennisetum clandestinum* and *Polypogon monspeliensis*). Two of these species (*Datura ferox* and

Pennisetum clandestinum) are listed under the Alien and Invasive Species List 2020, Government Gazette No. GN1003 as Category 1b. These IAP species must be controlled by implementing an IAP Management Programme, in compliance of Section 75 of the National Environmental Management: Biodiversity Act (NEMBA).

iv. Terrestrial Fauna Communities within the Study Area

Mammals

The International Union for Conservation of Nature (IUCN) Red List Spatial Data lists 64 mammal species that could be expected to occur within the area. This list excludes large mammal species that are limited to protected areas. Six (6) of these expected species are regarded as threatened. All but one of these have a low likelihood of occurrence based on the lack of suitable habitat (refer to **Table 8.8**).

Smutsia temminckii (Temminck's Pangolin) inhabits mainly savannas and woodlands in low-lying regions with moderate to dense scrub where average annual rainfall is between 250 mm and 1 400 mm. It also occurs in floodplain grassland, rocky slopes and sandveld up to 1 700 m above sea level. The population in South Africa is estimated to be between 16 329–24 102 mature individuals (Pietersen *et al*, 2019). In the Northern Cape Province, densities have been calculated at 0.16 reproductively active individuals/km² and overall densities at 0.23 individuals/km². The species' is over-exploited for medicinal use and is increasingly focused on core conservation areas. There has been a sharp increase in the number of individuals that have been seized from illegal trade since 2010. Changes in farming practices are directly impacting the species through habitat loss and alteration, while the increased human presence in these previously undisturbed areas is resulting in increased levels of poaching. Nomadic grazing is also having a negative impact across their range due to increased levels of poaching. Additional threats include fences (electrified and not), mining and roadkills.

Table 8.4: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI)	IUCN	
Felis nigripes	Black-footed Cat	VU	VU	Low
Panthera pardus pardus	African Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low
Smutsia temminckii	Temminck's Pangolin	VU	VU	Moderate
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Eidolon helvum	Straw-coloured Fruit Bat	NT	NT	Low

Field surveys for the area were undertaken from the 31st of October to the 3rd of November 2022 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). Seven (7) mammal species were observed. *Suricata suricatta* (Suricate) and *Geosciurus inauris* (South African Ground Squirrel) are ecosystem engineers within the region. The former species is also regarded as a keystone species within the Nama Karoo biome. The burrows they create are also utilised as shelter by an array of faunal species, which is pertinent in the climatically variable and semi-arid environment of the study area and surrounding landscape:

- Common Mole-rat (*Cryptomys hottentotus*)
- Common duiker (*Sylvicapra grimmia*)
- Black-backed jackal (*Lupulella mesomelas*)
- Yellow mongoose (*Cynictis penicillata*)
- Suricate (*Suricata suricatta*)
- Scrub Hare (*Lepus capensis*)
- Cape ground squirrel (*Geosciurus inauris*)

Amphibians

Based on the IUCN Red List Spatial Data and Amphibian Map, 11 amphibian species are expected to occur within the area. One of these species is threatened.

Table 8.5: List of Amphibian species of conservation concern that may occur in the project area as well as their global and regional conservation statuses

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI)	IUCN	
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Moderate

The Giant Bull Frog (*Pyxicephalus adspersus*) is listed as LC on a global scale (IUCN SSC Amphibian Specialist Group, 2013), but NT on a regional scale (Minter *et al*, 2004). The species is widely distributed in arid sub-saharan Africa, mainly at higher elevations. Within South Africa, it occurs in the north-eastern part of the Western Cape, central and southern Eastern Cape, northern, central and eastern parts of Northern Cape, northern KwaZulu-Natal (except the low-lying parts), Free State, North West, Gauteng and Limpopo provinces, and at only a few localities in Mpumalanga Province. It typically breeds in seasonal, shallow, grassy pans in flat, open areas but also utilises non-permanent vleis and shallow water on the margins of waterholes and dams. Although they sometimes inhabit clay soils, they prefer sandy substrates. Habitat loss due to crop agriculture and urbanisation is a major threat to this species. Due to the presence of suitable habitat, the likelihood of occurrence of this species on the site is rated a moderate.

Field surveys for the area were undertaken from the 31st of October to the 3rd of November 2022 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). One (1) species of amphibian (Boettger's dainty frog - *Cacosternum boettgeri*) was recorded within the project site during the survey period. However, there is the possibility of more species being present, as certain species are secretive and require long-term surveys to ensure capture. The species recorded is regarded as threatened.

Reptiles

Based on the IUCN Red List Spatial Data and the Reptile Map database, 35 reptile species are expected to occur within the area. None of these species are of conservation concern.

Field surveys for the area were undertaken from the 31st of October to the 3rd of November 2022 (summer), which is a wet-season survey, to determine the presence of Species of Conservation Concern (SCC). Five (5) species of reptile were recorded within the project site during the survey period. However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term

surveys to ensure capture. None of the species recorded are regarded as threatened. Species found include:

» Common Ground Agama (*Agama aculeata aculeata*)
» Cape Gecko (*Pachydactylus capensis*)
» Leopard Tortoise (*Stigmochelys pardalis*)
» Wahlberg's Snake-eyed Skink (*Panaspis wahlbergii*)
» Cape Skink (*Trachylepis capensis*)

v. Ecosystem protection level

The ecosystem protection level is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The project site overlaps mainly with a MP ecosystem, with a small portion being NP (Refer to **Figure 8.9**).

Figure 8.9: Map illustrating the ecosystem protection level associated with the Limestone PV1 project site

vi. Critical Biodiversity Areas (CBA)

According to the CBA map in **Figure 8.10**, the majority of the project site overlaps with areas classified as CBA; most of the area being CBA2. CBAs are areas that must be maintained in a good ecological condition (natural or near-natural state) in order to meet biodiversity targets. CBAs collectively meet biodiversity targets for all ecosystem types as well as for species and ecological processes that depend on natural or near-natural habitat, that have not already been met in the protected area network (SANBI, 2016).

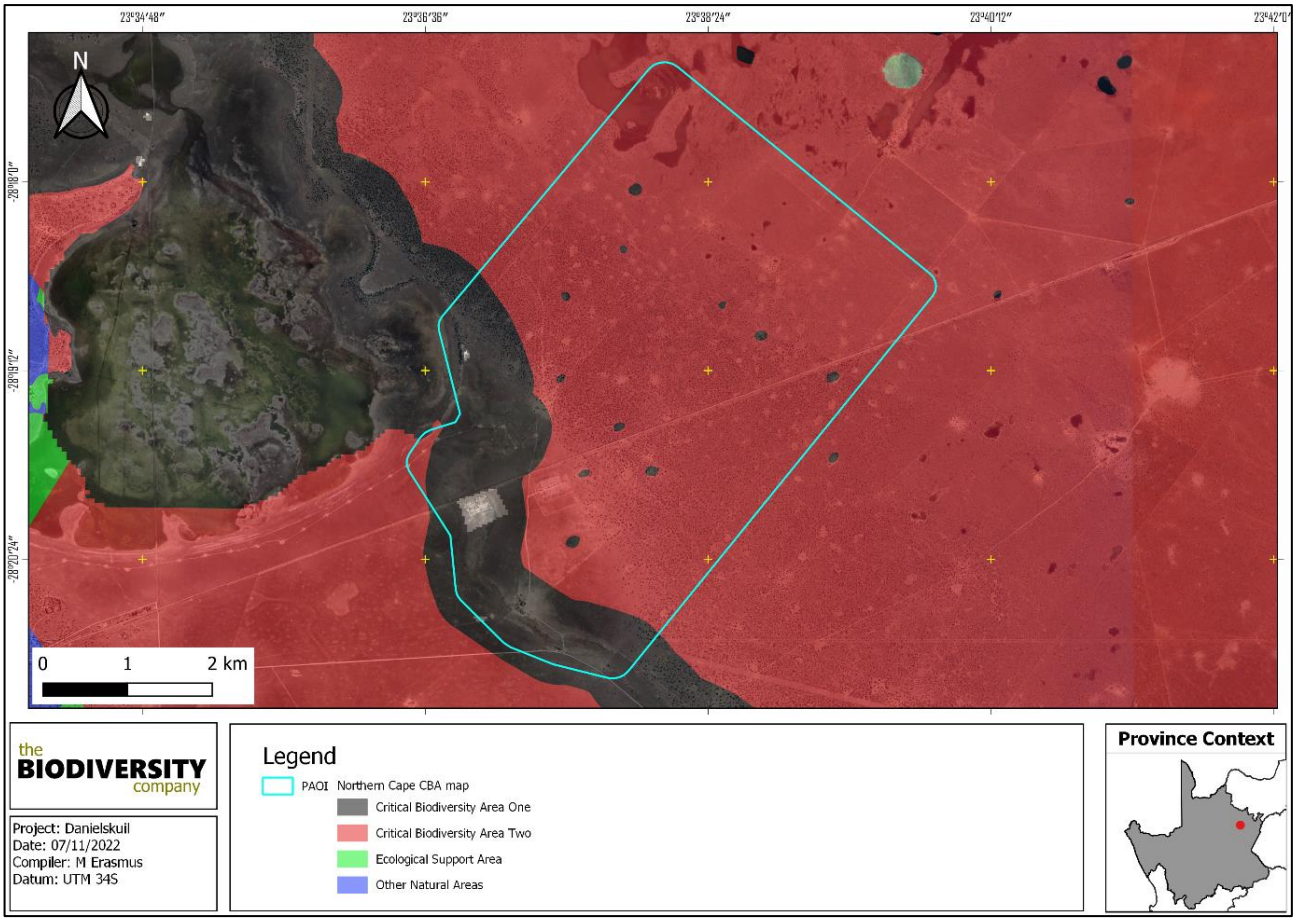


Figure 8.10: Provincially identified terrestrial conservation priority areas found within the project site

vii. National Protected Areas Expansion Strategy, Protected Areas, and Conservation Areas

Land-based protected area expansion targets include large, intact, and unfragmented areas of high importance for biodiversity representation and ecological persistence, which are suitable for the creation or expansion of large, protected areas. Such areas were identified through a systematic biodiversity planning process undertaken as part of the development of the National Protected Area Expansion Strategy 2008 (NPAES). They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with a strong emphasis on climate change resilience and requirements for protecting terrestrial and freshwater ecosystems (FEPA: Freshwater Ecosystem Priority Areas). These areas should not be seen as future boundaries of protected areas, since in many cases only a portion of a particular focus area would be required to meet the protected area targets set in NPAES. They are also not a replacement for fine-scale planning, which may identify a range of different priority sites based on local requirements, constraints, and opportunities.

The site is not located within any NPAES focus areas or any Formal-/Informal Protected Areas. The nearest NPAES focus area is located approximately 2.2 km north-west from the project site (Eastern Kalahari Bushveld), while the nearest Formal Protected Area is located approximately 29km south of the site (Rockwood Nature Reserve).

viii. Strategic Water Source Areas and National Freshwater Ecosystem Priority Areas

Strategic Water Source Areas (SWSAs) are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing. The project site is more than 100 km from the closest surface water SWSA but does fall within the Southern Ghaap Plateau groundwater SWSA.

The National Freshwater Ecosystem Priority Area (NFEPA) database provides strategic spatial priorities for conserving the country's freshwater ecosystems and associated biodiversity as well as supporting sustainable use of water resources. A NFEPA coverage for the project site (refer to **Figure 8.11**) revealed that the project site overlaps with several true NFEPA wetlands, as well as a FEPA River (NBA CR River), classed as Freshwater Ecosystem Priority Area.

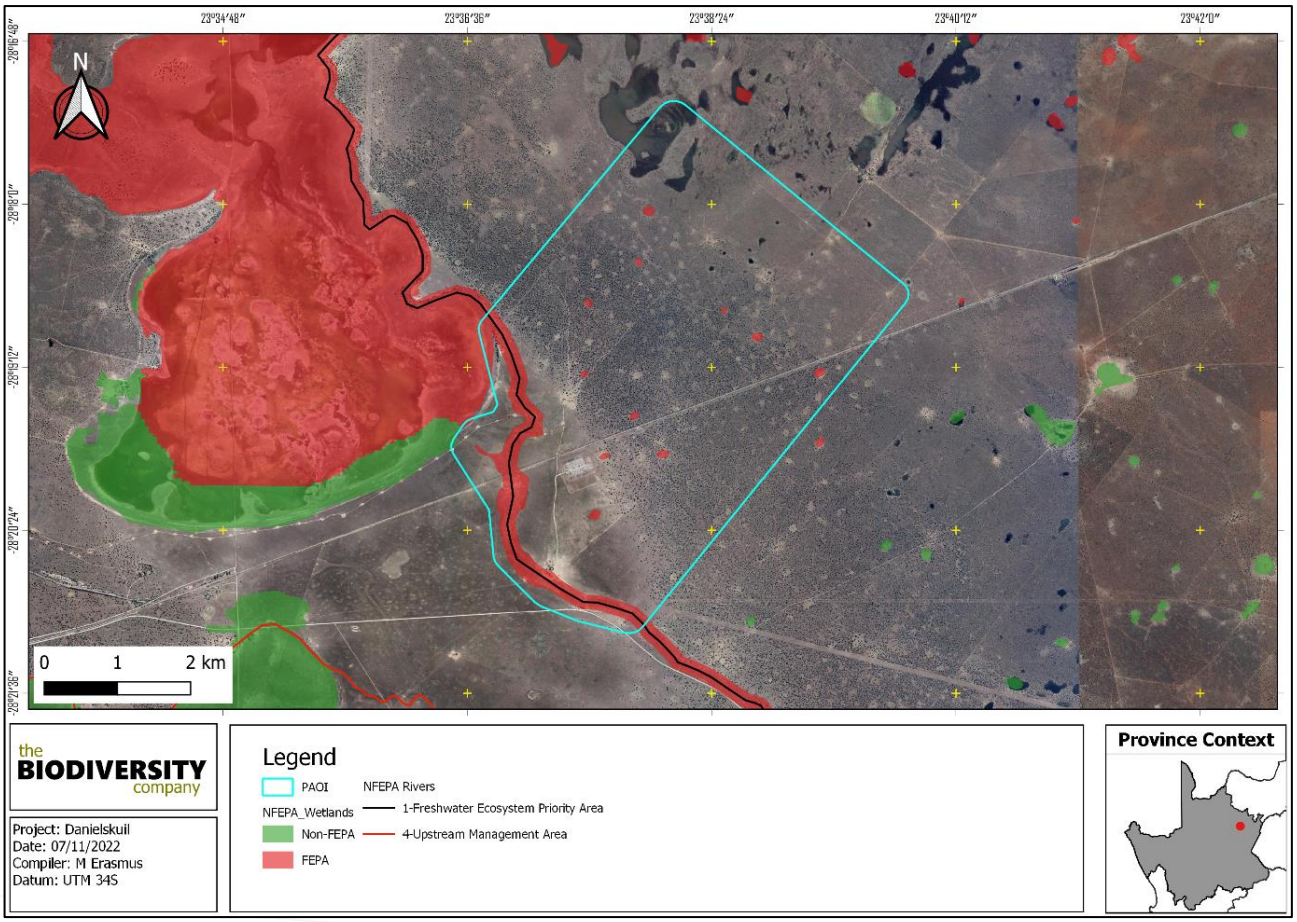


Figure 8.11: The project site in relation to the National Freshwater Ecosystem Priority Areas

ix. Avifauna

Important Bird and Biodiversity Areas (IBA)

The proposed development is not located within an IBA. The Spitskop Dam IBA is located approximately 83 km to the north-east of the project area (Spitskop Dam).

Avifauna Habitats

The proposed study site is comprised entirely of CBA 1 and CBA 2 areas. These form important areas needed to meet biodiversity targets for ecosystem types, species and ecological processes. The project site also overlaps with Freshwater Ecosystem Priority Areas (FEPA) that are classified as a critically endangered ecosystem. There are numerous FEPA wetlands that are also located within the project site. The FEPA and CBA sites form important areas for avifauna Species of Conservation Concern (SCCs). A short distance from the site is the Klein Riet River and adjacent is a pan which provides highly suitable habitat for Lesser and Greater Flamingo's. Habitat types located within the project area include grassland, vaalbos veld, transformed, water resources and shrubland. Water resources were considered areas of very high ecological importance. Grassland, Vaalbosveld and shrubland were considered to be of high ecological importance. Transformed areas were considered to be of very low ecological importance.

Expected Species

A list of possible species that could occur within the proposed project site was compiled using the expected avifauna list from the South African Bird Atlas Project (SABAP2) website. Threatened, Near- Threatened, Least Concern, and Vulnerable species were identified as potential impact receptors of the proposed development that could occur in the area. Based on the SABAP 2 data, 202 species are expected in the project area of which 12 species are threatened species (refer to **Table 8.6**).

Table 8.6: Consolidated list of Threatened, Near-Threatened, Endemic/ Near- endemic and Priority Species potentially occurring on the proposed development site as identified during the desktop study

Species	Common name	RegionalStatus (SANBI,2016)	IUCN (2021)	Likelihood of occurrence
Aquila rapax	Eagle, Tawny	EN	VU	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Moderate
Ciconia nigra	Stork, Black	VU	LC	Moderate
Cursorius rufus	Courser, Burchell's	VU	LC	High
Falco biarmicus	Falcon, Lanner	VU	LC	High
Neotis ludwigii	Bustard, Ludwig's	EN	EN	High
Oxyura maccoa	Duck, Maccoa	NT	VU	Moderate
Phoeniconaias minor	Flamingo, Lesser	NT	NT	High
Phoenicopterus roseus	Flamingo, Greater	NT	LC	High
Polemaetus bellicosus	Eagle, Martial	EN	EN	Moderate
Rostratula benghalensis	Painted-snipe, Greater	NT	LC	Moderate
Sagittarius serpentarius	Secretary bird	VU	EN	High

Species recorded through on-site surveys:

A field assessment was conducted 13-16 September 2022 (dry season) and 14 – 16 February 2023 (wet season), during this survey the 106 bird species (of the recorded 125 in the general area) were recorded of which four were SCCs, namely *Phoenicopterus roseus* (Greater Flamingos), *Cursorius rufus* (Burchell's Courser), *Falcon biarmicus* (Lanner Falcon) and *Ciconia nigra* (Black Stork).. 25 species were identified that would be at risk for collisions, electrocutions or habitat loss due to the development (refer to **Table 8.7)**

Table 8.7: Species at risk for collisions, electrocutions and habitat loss

Species	Common name	(Regional, Global)	Collisions	Electrocution	Habitat Loss
Elanus caeruleus	Black-winged Kite	X		X	
Hieraaetus pennatus	Booted Eagle	X	X	X	X
Anas capensis	Cape Teal	O	X		
Alopochen aegyptiaca	Egyptian Goose	O	X	X	
Phoenicopterus roseus	Greater Flamingo	X	X	X	
Falco rupicoloides	Greater Kestrel	X	X	X	
Ardea cinerea	Grey Heron	O	X	X	
Falco biarmicus	Lanner Falcon	X		X	
Egretta garzetta	Little Egret	O	X	X	
Melierax canorus	Pale Chanting Goshawk	X	X	X	
Anas erythrorhyncha	Red-billed Teal	O	X	X	
Microcarbo africanus	Reed Cormorant	O	X		
Tadorna cana	South African Shelduck	O	X		
Afrotis afraoides	Northern Black Korhaan	X	X		
Falco amurensis	Amur Falcon	X		X	
Lophotis ruficrista	Red-crested Korhaan	O	X		
Spatula smithii	Cape Shoveler	O	X		
Dendrocygna viduata	White-faced Whistling Duck	O	X		
Anas undulata	Yellow-billed Duck	O	X		
Spatula hottentota	Blue-billed Teal	O	X		
Falco vespertinus	Red-footed Falcon	X		X	X
Ciconia nigra	Black Stork	X	X	X	X
Circaetus cinereus	Brown Snake Eagle	X	X	X	X
Circaetus pectoralis	Black-chested Snake Eagle	X	X	X	X
Thalassornis leuconotus	White-backed Duck	O	X		X

8.5. Integrated Heritage including Archaeology, Palaeontology, and the Cultural Landscape

8.5.1 Cultural Landscape

In 1801, the London Missionary Society also established a station among the Griqua at Leeuwenkuil. The site proved too arid for cultivation and in about 1805 they moved the station to another spring further up the valley and called it Klaarwater. Their second choice was little better than their first, and for many years a lack of water prevented any further development. The name of the settlement was changed later to Griquatown or Griekwastad in Afrikaans. They lived among a mixed nomadic community of the Chaguriqua tribe and "bastaards" (people of mixed origin) from Piketberg. Their two leaders were Andries Waterboer and Adam Kok II. From 1813 to 17 July 1871, the town and its surrounding area functioned as Andries Waterboer's Land. Griekwastad was later the capital of British Colony Griqualand West from 1873 to 1880, with its own flag and currency, before it was annexed into the Cape Colony. The proposed development is located on one of the main routes between Griekwastad and Kuruman and as such, evidence of this heritage may be impacted by the proposed development.

Danielskuil derives its name from a cone-shaped depression deep in the dolomitic limestone; with a domed covering, reminiscent of the biblical 'Daniel in the lions' den'. The Griqua leader Adam Kok is said to have used this depression as a prison, and to also have kept snakes in it. The area was famous because of the Griqua Chief who ruled there by the name of Barend Barends. Barend Barends was the son of a "half-Hottentot Dutchman" and one of the most important leaders along the turbulent northern frontier of the Cape Colony from 1790 to 1834. He was one of the first chiefs of the Griqua tribe, an indigenous Khoi group. A book, Barend Barends - Die Vergete Kaptein van Danielskuil, has been recently published about his story. During the Anglo Boer war (1899-1902) the British army built and used a blockhouse fort, which overlooks the town from the north.

8.5.2. Archaeology

An archaeological assessment of the Finsch Mine was completed by Henderson in 2005 (SAHRIS ID 6780). Henderson drafted a brief history of the Finsch Mine and this is not repeated here. Suffice to note that "Recent human activity at the Finsch Mine, which would have left traces of mining and structures, therefore only dates back to 1959 on Brits. It would appear that there may be an earlier date for farming activities on Bonza". Elements of the cultural landscape that may be impacted by the proposed development include the sense of place of the historic core of Postmasburg as well as the mining and farming heritage of the area.

Due to mining activities in the area, a number of heritage impact assessments have been completed in close proximity to the development area. The well-known Taung site that preserved early hominid remains is located only some 50 kilometres to the west of the site under investigation. Wonderwerk cave near Kuruman also retain evidence of early peoples in its 6 meter midden deposit, especially in the rear portions of the cave. Towards the front rock-art from later Stone Age peoples are also preserved. Furthermore the engraving sites Wildebeestkuil, Driekopseiland and Nooitgedacht near Kimberly confirm a continued presence of Later Stone Age peoples in the general region. It is very likely that significant archaeological heritage may be impacted by the proposed development.

A recent HIA completed by CTS Heritage located south of this proposed development area (CTS 2022) revealed a great many heritage resources evident within the broader context. The vast majority of these

resources, consisting of individual artefacts and low density artefact scatters ascribed to the Middle and Later Stone Age as well as rural infrastructure such as wind mills, have been determined to be not conservation-worthy. A number of heritage resources of significance were, however, also identified. These resources range from significant archaeological sites and scatters to burial grounds and graves as well as historic farm werfs and infrastructure such as the irrigation furrows ascribed to the work of the London Missionary Society and the local Griekwa population. The relationship between the furrows, the farm werfs and the burials form a unique and layered cultural landscape that speaks to the unique past of this area and its Griekwa inhabitants. It is likely that similar heritage resources are located within this development footprint. **Figure 8.12** shows the heritage resources previously identified within the broader study area.

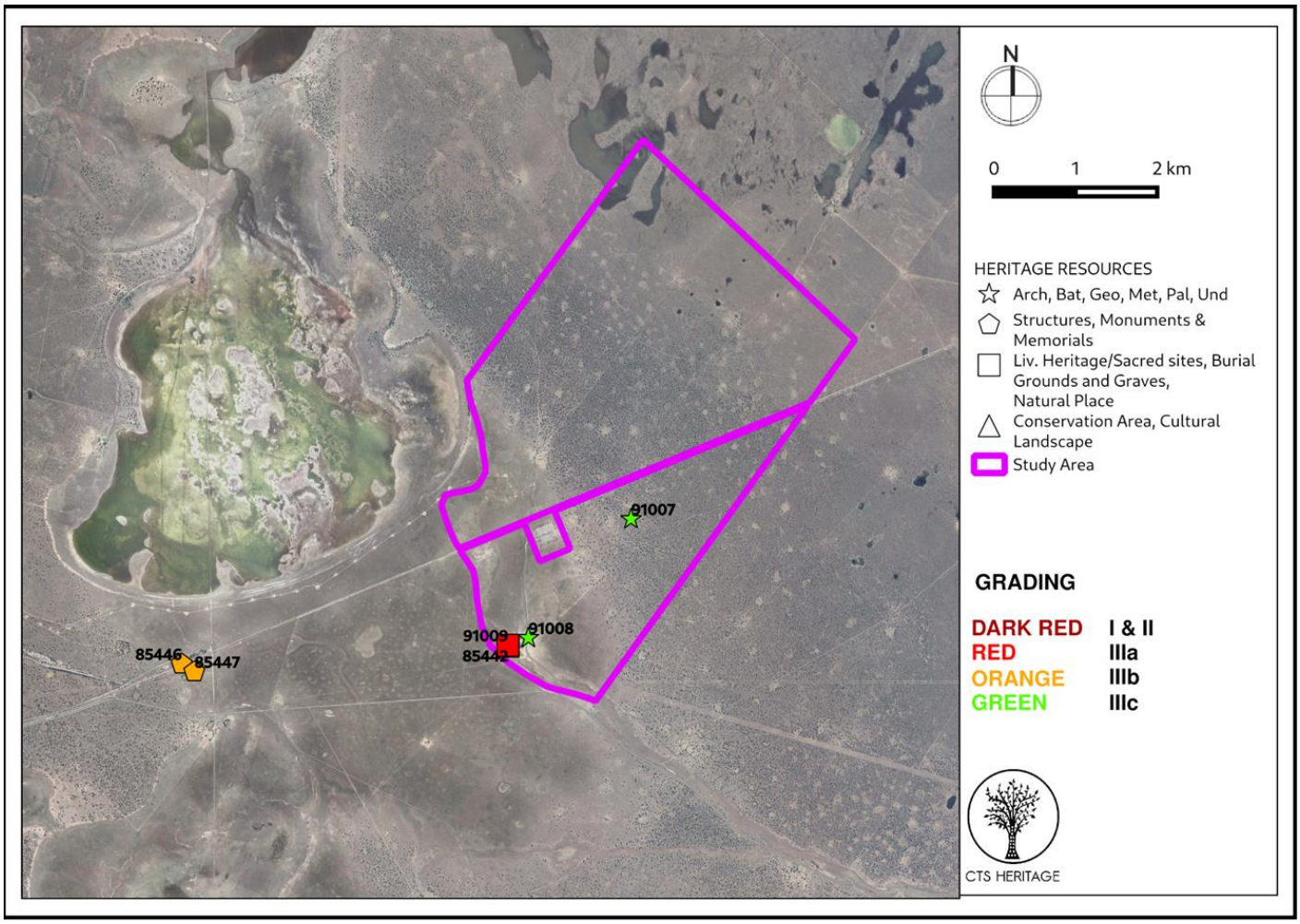


Figure 8.12: Heritage resources identified within the project site and surrounds.

8.5.3. Palaeontology

The proposed Limestone PV1 solar development is mostly underlain by quaternary surface limestone while the Lime Acres Member (Ghaap Group, Campbell Rand Subgroup, Kogelbeen Formation) crops out in the north-eastern portion of the development. The site is underlain by the Kalahari Group, the Klippan formation and Kogelbeen formation(Campbell Rand Subgroup, Transvaal Supergroup).

The Campbell Rand Subgroup consists of a thick (1,6 to 2,5 km) carbonate platform succession of cherts with minor tuffs and siliciclastic rocks as well as dolomitic limestones and dolostones. These sediments were deposited about 2,6 to 2,5 Ga (billion years ago) on the shallow submerged shelf of the Kaapvaal Craton

Young (1932); Beukes (1980, 1983); Eriksson & Truswell (1974); Eriksson & Altermann (1998); Eriksson et al. (2006); Altermann and Herbig (1991); Altermann and Wotherspoon (1995). Frequent changes in sea level were caused by changing depositional cycles in shallow water facies. Stromatolitic limestones and dolostones, oolites, laminated calcilutites, cherts, with subordinate siliclastics (shales, siltstones) and minor tuffs (Beukes 1980, Beukes 1986, Sumner 2002, Eriksson et al. 2006, Sumner & Beukes 2006) are present in the Campbell Rand Subgroup. Schopf (2006) reviewed the older Archaean stromatolite occurrences from the Ghaap Group. Stromatolites are layered mounds, columns and sheet-like sedimentary rocks. Originally, they were 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. The oxygen atmosphere that we depend on was generated by numerous cyanobacteria photosynthesizing during the Archaean and Proterozoic Era. Several authors have described the spectacular stromatolites of the Ghaap Group in the Northern Cape Province [Almond & Pether (2008)); Boetsap locality figured by McCarthy & Rubidge (2005); Eriksson et al. (2006)

The late Archaean Kogelbeen Formation is about 450m thick and comprise of limestone and chert with stromatolites and microbial horizons as well as dolomite. Within the stromatolitic horizons secondary chert replacement occurs. Columnar and domal stromatolites as well as microbial laminites and oolitic facies are also found in this Formation. Altermann & Wotherspoon (1995) found that the Lime Acres Member is present at the top of the Kogelbeen Formation. The Lime Acres Member is extensively mined in this region. Lime Acres is known for its significant fossil stromatolite site (Altermann & Wotherspoon 1995).

The fossil assemblages of the Kalahari are represented by terrestrial plants and animals with a close resemblance to living forms. Fossil assemblages include bivalves, diatoms, gastropod shells, ostracods, and trace fossils. Late Cenozoic calcrete may comprise of bones, horn corns as well as mammalian teeth. Tortoise remains have also been uncovered as well as trace fossils which includes termite and insect's burrows and mammalian trackways. Amphibian and crocodile remains have been uncovered where the depositional settings in the past were wetter. Fossils are mostly associated with ancient lakes, pans, and river systems.

The PalaeoMap of the South African Heritage Resources Information System indicates that the Palaeontological Sensitivity of the Quaternary surface limestones are High and that of the Lime Acres Member are Very High (refer to **Figure 8.13**) (Almond and Pether, 2009; Almond et al., 2013). The nature of the excavations associated with Renewable Energy facilities tends to be deep and as such, given the high and very high palaeontological sensitivity of the sediments that underlay the project site, the likelihood of impacting intact sediments is high.

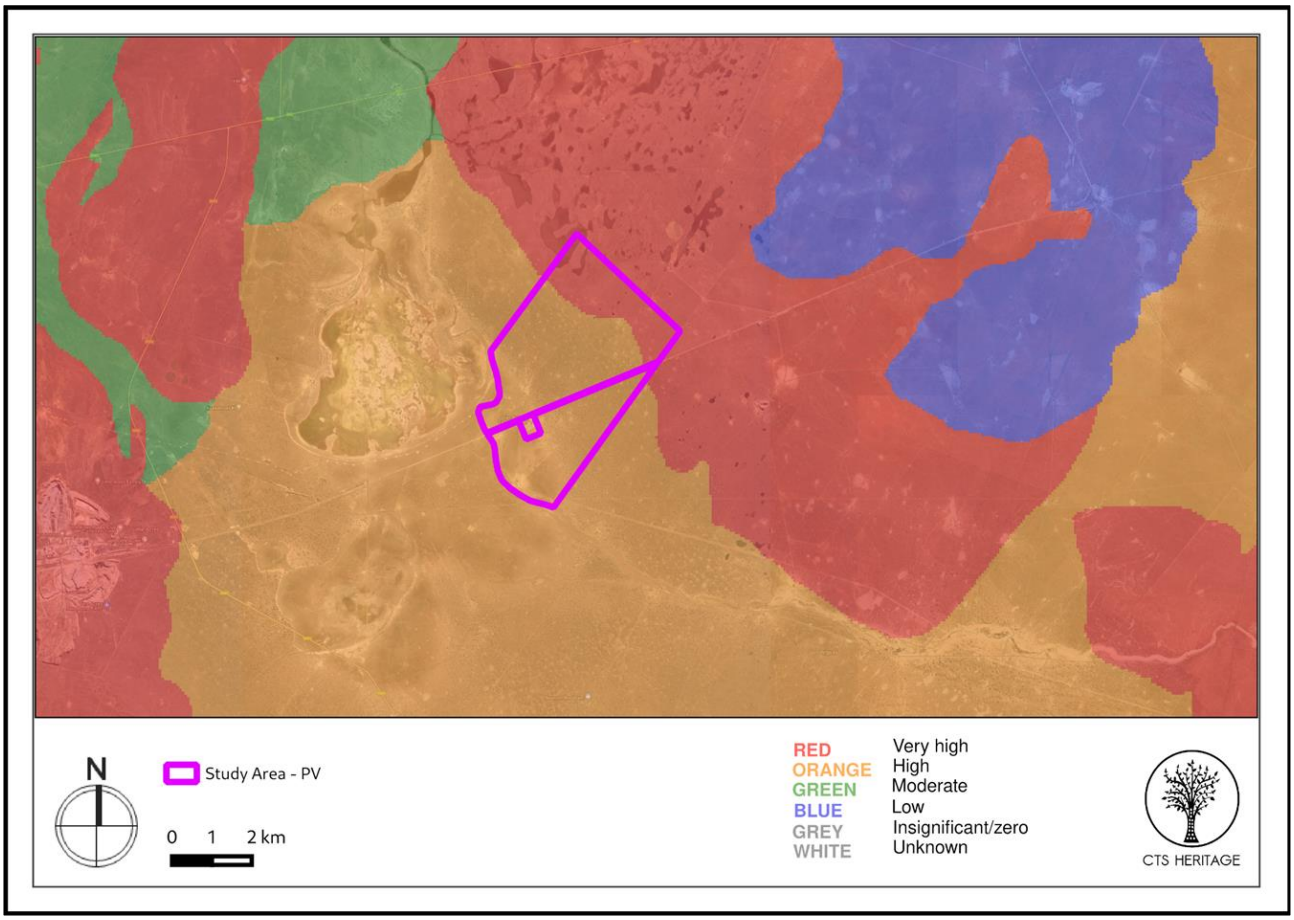


Figure 8.13: Palaeosensitivity map indicating fossil sensitivity underlying the project site.

8.6. Visual Quality

The greater landscape of the project site is characterised by wide-open spaces and very limited development. The study area is sparsely populated with 7.5 people per km^2 within the local municipality. In addition to Lime Acres, a number of isolated homesteads occur throughout the study area. Some of these in the study area include[13]:

- England
- Langverwag
- Oliënspruit
- Dikkbos
- Murray
- Aandrus
- Tevrede

The terrain surrounding the proposed project site is generally flat with numerous non-perennial pans present in the broader area. the Great Pan and Rooipan, which are located to the west of the proposed site. Land cover is primarily low *shrubland* concentrated more to the west and south west, and grassland found to the east with scattered areas of open woodland.

[13] The names listed below are of the homestead or farm dwelling as indicated on the SA 1: 50 000 topographical maps and do not refer to the registered farm name.

Access to the site is from a secondary road via the R385. Rail infrastructure is prominent in the area, with the Transnet Cape Corridor Freight railway line running from north east to south bisects the proposed site. This railway line is along heavy-haul railway line that connects mines between Warrenton in the North-East to Cape Town in the South. It is used primarily to transport commodities such as iron ore, manganese and lime and does not carry passengers. Other industrial infrastructure within the study area includes numerous existing high voltage lines that traverse the site:

- Olien/Ferrum 1 and 2 275 kV
- Olien/Ouplaas 1 132 kV
- Plateau/Trewill 1 132 kV
- Karats/Olien 1 and 2 132 kV
- Noko/Olien 1 132 kV
- Olien/Ulco 1 132 kV
- Silverstreams/Ulco 1 132 kV
- Boundary/Olien 1 and 2 275 kV

All of these power lines congregate at the Olien Substation which is located within the proposed Limestone PV1 project site. The Trewill Substation is located just east of the Olien Substation.

It should be noted that there are a few authorised (and current)/ proposed renewable energy applications within the study area and the greater region, that may change the landscape to some degree in the future.

8.6.1 Identified Visual Receptors

Possible receptors within the landscape up to 6km from the site which due to use could be sensitive to landscape change include:

0 – 1km
- There are two residences/farmsteads known as England located within this zone. However, the one England farmstead is located within the proposed development footprint,
- Additionally, a small section of a secondary road is located within this zone in the south, south west. It is anticipated that the proposed PV facility will be highly visible from this portion of road.

1 – 3km
- Residents of Langverwag and users of the secondary road.
- The rest of the visually exposed areas fall within vacant land and open space.

3 - 6km
- Most of this zone falls within vacant open space
- Residents of Aandrus, Olienspruit, Witput, Dikbos, Murray, Silverstreams, Outpost and Beadle homesteads.
- A secondary road is also located within this zone, however only small portions may be visually exposed and the intrusion will be fleeting.

8.7. Socio-Economic Profile

8.7.1. Profile of the Broader Area

The project site is located within Ward 3 and Ward 6 of the Kgatelopele Local Municipality, which form part of the ZF Mgcawu District Municipality.

Population, Income and Employment Profile

The ZF Mgcawu District Municipality forms the mid-northern region of the province, which borders Botswana. This district is 102 524km^2 in extent and covers around 27% of the Northern Cape Province area, making it the largest district in South Africa, after Pixley ka Seme and Namakwa. This district is bordered by four (4) District municipalities, namely John Taolo Gaetswe, Francis Baard, Pixley ka Seme and Namakwa District Municipality. It also shares borders with the Republic on Namibia and Botswana. The district municipality comprises of five (5) Local Municipalities namely, the Dawid Kruiper, Kai! Garb, Kheis and Kgatelopele Local Municipality.

The ZF Mgcawu District Municipality has a total population of 266 001, having experienced an increase of 37 555 from 2008 to 2018. The population growth in the local municipalities varied significantly. The population of the ZF Mgcawu District Municipality in 2018 was made up of 29.64% Africans (78 800), 8.35% Whites (22 200), 61.06% Colored (162 000), and 0.96% Asians (2 540). In 2019, there were 51% males and 49% females living in ZF Mgcawu District Municipality.

Table 8.8: Population figures of the ZF Mgcawu District Municipality

Municipality	2008	2013	2018	Average annual growth
Kai!Garib	64,600	67,400	70,500	0.87%
Dawid Kruiper	97,600	107,000	115,000	1.69%
!Kheis	17,800	17,300	17,600	-0.10%
Tsantsabane	31,600	36,600	40,900	2.61%
Kgatelopele	16,800	19,400	21,600	2.53%
Total	**228,446**	**247,820**	**266,001**	**1.53%**

Source: IHS Markit Regional eXplorer version 1750

The young working age (25–44 years) age group makes up the biggest percentage of the population, accounting for 86 700 people or 32.6% of the total. The age group of infants and children (0–14 years) has the second-highest population with a total share of 25.2%, followed by the age group of teenagers and young adults (15–24 years) with 49 300 persons.

The Kgatelopele Local Municipality, within which the Limestone PV1 site is located, is situated in the ZF Mgcawu District Municipality of the Northern Cape Province. The main towns include Lime Acres and Danielskuil, which both fall into a medium category for development potential on an individual basis. Danielskuil serves as the major town of significance for the entire Kgatelopele Local Municipality area, the basis for economic activity, social and Institutional services and development opportunities within the municipality, whereas Lime Acres is very prominent as the mining town.

According to the Information Handling Services (IHS) Markit Regional eXplorer version 1750 the population of this Kgatelopele municipality was 21 600 in 2018. The population growth between 2008 (16 800) and 2018 (21 600) has increased by 2.53%, with male population at 52.5% and female at 47.5%. The 2011 census indicates that the majority of the population is relatively young. According the 2011 Census the majority of the population within the municipality speaks Afrikaans (58%) and Setswana (33%).

Economic Profile

The Northern Cape is primarily dependent on two industries, namely mining and agriculture. These two industries employ approximately 57% of all workers in the province.

The ZF Mgcawu District Municipality Final Integrated Development Plan - framework 2021-2022 (IDP) identifies agriculture, agriculture enterprises, livestock farming, irrigation farming, tourism and heritage, and minerals and mining as the key economic activities. The municipal accounts for 30% of the provincial economy in terms of the minerals and mining in the district. Aside from mining, tourism is regarded as the most important sector in the district, and it is the fastest growing industry that contributes to the district economy. The mining and agricultural sectors thus largely dominates the economy of the ZF Mgcawu District Municipality.

The Kgatelopele Local Municipality IDP of 2018/2019 indicates that most people within the municipality have at least some secondary educations and have finished secondary school. Some have only completed elementary school, while others have no formal education. This indicates that their prospects of finding a good job or other employment options are reduced because they did not obtain their senior certificate. Due to a high percentage of people who completed secondary school and obtained a higher education, the municipality has large, capacitated workforce to contribute to the economy of the municipality.

The number of economically active people is slightly higher than the number of non-economically active people, resulting in a very high dependency ration of 50.6%. According to Stats 2011, the unemployment rate is 22.3% and 29.1% of all unemployment people are young adults. There is a need to address the difficulties faced by those who are unemployed, especially young people.

CHAPTER 9: ASSESSMENT OF IMPACTS

This chapter serves to assess the significance of the positive and negative environmental impacts (direct and indirect) expected to be associated with the development of Limestone PV1 and associated infrastructure. This assessment has considered the construction of a solar PV facility with a contracted capacity of up to 150MW Maximum Export Capacity, within a development footprint of approximately 177ha. The development footprint includes the following infrastructure:

- PV modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost (up to 167ha).
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation with a capacity up to 250 MVA (up to 0.75ha)
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors (up to 1ha).
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) with a length of 3km (up to 1.8ha)
- Internal distribution roads (up to 5m wide) with a length of 13km (up to 6.5ha)
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.

The development of the project will comprise the following phases:

- *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of access roads, construction camps, batching plant, laydown areas, and facility infrastructure; construction of foundations involving excavations and cement pouring; the transportation of components/construction equipment to site; laying cabling; and commissioning of new equipment and site rehabilitation. The construction phase for Limestone PV1 is estimated up to 18 months.

- *Operation* – will include the operation of the solar facility and the generation of electricity, which will be fed into the national grid via new a new onsite collector substation (which will be assessed in a separate BA process). The operation phase of Limestone PV1 is expected to be up to 25 years (with maintenance).

- *Decommissioning* – at the end of the project's life, decommissioning will include site preparation, disassembling of the components of the solar facility, clearance of the relevant infrastructure at the site and rehabilitation.

The project is proposed to be developed on Portion 4 of the Farm Engeland 300, which is ~1 842ha in extent. On-site sensitivities were identified through the review of existing information, desktop evaluations and detailed field surveys. The identification of a development footprint for the solar PV facility within the project site was undertaken by the developer through consideration of the sensitive environmental features and areas, and application of a mitigation hierarchy which aimed at avoidance as the first level of mitigation. The specialist assessments undertaken as part of this EIA process have considered the development footprint (refer to **Figure 9.1**) which was provided by the developer.

The sections which follow provide a summary of the specialist input for each field of study in terms of the impacts which are expected to occur, the significance of the impacts, the opportunity for mitigation of the impacts to an acceptable level and the appropriate mitigation measures recommended for the reduction of the impact significance. Note that impacts associated with decommissioning are expected to be similar to those associated with construction activities and in certain instances, these impacts are not considered separately within this chapter. This section of the report must be read together with the detailed specialist studies contained in **Appendix G** to **M**.

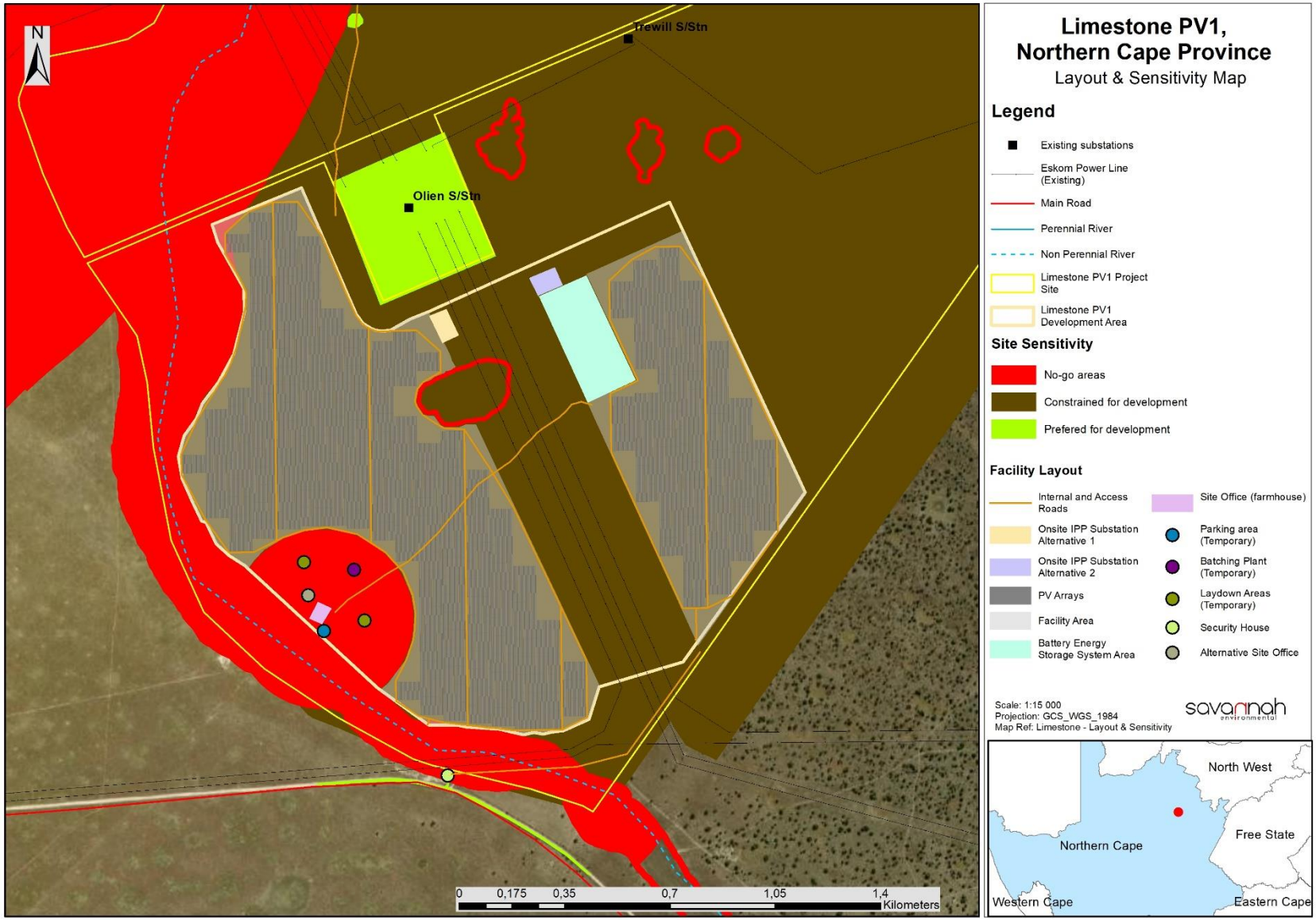


Figure 9.1: Map showing the development footprint within which the Limestone PV1 facility and associated infrastructure has been placed and assessed as part of this EIA process and associated sensitivities (also refer to **Appendix D** for maps).

9.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(h)(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.	The impacts and risks associated with the development of Limestone PV1, including the nature, significance, consequence, extent, duration and probability of the impacts and the degree to which the impact can be reversed and cause an irreplaceable loss of resources are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**
3(1)(h)(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.	The positive and negative impacts associated with the development of Limestone PV1 are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**
3(1)(h)(viii) the possible mitigation measures that could be applied and the level of residual risk.	The mitigation measures that can be applied to the impacts associated with Limestone PV1 are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**
3(1)(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 development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment 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.	A description of all environmental impacts identified for Limestone PV1 during the EIA process, and the extent to which the impact significance can be reduced through the implementation of the recommended mitigation measures provided by the specialists are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**
3(1)(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 avoided, managed or mitigated.	An assessment of each impact associated with the development of Limestone PV1, including the nature and significance, the extent and duration, the probability, the reversibility, and the potential loss of irreplaceable resources, as well as the degree to which the significance of the impacts can be mitigated are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**
3(1)(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as well as for inclusion as conditions of authorisation.	Mitigation measures recommended by the various specialists for the reduction of the impact significance are included in **sections 9.3.3, 9.4.3, 9.5.3, 9.6.3, 9.7.3, 9.8.3.** and **9.9.3.**

9.2. Quantification of Areas of Disturbance on the Site

Site-specific impacts associated with the construction and operation of Limestone PV1 relate to the direct loss of vegetation and species of special concern, disturbance of animals and loss of habitat and impacts on soils. In order to assess the impacts associated with Limestone PV1, it is necessary to understand the extent of the affected area.

The development footprint (**Figure 9.1**) will include affected areas, which will comprise of PV modules (mounted on either a fixed tilt or single axis tracker structure, dependent on optimisation, technology available and cost) at a height of up to 2.2m, main access road (up to 6m in width), internal access roads (width of up to 5m), 33/132kV onsite substation (~0.75ha), a Battery Energy Storage System (capacity up to 250 MVA within an extent of up to 6ha), and a laydown area with an extent of up to 2ha. The maximum area of disturbance is approximated to be ~167ha in extent (this is also the extent of the development footprint), some of which will be temporary and will be rehabilitated following construction.

Wherever possible, existing access roads will be utilised to access the project site and development footprint, essentially reducing the extent of disturbance resulting from access road construction. Some roads will need to be upgraded as part of the proposed development.

9.3. Assessment of Terrestrial Ecology (including flora and fauna) and Freshwater Ecology Impacts

The development of Limestone PV1 is likely to result in a variety of impacts associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as PV panels and service areas, roads, operations buildings etc. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix G** for more details).

9.3.1 Results of the Terrestrial and Freshwater Ecology Impact Assessment

Various ecological features and habitats are present within the project site within which the development footprint has been sited. These features, their location within the project site and the associated ecological sensitivity are described below. An ecological sensitivity map has been included in **Figure 9.2** and **Figure 9.3**.

Habitat types identified within the development area include:

- Watercourses/Rivers – Very high sensitivity (no go)
- Wooded Vaalbosveld – High sensitivity
- Open Shrubveld – High sensitivity
- Open Grassland – High sensitivity
- Water Resources (Depression/ Pan)– High sensitivity
- Transformed – Very Low sensitivity

The areas of very high sensitivity (watercourses/rivers) are considered as no-go areas for all infrastructure where no development should proceed. These areas provide surface water resources within the landscape, corridors for fauna dispersion within the landscape and important foraging and nesting habitat. These features also form part of Critical Biodiversity Areas 1(CBA1), Critically Endangered (CR) and Freshwater Ecosystem Priority Areas (FEPA) rivers and wetlands. The very high sensitivity watercourse flows along the western portion of the project site but is not located within the development area.

Areas and features of high ecological sensitivity represent other sensitive features such as wooded Vaalbosveld, open shrubland, open grassland, and other water resources such as depressions and pans. These areas should ideally be avoided. These areas may also form part of the CBA2 areas and may potentially contain and support SCC. Limited development activities of low impact are considered acceptable and offset mitigations may be required for high impact activities. These areas provide grazing and foraging resources for indigenous fauna and livestock, aids in the filtration of water permeating through the soil into the drainage areas and act as Important corridors for fauna dispersion within the landscape.

Areas and features of very low ecological sensitivity include already transformed areas where development activities of medium to high impact are considered acceptable and habitat restoration activities may not be required. These areas contain no natural habitat. Transformed areas are mainly found concentrated in the western – central portions of the project site, around the Olien MTS substation, existing roads and farmhouse. Within the development area, transformed features include existing roads and the farmhouse in the southwestern corner.

CBA1 areas are mainly found in the western portions of the project site and correspond with the very high sensitivity watercourse/river. Other CBA1 areas include high sensitivity water resource depressions/pans that are scattered throughout the project site and development area. CBA2 areas comprise the remainder of the project site which comprises of mostly high sensitivity with some very low sensitivity areas. Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (CBAs and ESAs), development may proceed but with caution and only with the implementation of mitigation measures.

A detailed assessment of the development footprint confirms that there is no infrastructure located within the Very High terrestrial ecology and freshwater sensitivity areas. As a result, the development of the Limestone PV1 facility would avoid significant impact on the major ecological features of the site. Majority of the infrastructure is proposed in high sensitivity areas. Development of low impact such as the proposed project (refer to Section 9.3.3) is supported within these areas as long as mitigation measures are implemented. As a result, there are no fatal flaws and with the avoidance of very high (SEI) sensitive features at the site by the facility layout, no high impacts are likely to occur as a result of the development.

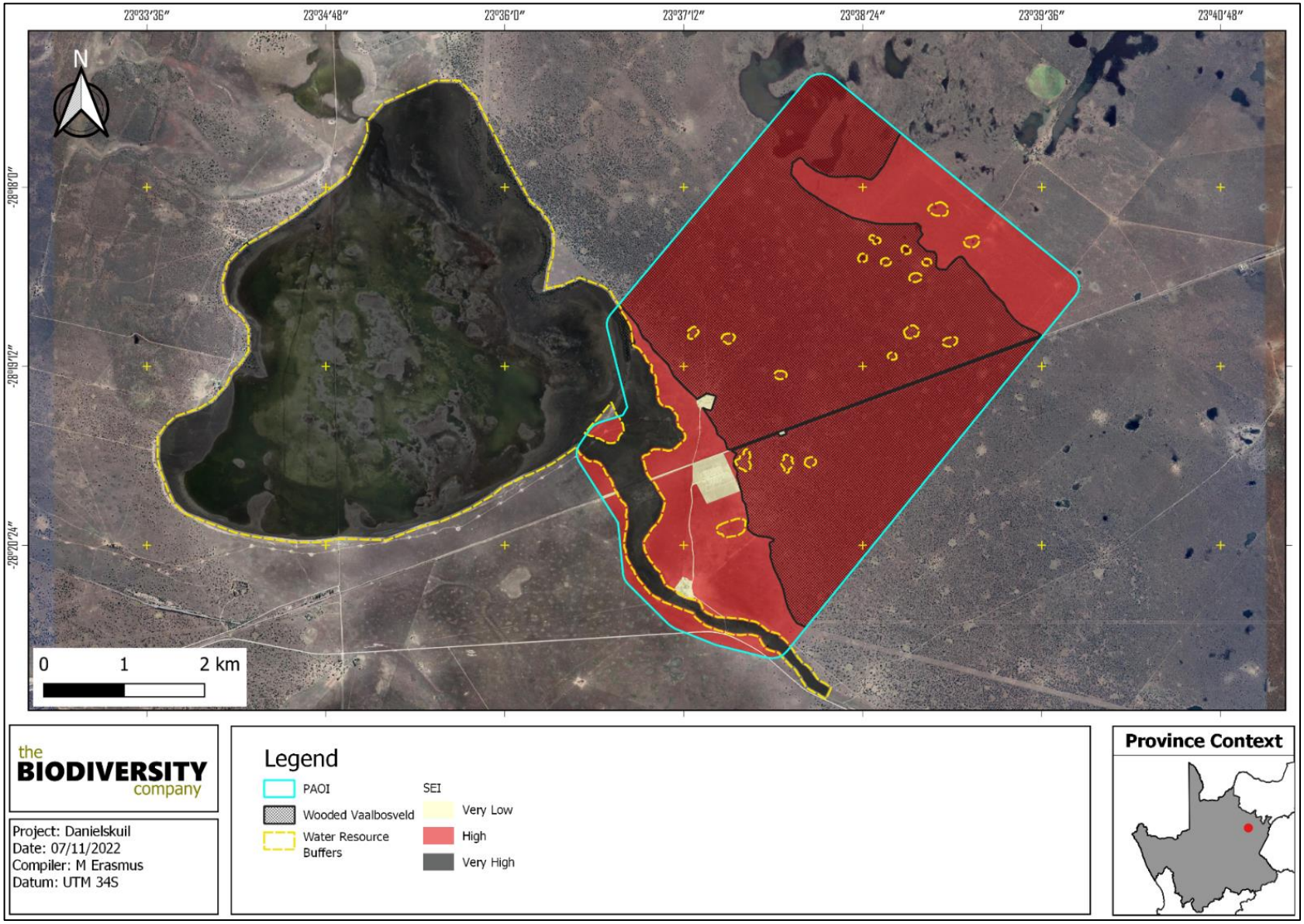


Figure 9.2: Terrestrial ecological sensitivity map of the project site

Figure 9.3: Terrestrial ecological sensitivity map of the development area within which the facility infrastructure will be placed.

9.3.2 Description of Impacts on Terrestrial and Freshwater Ecology

Potential ecological impacts resulting from the proposed development would stem from a variety of different activities and risk factors associated with the construction and operation phases of the project including the following:

Construction:

- The loss of vegetation within development footprint resulting in habitat destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community
- Introduction of alien and invasive species, especially plants resulting in the degradation and loss of surrounding natural vegetation, persecution of indigenous fauna species
- Destruction of protected plant species due to construction activities
- Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, dust, vibration and poaching) leading to the direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.

Operation:

- Continued fragmentation and degradation of habitats and ecosystems resulting in disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.
- Spread of alien and/or invasive species resulting in the degradation and loss of surrounding natural vegetation, persecution of indigenous fauna species
- Ongoing displacement and direct mortalities of faunal community (including potential SCC) due to disturbance (road collisions, noise, light, dust, vibration) resulting in mortality, disturbance or persecution of fauna in the vicinity of the development.

Decommissioning:

- During decommissioning, the potential impacts will be very similar to that of the construction Phase. Similar mitigation measures would therefore be applicable.

9.3.3 Impact tables summarising the significance of impacts on terrestrial and freshwater ecology during construction and operation (with and without mitigation)

Construction Phase Impacts

Nature: *Loss of vegetation within development footprint* Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community		
	Without mitigation	**With mitigation**
Extent	Low (2)	Very low (1)
Duration	Permanent (5)	Moderate term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (52)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	

Mitigation:

- All 'Very High' SEI habitats (watercourse) and associated buffer zones are to be avoided.
- Avoid the disturbance or destruction of High SEI areas, as far as possible. Vegetation under the panels is to be retained.
- Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage
- Do not clear areas of indigenous vegetation outside of the direct project footprint
- Minimise vegetation clearing to the minimum required
- Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the project site
- Compile and implement a rehabilitation plan from the onset of the project;
- Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and bare (unvegetated) areas.
    - Reduce the dust generated by operational vehicles and earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limits to enforce reduced speeds.
    - No non-environmentally friendly suppressants may be used as this could result in pollution of water sources.
- Rehabilitate areas as soon as they are no longer impacted by construction
    - The rehabilitated areas must be revegetated with indigenous vegetation
- Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover.
- 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).
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.

Residual Impacts:

The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.

Nature: *Introduction of alien and invasive species, especially plants*		
Degradation and loss of surrounding natural vegetation, persecution of indigenous fauna species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (36)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Compile and implement an alien vegetation management plan from the commencement of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated.
- Implementation of a waste management plan, this plan must be also prescribe a monitoring plan and be updated as/when new data is collated. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site.
- Refuse bins will be emptied and secured.
- Temporary storage of domestic waste shall be in covered waste skips.
- Maximum domestic waste storage period will be 7 days.
- A pest control plan must be put in place and implemented; it is imperative that poisons not be used.

Residual Impacts:

Long-term broad scale. IAP infestation if not mitigated. The residual impacts are anticipated to be of low significance with mitigation measures.

Nature: *Destruction of protected plant species*		
Construction activity will likely lead to direct loss of protected tree species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Vegetation clearing commences only after the necessary permits have been obtained, if the protected trees cannot be avoided.

Residual Impacts:

No residual impacts are anticipated.

Nature: *Displacement of faunal community due to habitat loss, direct mortalities and disturbance*
Construction activity will likely lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated, impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	

Mitigation:

- Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers e.g., safety tape, not painted lines, and use signage.
- Prior to vegetation clearing activities, the area to be cleared should be walked on foot by 1-2 individuals to create a disturbance in order for fauna to move off. Sites should be disturbed only prior to the area having to be cleared, not more than 1 day in advance.
- Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.
- All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
- 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.
- Minimise vegetation clearing to the minimum required. Areas should be cleared and disturbed on a needs basis only, as opposed to clearing and disturbing a number of sites simultaneously.
- Provide All personnel and contractors to undergo Environmental Awareness Training to all personnel and contractors. A signed register of attendance must be kept for proof. Discussions The training must include.
- The timing between clearing of an area and subsequent development must be minimized to avoid fauna from re-entering the site to be disturbed.
- Any holes/deep excavations must done in a progressive manner on a needs basis only. No holes/excavations may be left open overnight. In the event holes/excavations are required to remain open overnight, these areas must be covered to prevent fauna falling into these areas and subsequently inspected prior to backfilling
- Where possible, work should be restricted to one area at a time and be systematic. This is to reduce the number and extent of on-site activities, allowing fauna to move off as the Project progresses. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories.
- Considering that many of the mammal fauna recorded within the project area are nocturnal, no construction activity is to occur at night.

Residual Impacts:
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species. The residual impacts are anticipated to be of low significance with mitigation measures.

Operation Phase Impacts

Nature: *Continued fragmentation and degradation of habitats and ecosystems* Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without Mitigation	With Mitigation
Extent	Low (2)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (48)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation: • All 'Very High' SEI habitats and associated buffer zones are to be avoided. • Avoid the further disturbance or destruction of Sandy Grassland (High SEI areas) , as far as possible. • It should be made an offence for any staff to /take bring any plant species into/out of any portion of the Project Area of Interest (PAOI). No plant species whether indigenous or exotic should be brought into/taken from the PAOI, to prevent the spread of exotic or invasive species or the illegal collection of plants. • A Rehabilitation Plan must be written for the development area and ensured that it be adhered to. • Access roads should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk. • All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial grass, shrubs and trees.		
Residual Impacts There is still the potential some potential for erosion and IAP encroachment even with the implementation of control measures but would have a low impact.		

Nature: *Spread of alien and/or invasive species* Degradation and loss of surrounding natural vegetation, persecution of indigenous fauna species		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (52)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Implementation of an alien vegetation management plan. o Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 3 months during the first two years of the operation phase and every six months for the life of the project.		

- All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management plan
- Compile and implement a Solid Waste Management Plan. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis as a minimum.
- A pest control plan must be implemented; it is imperative that poisons not be used.

Residual Impacts:
Long term broad scale IAP infestation if not mitigated. The residual impacts are anticipated to be of low significance with mitigation measures.

Nature: *Ongoing displacement and direct mortalities of faunal community (including potential SCC) due to disturbance (road collisions, noise, light, dust, vibration).*
The operation and maintenance of the proposed development may lead to mortality, disturbance or persecution of fauna in the vicinity of the development.

	Without Mitigation	**With Mitigation**
Extent	Low (2)	Very low (1)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (48)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Outside lighting should be designed and limited to minimize impacts on fauna. Lighting fixtures should be fitted with baffles, hoods or louvres and directed downward. Outside lighting should be directed away from highly sensitive areas such as the wetlands. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible;
- Where feasible, motion detection lighting must be used to minimise the unnecessary illumination of areas
- No vehicle traffic nor the use of vehicle lights should be permitted during the night.
- Noise must be kept to a minimum from dusk to dawn to minimize all possible disturbances to amphibian species and nocturnal mammals
- Latest technology solar panels with an anti-reflective coating must be used. This will also improve the light transmittance and therefore increases the overall efficiency.
- If panels do not possess anti-reflective coatings, then non-polarising white tape can be used around and/or across panels to minimise reflection (Bennun *et al*, 2021).
- All personnel and contractors must undergo Environmental Awareness Training and must include awareness about not harming or collecting species.
- Any fauna threatened by the maintenance and operational activities should be removed to a safe location by an appropriate individual.
- All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions. Appropriate signs must be erected.
- If any excavations are to be dug these must not be left open for more than a few hours without ramps for trapped fauna to leave and must be filled at night.

Residual Impacts
Disturbance from maintenance activities will occur albeit at a low and infrequent level.

9.3.4 Overall Result

Six habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld, Open Grassland, Water Resources (Depression/ Pan) and Transformed. Watercourses/Rivers were identified as no-go areas where no development should take place (although no impacts on NFEPA's in terms of the aquatic impacts are anticipated). The remaining habitats were identified as having high sensitivity, with the exception of the transformed habitat which is considered to be very low sensitivity.

In terms of the guideline for interpreting Site Ecological Importance in the context of the development, it is indicated that "*Offset mitigation may be required for high impact activities*". Renewable energy projects can be considered low intensity developments with the correct implementation of the mitigation hierarchy. Referring to the mitigation hierarchy, the project will achieve avoidance by means of revised and reduced spatial planning, suggested seasonal constraints for construction to prioritise the dry season period and also the 'avoidance' of vegetation clearing beneath the panels.

The primary expected impacts of the proposed project will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, there are areas within the PAOI that possess a 'Very High' SEI. This denotes that avoidance mitigation is the only appropriate option for these areas and no destructive development activities should be considered. Avoidance of these designated areas has been achieved by the project layout. There are areas within the PAOI that possess a 'High' SEI. This denotes that avoidance mitigation wherever possible must be implemented. This includes changes to project infrastructure design to limit the amount of habitat impacted. The maintenance of basal vegetation cover beneath the solar panels will contribute to achieving avoidance. Complete clearance is not recommended. Project alternatives, planning and technology considered (in Section 3.3 of this report) outlines favourable avoidance mitigation. The overall low residual impact does not present a fatal flaw for the development, and the project may be favoured for authorisation. Due to the low residual impacts expected for the project, *no biodiversity offset strategy is required.*[14]

Considering that this area has been identified as being of significance for biodiversity maintenance and ecological processes (CBAs and ESAs), development may proceed but with caution and only with the implementation of mitigation measures, specifically the avoidance of clearing of the areas below the panels. The overall residual impacts are expected to be low. Considering the above-mentioned information, 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 supporting recommendations are implemented.

[14] The National Draft Biodiversity Offset Guideline indicates that "*where residual negative biodiversity impacts are evaluated to be of medium or high significance, a biodiversity offset would be required. Biodiversity offsets are unlikely to be required when the residual negative impacts of a proposed activity, or activities, on biodiversity are evaluated to be of low significance.*". In terms of the need for an offset, the specialist is clear that through the mitigation hierarchy and the recommended mitigation measures which respond to the management outcomes, the project's residual impacts are expected to be low.

9.4. Assessment of Avifauna impacts

The development of Limestone PV1 is likely to result in a variety of impacts associated largely with the disturbance, loss and transformation of intact vegetation and faunal habitat to hard infrastructure such as PV panels and service areas, roads, operations buildings etc. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix H** for more details).

9.4.1 Results of the Avifauna Impact Assessment

The development of Limestone PV1 is likely to result in a variety of impacts from an avifaunal perspective. Potential impacts and the relative significance of the impacts are summarised below. An avifauna sensitivity map has been included in **Figure 9.4**.

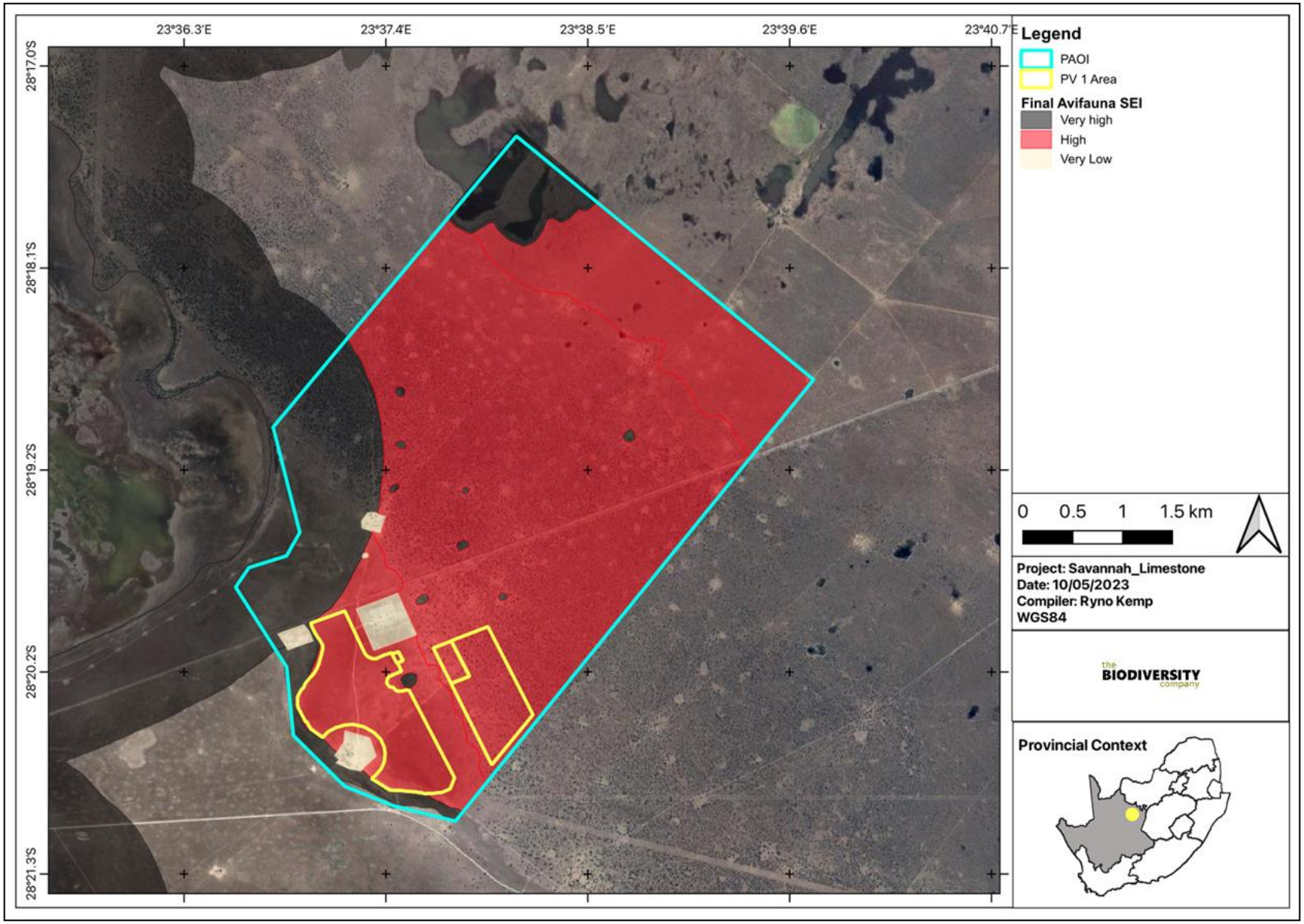


Figure 9.4: Avifaunal sensitivity map of the development area within which the facility infrastructure will be placed.

As detailed in Section 9.3 above, habitat types and associated sensitivities identified within the development area include (**Figure 9.5**):

» Watercourses/Rivers – Very high sensitivity (no-go)
» Wooded Vaalbosveld – High sensitivity
» Open Shrubveld – High sensitivity
» Open Grassland – High sensitivity
» Transformed – Very Low sensitivity

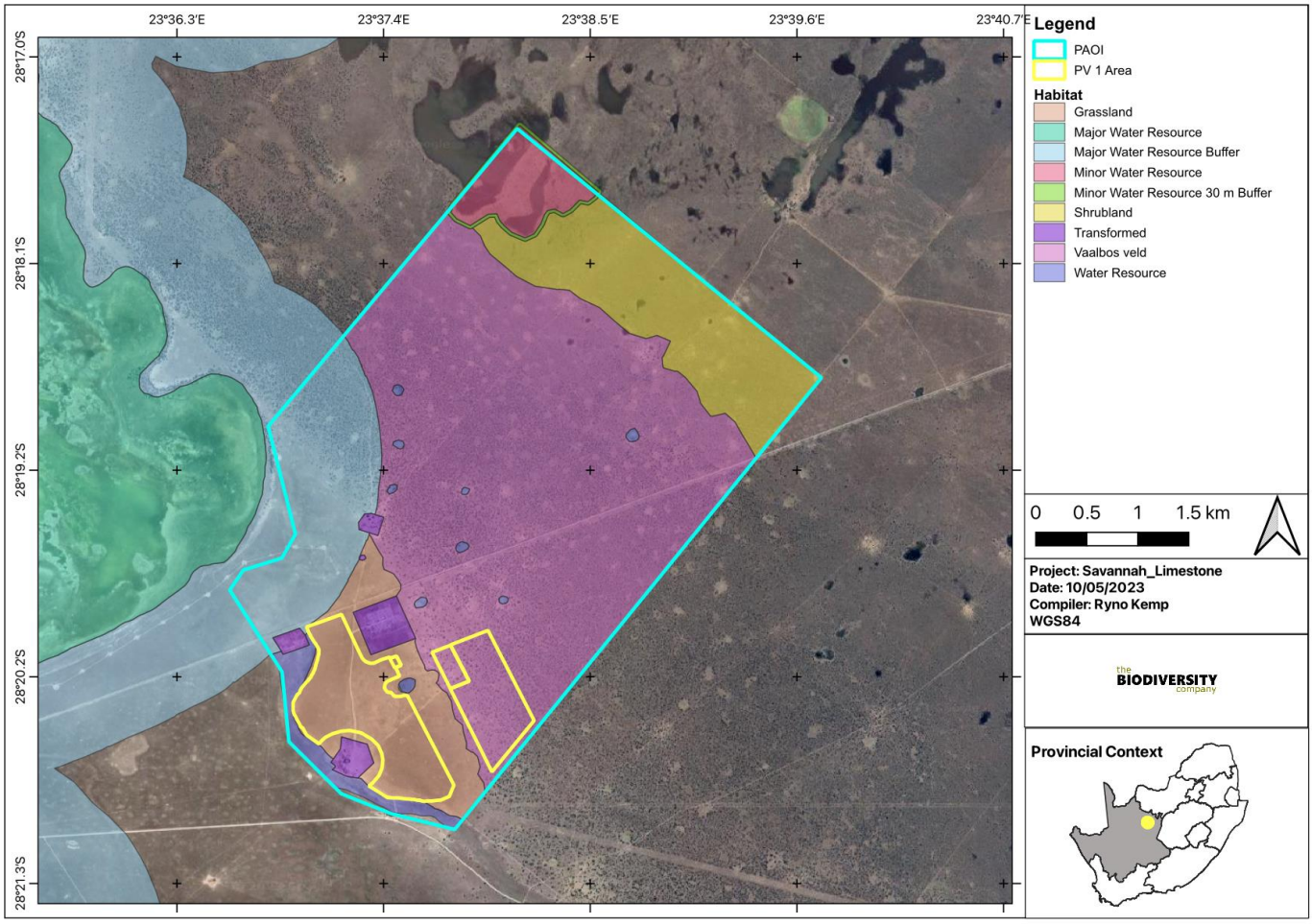


Figure 9.5: Avifaunal habitat map showing avifauna habitat found within the project site and development area.

A detailed assessment of the development footprint confirms that there is no infrastructure located within the Very High avifauna sensitivity areas. As a result, the development of the Limestone PV1 facility would avoid significant impact on the major avifaunal features of the site. Majority of the infrastructure is proposed in high sensitivity areas. Development of low impact such as the proposed PV development (refer to Section 9.4.3) is supported within these areas as long as mitigation measures are implemented. As a result, there are no fatal flaws and with the avoidance of very high sensitive features (with the exception of the small portion on the north western corner of Limestone PV1) by the facility layout, no high impacts are likely to occur as a result of the development.

9.4.2 Description of Impacts on Avifaunal

Potential avifaunal impacts resulting from the proposed development would stem from a variety of different activities and risk factors associated with the construction, operation and decommissioning phases of the project including the following:

Construction:
- » Loss of habitat within development footprint resulting in habitat destruction within the direct project footprint.
- » Destruction, degradation, and fragmentation of surrounding habitats resulting in impacts to surrounding habitats such as unauthorised clearing of vegetation, poor solid waste management and dust pollution. This may have larger scale consequences due to the presence of habitat specialist SCC.
- » Displacement of avifauna community (including SCC) due to noise pollution resulting in emigration of fauna. Noise pollution leads to changes in vocal communication and concomitantly to reproductive success. Many species may consequently avoid these areas completely. Larger species tend to also be wary of humans and therefore will emigrate the area from increased human presence.
- » Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs. Direct mortality may arise when the area is cleared for construction, especially for species in which their predator response is to remain still and camouflaged against the substrate, as well as those species that are ground-nesting. Increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.

Operation:
- » Destruction, degradation, and fragmentation of surrounding habitats resulting in impacts to surrounding habitats such as unauthorised clearing of vegetation and poor solid waste management. This may have larger scale consequences due to the presence of habitat specialist SCC.
- » Collisions with PV panels and fences resulting in mortality or injury.
- » Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs. Direct mortality may arise due to increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.

Decommissioning:
- » Direct mortality of fauna will likely lead to direct mortality of avifauna due to earthworks, vehicle collisions and persecution.
- » Continued habitat degradation. Disturbance created during decommissioning will leave the development area vulnerable to erosion and encroachment by Alien Invasive Plants.

9.4.3 Impact tables summarising the significance of impacts on avifauna during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: *Loss of habitat within development footprint* Habitat destruction within the direct project footprint		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Very low (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Moderate
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, although this impact cannot be well mitigated as the loss of vegetation is unavoidable.	

Mitigation:

- All 'Very High' habitats must be avoided (as shown in the proposed facility layout).
- Avoid the disturbance or destruction of Water bodies ('Very High' SEI areas) as far as possible (as shown in the proposed layout). In terms of the Site Ecological Importance, the proposed development is considered low impact activity and through the mitigation measures outlined of no clearance of vegetation beneath the PV panels, no offset is required. Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers and signage.
- Do not clear areas of indigenous vegetation outside of the direct project footprint.
- Minimise vegetation clearing to the minimum required.
- Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site.
- Compile and implement a Rehabilitation Plan from the onset of the project.
- Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover.
- 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).
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- Pre-construction environmental induction for all 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.

Residual Impacts:

The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact is, however, low.

Nature: *Destruction, degradation, and fragmentation of surrounding habitats*

Construction activities may lead to impacts to surrounding habitats such as unauthorised clearing of vegetation, poor solid waste management and dust pollution. This may have larger scale consequences due to the presence of habitat specialist SCC.

	Without mitigation	**With mitigation**
Extent	High (4)	Very low (1)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (68)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes.	

Mitigation:

- All 'Very High' SEI habitats must be avoided.
- Avoid the disturbance or destruction of Water bodies ('Very High' SEI areas) as far as possible. No Offset mitigation will be required for construction activities within these areas.
- Avoid the disturbance or destruction of Water bodies ('Very High' SEI areas) as far as possible. No Offset mitigation will be required for construction activities within these areas.
- Demarcate work areas during the construction phase to avoid affecting outside areas. Use physical barriers and signage.
- Do not clear areas of indigenous vegetation outside of the direct project footprint.
- Minimise vegetation clearing to the minimum required.
- Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site.
- Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities.
- A drift fence must be erected to impede dust pollution into surrounding habitats.
- Solid Waste must be legally discarded off site and not dumped into surrounding areas.
- Suitable sanitary facilities to be provided for construction staff as per the guidelines in Health and Safety Act.
- Temporary laydown areas should be clearly demarcated and rehabilitated subsequent to end of use.
- Pre-construction environmental induction for all 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.

Residual Impacts:

There may be effects of dust pollution, but residual impacts are expected to be negligible with mitigation measures.

Nature: *Displacement of avifauna community (including SCC) due to noise pollution*

Noise pollution generated from construction activities will lead to emigration of fauna. Noise pollution leads to changes in vocal communication and concomitantly to reproductive success. Many species may consequently avoid these areas completely. Larger species tend to also be wary of humans and therefore will emigrate the area from increased human presence.

	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (3)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Medium (32)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, albeit only to a certain level. Impacts are difficult to mitigate against.	

Mitigation:

- The increased presence of humans cannot be well mitigated against. Staff must be advised to not leave the boundary of the project footprint.
- Noise must be kept to minimum and when possible, no construction activity is to occur during dawn to avoid impacts to the dawn chorus in the surrounding areas.
- Generators used must have baffle boxes.

Residual Impacts:

Due to the sensitivity and furtive behaviour of the SCC within the region, residual impacts are expected to remain with this impact, but considered to be of low residual impact because this is a short-term impact, reversible and appropriate mitigation measures to be implemented in terms of the EMPr.

Nature: *Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs*

Direct mortality may arise when the area is cleared for construction, especially for species in which their predator response is to remain still and camouflaged against the substrate, as well as those species that are ground-nesting. Increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.

	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (56)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- Immediately prior to the removal of vegetation, at least two staff members must traverse the clearance area to create a disturbance so that species have the opportunity to vacate the area.
- Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.
- All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.

- Poaching must be made a punishable offence and any incidences must be reported to the relevant conservation body.
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof of attendance.

Residual Impacts:
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any avifauna species. The residual impact will be of low significance due to the implementation of mitigation measures.

Operation Phase Impacts

Nature: *Destruction, degradation, and fragmentation of surrounding habitats*
Operational phase activities may lead to impacts to surrounding habitats such as unauthorised clearing of vegetation and poor solid waste management. This may have larger scale consequences due to the presence of habitat specialist SCC.

	Without mitigation	**With mitigation**
Extent	High (4)	Very low (1)
Duration	Permanent (5)	Very short term (1)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**High (68)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes.	

Mitigation:
- Demarcate operational physical barriers and signage.
- Do not clear areas of indigenous vegetation outside of the direct project footprint.
- Minimise vegetation clearing to the minimum required.
- Consult a fire expert and compile and implement a Fire Management Plan to minimise the risk of veld fires around the project site.
- A Solid Waste Management Plan must be implemented, and solid waste legally discarded off site and not dumped into surrounding areas.

Residual Impacts:
There may be effects of dust pollution, but residual impacts are expected to be minimal.

Nature: *Collisions with PV panels and fences*
As described above, there is the potential for species collisions with components of the PV development, resulting in mortality or injury

	Without mitigation	**With mitigation**
Extent	Low (2)	Very Low (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	**Medium (56)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:

- The design of the proposed solar plant must be as endorsed by Jenkins et al. (2017) Best Practice Guidelines Birds & Solar Energy, considering the mitigation guidelines recommended by Birdlife South Africa.
- White strips must be placed on the edge of the solar panels to reduce reflection and prevent collisions. This is especially pertinent to the project area as species exhibits diel movement between water resources and feeding/nesting areas. These species may recognise the panel array as water bodies (lake effect) and collide with the panels, causing mortality.
- Fencing mitigations:
    - Top 2 strands must be smooth wire.
    - Routinely retention loose wires.
    - Minimum 30 cm between wires.

Residual Impacts:
It is unlikely that residual impacts are expected if the appropriate mitigation measures are implemented. However, there may still be collisions.

Nature: *Direct mortality from vegetation clearing, increased vehicle traffic and poaching, including the collection of eggs*
Direct mortality may arise due to increased vehicle traffic will result in the increased likelihood of roadkill. There is the potential for poaching, especially with Vulture species that are used in traditional medicine.

	Without mitigation	**With mitigation**
Extent	High (4)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (60)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
- Immediately prior to the removal of vegetation, at least two staff members must traverse the clearance area to create a disturbance so that species have the opportunity to vacate the area.
- Any fauna threatened by the operational activities should be removed safely by an appropriately qualified environmental officer or removal specialist.
- All operational vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
- Poaching must be made a punishable offence and any incidences must be reported to the relevant conservation body.
- All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof of attendance.

Residual Impacts:
There is still potential for roadkill to occur albeit this may not likely affect the viability of the local population. The residual impact will be of low significance due to the implementation of mitigation measures.

Decommissioning Phase Impacts

Nature: *Direct mortality of fauna* Decommissioning activity will likely lead to direct mortality of avifauna due to earthworks, vehicle collisions and persecution.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Low (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	**Medium (44)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes, vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation: • All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species. • Prior to commencing work each day, two individuals should traverse the working area in order to disturb any fauna and so they have a chance to vacate. • Any fauna threatened by deconstruction activities should be removed safely by an appropriately qualified environmental officer or removal specialist. • All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • All hazardous materials, if any, should 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.		
Residual Impacts: It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any avifauna species.		

Nature: *Continued habitat degradation* Disturbance created during decommissioning will leave the development area vulnerable to erosion and encroachment by Alien Invasive Plants.		
	Without mitigation	**With mitigation**
Extent	Moderate (3)	Local (1)
Duration	Permanent (5)	Long-term (3)
Magnitude	Very High (10)	Minor (2)
Probability	Definite (5)	Improbable (2)
Significance	**High (90)**	**Low (12)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation: • Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas that have been modified during the Operational Phase and disturbed during the Decommissioning Phase. • Monitoring of the rehabilitated area must be undertaken at quarterly intervals for three years after the decommissioning phase.		

• All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. • There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.
Residual Impacts: No significant residual risks are expected, although AIP encroachment and erosion might still occur but would have a negligible impact if effectively managed.

9.4.4 Overall Result

Five habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld and Open Grassland. Some of the area within the project site was also transformed. Watercourses/Rivers were identified as no-go areas where no development should take place. The remaining habitats were identified as having high sensitivity, with the exception of the transformed areas which is considered to be very low sensitivity.

Impacts of a medium to high significance for avifauna have been identified for the proposed Limestone PV1 facility. With the implementation of the mitigation measures, all impacts would be reduced to a low significance which is considered acceptable. Development of low impact such as that proposed (refer to Section 9.4.3) is supported within these areas as long as mitigation measures are implemented. There are no fatal flaws associated with the development footprint. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development. It is the specialist's opinion that development may proceed but with caution and only with the implementation of mitigation measures.

9.5. Assessment of Soil and Agricultural Impacts

The development of Limestone PV1 is unlikely to result in impacts on soil and agricultural resources. Findings of the specialist study are summarised below (refer to **Appendix I** for more details).

9.5.1 Results of the Soils and Agricultural Potential Assessment

According to the land type database (Land Type Survey Staff, 1972 - 2006) the proposed project site falls within the Fc 04 land type. The Fc 04 land type mostly consists of bare rocks and Mispah soil forms following the South African soil classification working group (1990) with the possibility of other soils occurring throughout the landscapes. The area is also characterised with the Glenrosa soil form and shallow soils. Lime is absent in the entire terrain landscape.

The most sensitive soil forms identified within the assessment area are the Etosha and Vaalbos soil forms, with other associated soils also occurring. The Etosha soil form has an orthic topsoil with a neocutanic subsurface horizon underlain by a soft carbonate horizon. The Vaalbos soil form consists of an orthic topsoil horizon on top of a red apedal horizon merging into a hard rock substratum below.

The land capability of the above-mentioned soils has been determined to have land capability classes of "III" and "IV" with a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capability and climate capability results in land potential "L6". The "L6" land potential level is characterised by a very restricted potential. Regular and/or severe limitations occur due to soil, slope, temperatures or rainfall. These areas are non-arable. The "L6" land potential of the assessment area is characterized with an

overall "Low" sensitivity following the baseline findings. Land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also fall within the DAFF, (2017) requirements for a compliance statement report only. The DEA screening tool, (2022) shows that there are no crop fields with "High" sensitivity within the assessment area and as a result there will be no segregation of crop production (refer to **Figure 9.6**). It is the specialist's opinion that the proposed solar power project will have limited impact on the agricultural production ability of the land.

9.5.2 Overall Result

It is the specialist's opinion that the proposed solar power project will have limited impact on the agricultural production ability of the land. Additionally, the proposed activities will not result in the segregation of any high production agricultural land. Therefore, the proposed solar power project may be favourably considered.

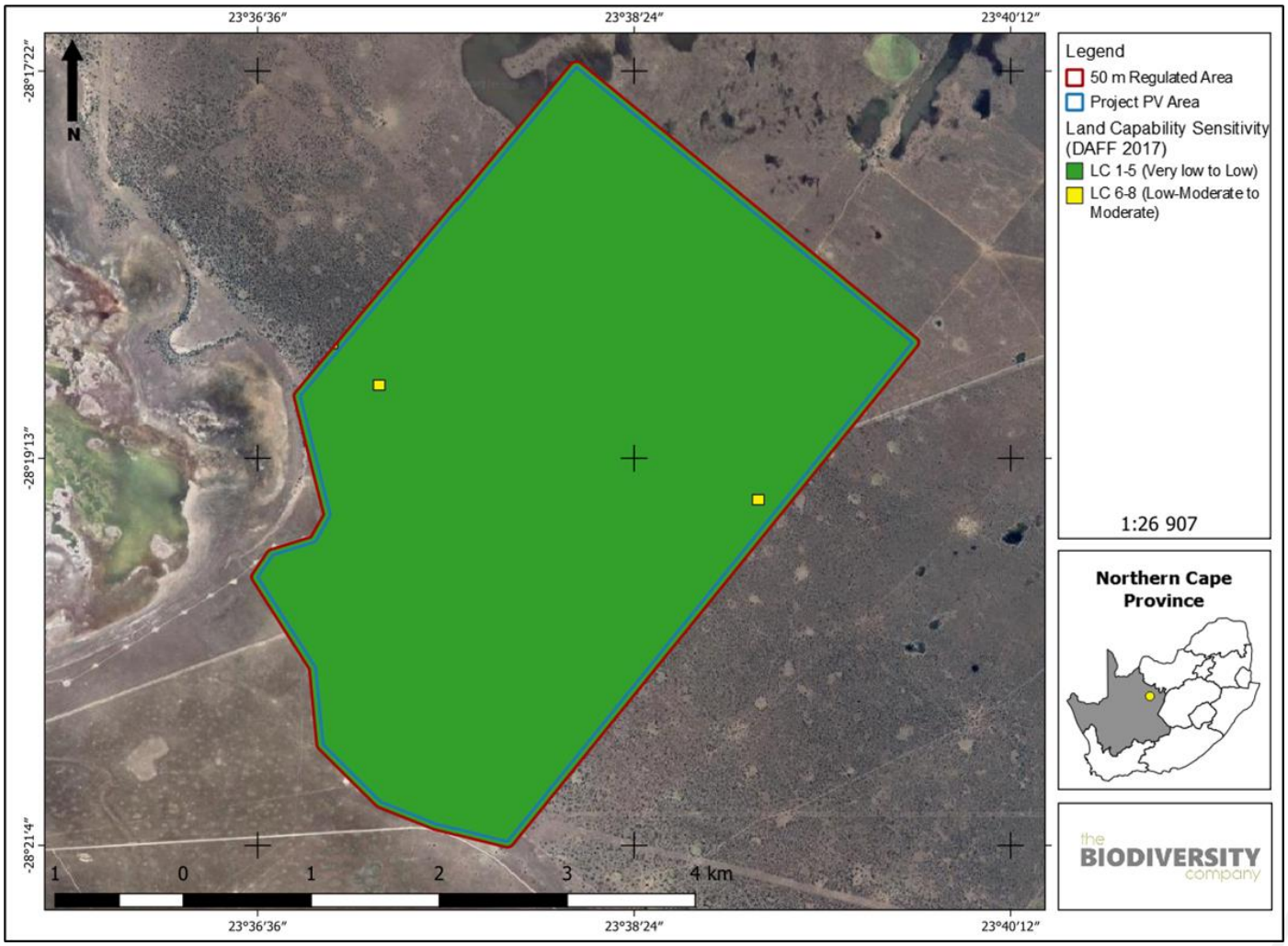


Figure 9.6: Land capability present within the Limestone PV1 project site.

9.6. Assessment of Heritage impacts (including Archaeology and Palaeontology)

Various impacts have been identified with the development of Limestone PV1 from a heritage perspective. Potential impacts on heritage resources and the relative significance of the impacts associated with the development of Limestone PV1 are summarised below (refer to **Appendix J** for more details).

9.6.1 Results of the Heritage Impact Assessment

Archaeology

Most of these observations were made of open-air stone tool scatters dating to the Middle Stone Age (MSA) using the abundant and locally available sources of hornfels stone. There was a strong early MSA component distributed throughout the area and weathering and deposition conditions are favourable in many areas of the study site to view these artefacts on the surface. Larger numbers of Later Stone Age (LSA) scatters were also found, particularly on the level ground surrounding the wetlands near the pans for the PV area.

Certain features and resources at the England farm, previously recorded, are worthy of conservation such as the farm graves and the stone walling in the farm complex. This complex was originally assigned a 500m buffer for panels. However, it was noted that as the site will form part of the operational infrastructure a buffer area of 300m would be appropriate.

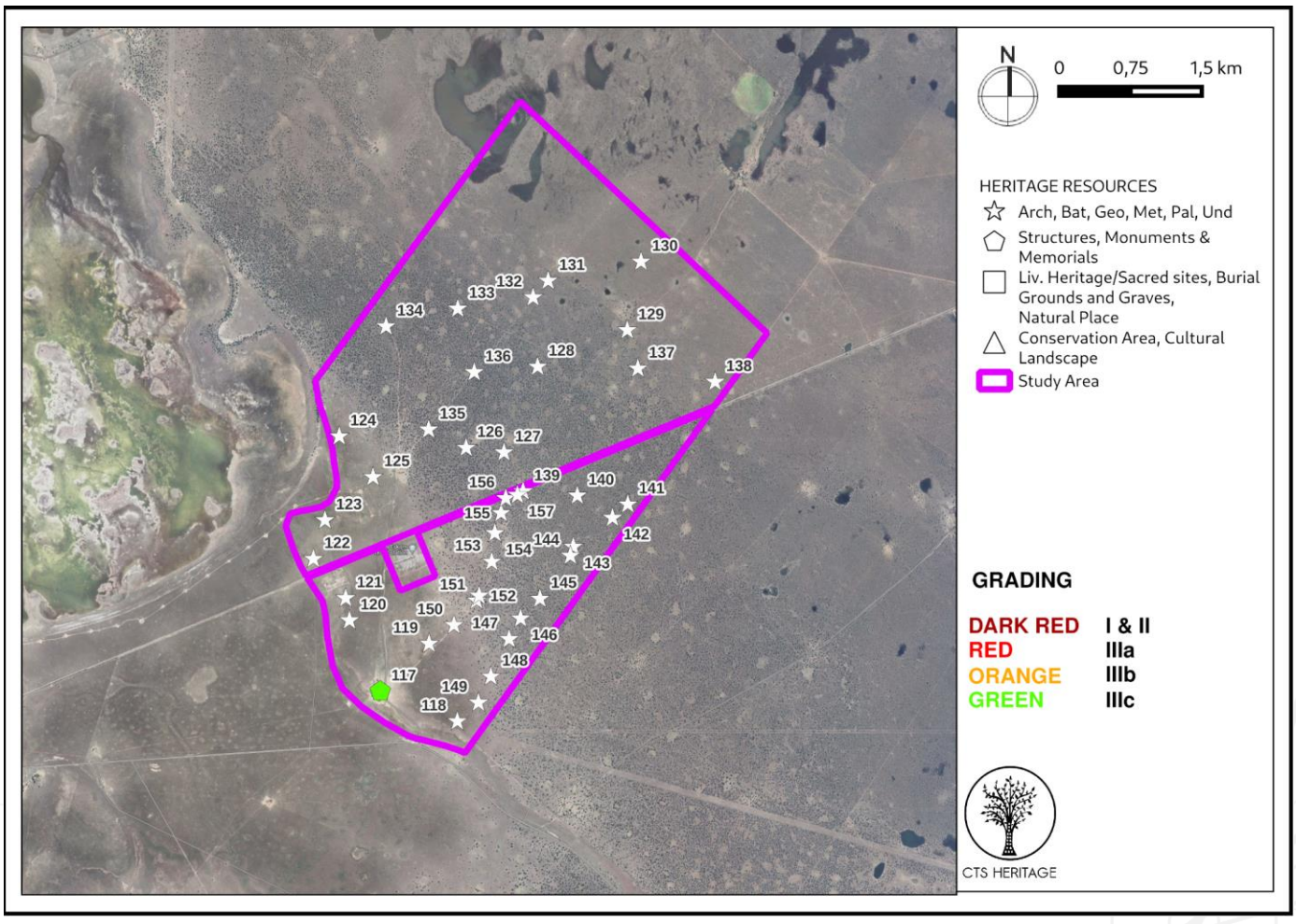


Figure 9.7: Archaeology map indicating the sensitivity of the Limestone PV1 project site

Cultural Landscape

In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character, however there are numerous existing powerlines and substations in proximity to the proposed site which results in the visual quality of the region being moderate. The anticipated significance of the visual impacts on the sense of place within the region (i.e., beyond a 6km radius of the development and within the greater region) is expected to be of moderate significance. The following recommendations are adapted from Winter and Wilson (2021) in terms of Solar PV placement ("where" and "how"). The following general principles apply to the PV layout:

- Avoid steep slopes.
- Avoid proximity to historic corridors.
- Avoid placement within viewshed of farmsteads.

The layouts provided comply with the above general principles.

Palaeontology

A few weathered stromatolite outcrops were identified in the development footprint. Due to the weathered and relatively scarce stromatolite finds during the site visit it is proposed that the development will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

However, just east of the development, well-preserved stromatolite outcrops in the Lime Acers Member (Altermann & Wotherspoon 1995) were identified, while Almond (2015) found well-preserved stromatolites south of the R385, north of Lime Acres. These well-preserved outcrops are located just south-west of the present study area. The possibility of well-preserved stromatolite finds is thus possible.

According to the SAHRIS Palaeosensitivity Map (refer to **Figure 9.8**), the development area is located within an area of high sensitivity whilst the project site extends over sediments of high and very high palaeontological sensitivity.

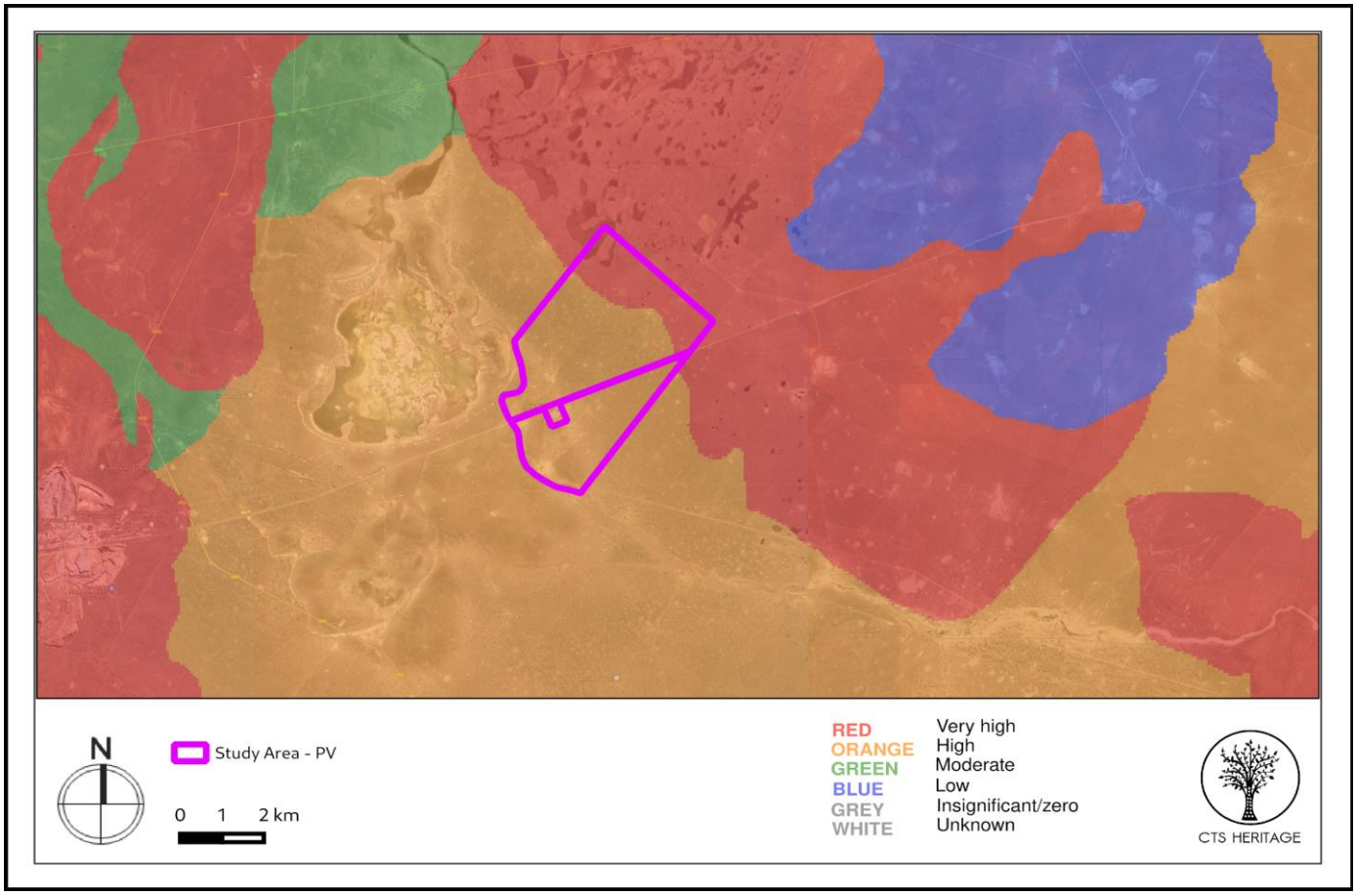


Figure 9.8: Palaeosensitivity map indicating the sensitivity of the Limestone PV1 project site

The development of Limestone PV1 is likely to result in a variety of impacts from a heritage perspective. Potential impacts and the relative significance of the impacts are summarised below. A heritage sensitivity map has been included in **Figure 9.9.**

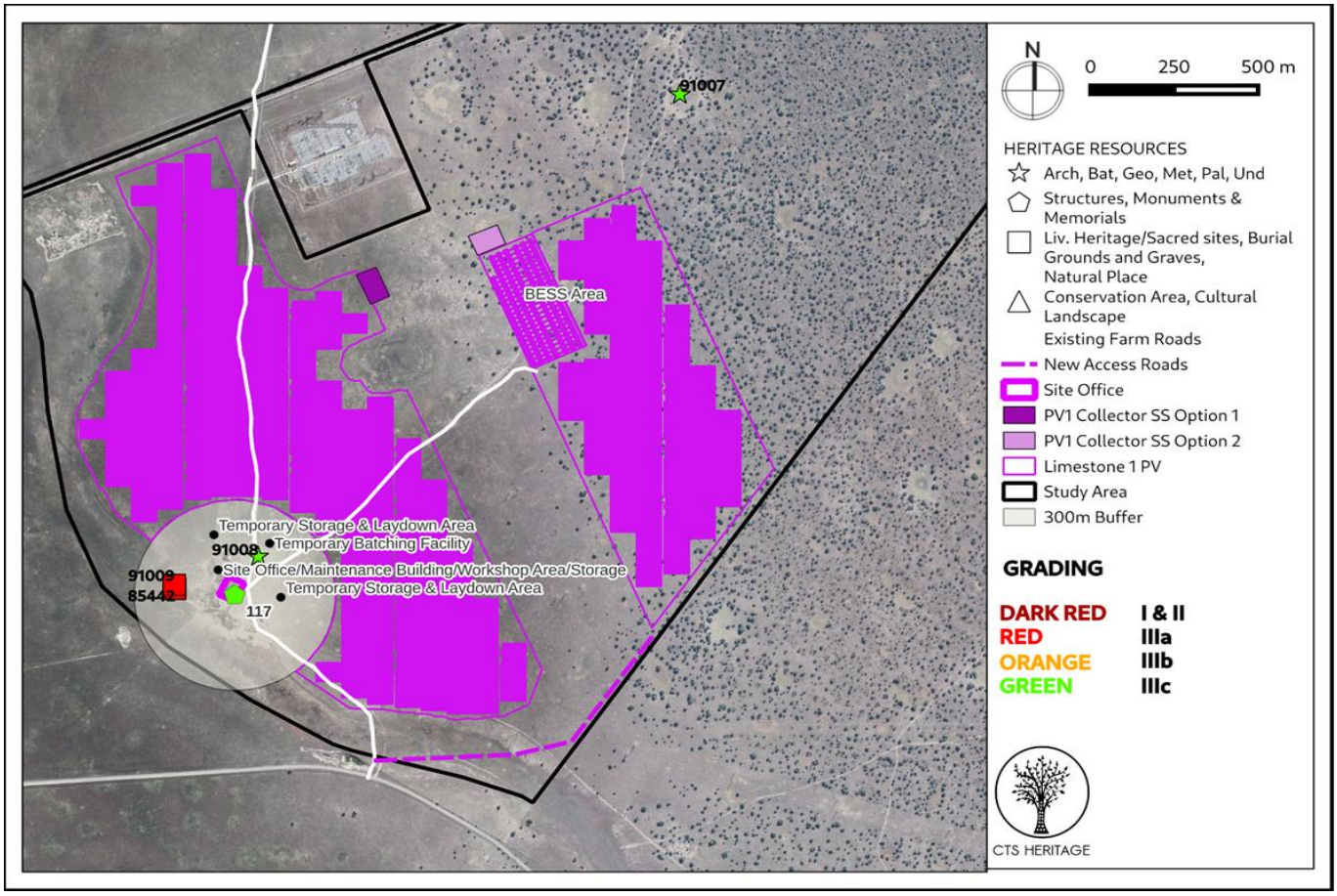


Figure 9.9: Heritage resources located within the Limestone PV1 project site.

9.6.2 *Description of the Heritage Impacts*

The following impacts are expected from a heritage perspective:

» Impact to archaeological resources
» Impact to palaeontological resources
» Impact to Cultural Landscape

9.6.3 *Impact tables summarising the significance of impacts on heritage during construction, operation, and decommissioning (with and without mitigation*

Nature: *Cultural Landscape Heritage Resources impacted by the Solar Energy Facility* The broader context of the area proposed for development has cultural significance that may be impacted by the proposed development		
	Without mitigation	**With mitigation**
Extent	Regional (5)	Regional (5)
Duration	High (4)	High (4)
Magnitude	Moderate (5)	Moderate (5)
Probability	Probable (5)	Improbable (1)
Significance	**High (70)**	**Low (13)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

- A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented

Residual Impacts:

Expected to be negligible with the implementation of the mitigation measures.

Nature: *Archaeological Heritage Resources impacted by the Solar Energy Facility*

The area proposed for development is known to conserve heritage resources of archaeological significance that may be impacted by the proposed development

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	High (5)	High (5)
Magnitude	High (7)	High (7)
Probability	Probable (4)	Improbable (1)
Significance	**Medium (52)**	**Low (13)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

» The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities.

- Should any previously unrecorded heritage resources be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.

Residual Impacts:

Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources. However, with the implementation of the mitigation measures, any impact would be considered very low significance.

Nature: *Palaeontological Heritage Resources impacted by the Solar Energy Facility*

It is possible that buried palaeontological resources may be impacted by the proposed development in the preferred location

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	High (5)	High (5)
Magnitude	Low (1)	Low (1)
Probability	Probable (4)	Improbable (1)
Significance	**Low (7)**	**Low (7)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Unlikely	Unlikely
Can impacts be mitigated?	Yes	

Mitigation:

- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities
- Should any previously unrecorded palaeontological resources be identified during the course of construction activities, work must cease in the immediate vicinity of the find, and SAHRA must be contacted regarding an appropriate way forward.
-

Residual Impacts:
Should any significant archaeological resources be impacted (however unlikely) residual impacts may occur, including a negative impact due to the loss of potentially scientific cultural resources

9.6.4 Overall Result

It is the specialist's opinion that the proposed solar power project will not negatively impact on significant heritage resources on condition that:

- The recommendations of the VIA must be implemented.
- A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.
- The attached Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- 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. 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.

No fatal flaws associated with the development footprint were identified. Given the avoidance of sensitive features at the site by the facility layout no high impacts are likely to occur as a result of the development. It is the specialist's opinion that development may be favourably considered.

9.7. Assessment of Visual impacts

The development of Limestone PV1 is likely to result in visual impacts on the surrounding area. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix K** for more details).

9.7.1 Results of the Visual Impact Assessment

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed Limestone PV 1 Facility are displayed on **Figure 9.10**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

The criteria which inform the visual impact index are:

» Visibility or visual exposure of the structures
» Observer proximity or visual distance from the structures
» The presence of sensitive visual receptors
» The perceived negative perception or objections to the structures (if applicable)
» The visual absorption capacity of the vegetation cover or built structures (if applicable)

An area with short distance visual exposure to the proposed infrastructure, a high viewer incidence and a potentially negative perception (i.e. a sensitive visual receptor) would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential magnitude of the visual impact.

The index indicates that potentially sensitive visual receptors within a 1km radius of the proposed facility may experience a very high visual impact. The magnitude of visual impact on sensitive visual receptors subsequently subsides with distance to; high within a 1–3km radius (where/if sensitive receptors are present) and moderate within a 3–6km radius (where/if sensitive receptors are present). Receptors beyond 6km are expected to have a low potential visual impact.

Magnitude of the potential visual impact

The Limestone PV1 facility may have a visual impact of **very high** magnitude on observers (within a 0-1km radius):

- Residents of/visitors to England (sites 1 and 3)
- Observers travelling along: The Secondary road (site 2)

The Limestone PV1 facility may have a visual impact of **high** magnitude on the following observers (1 – 3km radius).

- Residents of/visitors to Langverwag (site 4)
- Observers travelling along: The secondary road

The Limestone PV1 facility may have a visual impact of **moderate** magnitude impact on observers located between a 3 – 6km radius. Residents of/visitors to:

- Oliënspruit (site 5)
- Witput (site 6)
- Dikbos (site 7)
- Murray (site 8)
- Silverstreams (site 9 and 10)
- Outpost (site 11)
- Beadle (sites 12 and 13)
- Unknown (sites 14 and 15)

Observers travelling along the secondary road

The PV facility may have a visual impact of **low** magnitude impact on the following observers located beyond the 6 km radius of the PV Facility. Residents of/visitors to:

- Vleiplaas (site 16)
- Paddafontein (site 17)
- Tevrede (site 18)
- Jonasbank (site 19)
- Aandrus (site 20)
- Hinton George (site 21)
- Excelsior (site 22)

Observers travelling along various secondary roads, the R385 and R31

Note: *Where any of the above-mentioned homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.*

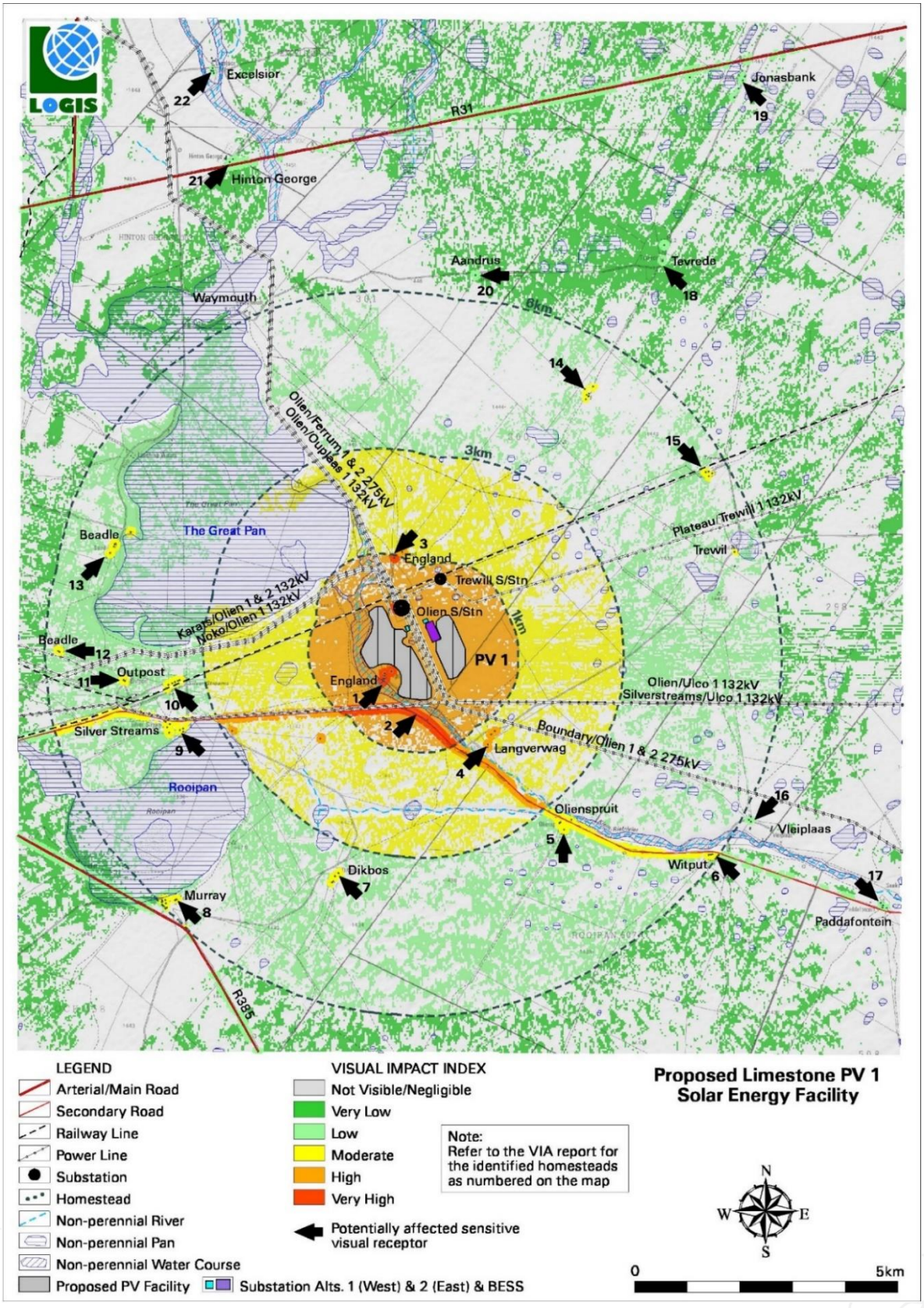


Figure 9.10: Visual impact of the development area within which the facility infrastructure will be placed.

9.7.2 Description of Visual Impacts

During the construction and decommissioning period there will be an increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity (within 1km). Additionally, dust as a result of the construction activities and construction equipment (i.e. cranes), temporary laydown areas, construction camps, etc. may also be visible at the site, resulting in a visual impact occurring during construction.

The operation of the Limestone PV1 will have a visual impact on observers/visitors residing at homesteads within a 6km radius of the proposed facility. The impact on sensitive visual receptors in the area greater than 6km away is considered to be of low significance. A mitigating factor in this scenario is the low occurrence of receptors within the receiving environment and that observers traveling along these roads will only be exposed to the visual intrusion for a short period of time. This reduces the probability of this impact occurring.

The area immediately surrounding the proposed facility has a relatively low incidence of receptors and light sources, so light trespass and glare from the security and after-hours operational lighting for the facility will have some significant impact. Lighting impacts relate to the effects of glare and sky glow. The source of glare light is unshielded luminaries which emit light in all directions and which are visible over long distances. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow. It is possible that the PV facility may contribute to the effect of sky glow within the environment which is currently undeveloped.

Glint and glare occurs when the sun reflects off surfaces with specular (mirror-like) properties. Examples of these include glass windows, water bodies and potentially some solar energy generation technologies (e.g. parabolic troughs and CSP heliostats). Glint is generally of shorter duration and is described as "a momentary flash of bright light", whilst glare is the reflection of bright light for a longer duration. The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relative close proximity to the source (e.g. users of the secondary road), or aviation safety risk for pilots (especially where the source interferes with the approach angle to the runway). The Federal Aviation Administration (FAA) of the United States of America have researched glare as a hazard for aviation pilots on final approach and may prescribe specific glint and glare studies for solar energy facilities in close proximity to aerodromes (airports, airfields, military airbases, etc.). There are no major, arterial or secondary roads within a 1km radius of the proposed PV facility, however a railway line is located within 50 m of the proposed site. 1km is the approximate distance is recommended as a threshold within which the visual impact of glint and glare (if there is visual line of sight from the road) may influence road users and 100 m for railway.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character, however there are numerous existing powerlines and substations in close proximity to the proposed site which results in the visual quality of the region being moderate.

9.7.3 Impact tables summarising the significance of visual impacts during construction, operation and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: *Potential visual impact of construction activities on sensitive visual receptors in close proximity (within 1km) to the proposed PV facility.*
During the construction period there will be an increase in heavy vehicles utilising the roads to the construction sites that may cause, at the very least, a visual nuisance to other road users and landowners in the area in close proximity (within 1km). Additionally, dust as a result of the construction activities and construction equipment (i.e. cranes), temporary laydown areas, construction camps, etc. may also be visible at the site, resulting in a visual impact occurring during construction

	Without mitigation	**With mitigation**
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Short term (2)	Short term (2)
Magnitude	Very high (10)	High (8)
Probability	Highly probable (4)	Probable (3)
Significance	**High (64)**	**Moderate (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain and maintain natural vegetation in all areas outside of the development footprint, but within the project site.

Construction:

- Ensure that vegetation is not unnecessarily removed during the construction period.
- 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.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities.
- Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
- Rehabilitate all disturbed areas immediately after the completion of construction works.

Residual Impacts:
None, provided that rehabilitation works are carried out as required.

Operational Phase Impacts

Nature: *Potential visual impact on sensitive visual receptors located within a 1km radius of the PV Facility* The direct visual impact of the facility due to its operation		
	Without mitigation	**With mitigation**
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Very high (10)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**High (72)**	**Moderate (42)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning: • Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. • Consult adjacent landowners (if present) to inform them of the development and to identify any (valid) visual impact concerns. Operations: • Maintain the general appearance of the facility as a whole. • Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible. • Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.		

Nature: *Potential visual impact on sensitive visual receptors within the 1 – 3km radius* Visual impact on observers travelling along the road and residents at the Langverwag homestead within a 1 – 3km radius of the facility		
	Without mitigation	**With mitigation**
Extent	Short distance (3)	Short distance (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Moderate (45)**	**Low (26)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Planning: • Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site. Operations: • Maintain the general appearance of the facility as a whole.		

- Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible.
- Investigate the potential to screen affected receptor sites (if applicable and located within 1-3km of the facility) with planted vegetation cover.

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

Nature: *Potential visual impact on sensitive visual receptors within the 3 – 6km radius*
Visual impact on observers travelling along the roads and residents at homesteads within a 3 – 6km radius of the facility

	Without mitigation	**With mitigation**
Extent	Medium distance (2)	Medium distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Moderate (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
Planning:
- Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:
- Maintain the general appearance of the facility as a whole.
- Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible.
- Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.

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

Nature: *Potential visual impact on sensitive visual receptors within the greater area (beyond 6km radius)*
Visual impact on observers travelling along the roads, residents at homesteads and protected areas beyond the 6km radius of the facility

	Without mitigation	**With mitigation**
Extent	Long distance (1)	Long distance (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Very improbable (1)
Significance	**Low (18)**	**Low (9)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:

- Maintain the general appearance of the facility as a whole.
- Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible.
- Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.

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

Nature: *Potential visual impact of operational, safety and security lighting of the facility at night*
Visual impact of lighting at night on sensitive visual receptors.

	Without mitigation	**With mitigation**
Extent	Short/Medium (3)	Short/Medium (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	**Moderate (60)**	**Moderate (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
Planning & operation:

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

Residual Impacts:
The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain

Nature: *Potential visual impact of solar glint and glare as a visual distraction and possible rail/road travel hazard*
The visual impact of solar glint and glare as a visual distraction and possible rail travel hazard

	Without mitigation	**With mitigation**
Extent	Very short distance (4)	N.A
Duration	Long term (4)	N.A
Magnitude	Moderate (6)	N.A
Probability	Probable (3)	N.A
Significance	**Moderate (42)**	N.A
Status (positive or negative)	Negative	N.A
Reversibility	Reversible (1)	N.A
Irreplaceable loss of resources?	No	N.A

Can impacts be mitigated?	N.A.
Mitigation: Planning & operation: • Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover. • Use an anti-reflective coating on the panels	
Residual Impacts: N.A.	

Nature: *Potential visual impact of solar glint and glare on static ground-based receptors (residents of homesteads) in close proximity (within 1km) to the PV facility*

The visual impact of solar glint and glare on residents of homesteads in closer proximity to the PV facility

	Without mitigation	**With mitigation**
Extent	Very short distance (4)	Very short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	**Moderate (48)**	**Low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning & operation:

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

Residual Impacts:

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

Nature: *Visual impact of the ancillary infrastructure*

Visual impact of the ancillary infrastructure on observers in close proximity to the structures.

	Without mitigation	**With mitigation**
Extent	Very Short distance (4)	Very Short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (24)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning:

- Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:

- Maintain the general appearance of the facility as a whole.

- Retain/re-establish and maintain natural vegetation (if present) immediately adjacent to the development footprint, where possible.
- Investigate the potential to screen affected receptor sites (if applicable and located within 1km of the facility) with planted vegetation cover.

Residual Impacts:
The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed and the area rehabilitated. Failing this, the visual impact will remain.

Nature: *The potential impact on the sense of place of the region.*
In general, the landscape character of the greater study area and site itself presents as largely undeveloped and natural in character, however there are numerous existing powerlines and substations in close proximity to the proposed site which results in the visual quality of the region being moderate.

	Without mitigation	**With mitigation**
Extent	Long distance (1)	Long distance (1)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	**Moderate (39)**	**Moderate (39)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	

Mitigation:
Planning:
- Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint/servitude, but within the project site.

Operations:
- Maintain the general appearance of the facility as a whole.

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

Decommissioning Phase Impacts

Nature: *Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed facility.*
During decommissioning there may be a noticeable increase in heavy vehicles utilising the roads to the site that may cause, at the very least, a visual nuisance to other road users and landowners in closer proximity (< 1 km) to the decommissioning activities.

	Without mitigation	**With mitigation**
Extent	Very short distance (4)	Very short distance (4)
Duration	Very Short term (1)	Very Short term (1)
Magnitude	High (8)	Moderate (6)
Probability	Definite (5)	Highly probable (4)
Significance	**High (65)**	**Moderate (48)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:
Decommissioning:

• Remove infrastructure not required for the post-decommissioning use of the site. • Rehabilitate all areas as per the rehabilitation plan undertaken. Consult an ecologist regarding rehabilitation specifications. • Monitor rehabilitated areas post-decommissioning and implement remedial actions as required.
Residual Impacts: None, provided rehabilitation works are carried out as specified.

9.7.4 Overall Result

The findings of the Visual Impact Assessment undertaken for the proposed Limestone PV 1 Facility is that the visual environment surrounding the site, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e. a minimum of 20 years).

The following is a summary of impacts remaining:

» Construction activities may potentially result in a high temporary visual impact, that may be mitigated to moderate.
» The operation of the proposed PV facility is expected to have a high visual impact that may be mitigated to moderate on sensitive visual receptors within a 1km radius of the PV facility.
» The operational facility could have a moderate visual impact (significance rating = 45) which may be mitigated to low (significance rating = 26) on residents/visitors to the homestead of Langverwag as well as observers travelling along the secondary road within 1 – 3km radius of the facility.
» The operational facility could have a moderate visual impact (significance rating = 36) which may be mitigated to low (significance rating = 24) on residents/visitors to the various homesteads as well as observers travelling along the secondary road within 3 – 6km radius of the facility.
» The operational facility could have a low visual impact both pre and post mitigation on residents/visitors to various homesteads as well as observers travelling along the various secondary roads beyond the 6km radius of the facility.
» This anticipated lighting impact is likely to be of high significance and may be mitigated to moderate especially within 0-3 km radius of the PV facility.
» The potential visual impact related to solar glint and glare as a rail travel hazard is expected to be of moderate significance.
» There are two (2) affected residences within a 1km radius of the proposed PV facility, namely England. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of moderate significance before mitigation and low post mitigation.
» The anticipated visual impact resulting from ancillary infrastructure is likely to be of low significance both before and after mitigation.
» Decommissioning activities may potentially result in a high pre mitigation and moderate post mitigation.
» The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6 km radius of the development and within the greater region) is expected to be of Moderate significance.
» The anticipated cumulative visual impact of the proposed facility is expected to be of high significance.

The anticipated visual impacts listed above (i.e., post mitigation impacts) range from prominently moderate to low significance. One visual impact of high is anticipated in terms of the cumulative visual impact of the proposed Limestone PV facilities. Anticipated visual impacts on sensitive visual receptors (if and where

present) in proximity to the proposed Limestone PV 1 Facility are not considered to be fatal flaws for the proposed PV facility.
A number of mitigation measures have been proposed that are considered to be good practice. These measures should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

If mitigation is undertaken as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the Limestone PV 1 facility would be considered acceptable from a visual impact perspective and can therefore be authorised.

9.8. Assessment of Social Impacts

Various positive and negative impacts have been identified with the development of Limestone PV1 from a social perspective. Potential social impacts and the relative significance of the impacts associated with the development of Limestone PV1 are summarised below (refer to **Appendix L**).

9.8.1 Results of the Social Impact Assessment

The Republic of South Africa's White Paper on Energy Policy of 1998 stated that because renewable energy resources operate from an infinite resource base, such as the sun, renewable energy can increasingly contribute to long-term sustainable energy for future generations. This policy also emphasizes that, due to South Africa's unlimited renewable energy resource base, renewable energy applications such as solar and wind energy are more sustainable in terms of social and environmental costs. The development of the proposed solar facility is therefore supported by key policy and planning documents.

Renewable energy applications are supported by policy documents at the provincial, district, and local levels. The use of renewable energies is not explicitly addressed in policy documents at the provincial, district, and local levels; however, the transition to low-carbon economies and the reduction of municipal areas' carbon footprint, as well as their support for alternative energies as a Local Economic Development (LED) program, are mentioned. More employment opportunities are being created to reduce community vulnerabilities in order to ensure more resilient communities and a more sustainable economy.

According to a review of relevant policies and documents related to the energy sector, renewables such as solar energy and the establishment of these facilities are supported at all levels of government. The author of this SIA report believes that the establishment of the Limestone PV1 solar Energy Facility is supported by the policies and planning documents reviewed in this section at all levels of government.

The project is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality of the Northern Cape. The number of economically active people within the Kgatelopele Local Municipality is slightly higher than the number of non-economically active people, resulting in a very high dependency ration of 50.6%. According to Stats 2011, the unemployment rate is 22.3% and 29.1% of all unemployment people are young adults. There is a need to address the difficulties faced by those who are unemployed, especially young people.

The site is located in a relatively sparsely inhabited rural area with 7.5 people per km^2 within the local municipality. In addition to Lime Acres, a number of isolated homesteads occur within the project site and surrounding areas. The immediate study area sense of place influenced by the present of the proposed

development is located near Danielskuil, a densely populated industrial area which will absorbs the visual change that the proposed project brings about. Eskom's Olien Substation and high voltage power lines is a prominent feature when approaching town from the south R31 connecting Danielskuil with Kuruman and runs north-south through the town. The visual exposure for the Limestone PV1 Solar energy facility would largely be concentrated on the site itself and extend to the west, south and southeast. The findings from Visual Impact Assessment.

9.8.2 Description of Social Impacts

Potential social impacts resulting from the proposed development would stem from a variety of different activities and risk factors associated include the following:

Construction
» Creation of employment opportunities (Positive)
» Potential risks to livestock and farming infrastructure and the presence of workers on site (Negative)
» In- migration or potential influx of job seekers (Negative)
» Potential impacts of heavy and construction related activities (Negative)
» Increase Traffic (Negative)

Operation
» Creation of local employment and business opportunities, skills development, and training (Positive)
» The development of infrastructure for the generation of renewable energy (Positive)
» Visual impacts and associated impacts on the sense of place (Negative)

Decommissioning
» Loss of income and employment (Negative)

9.8.3 Impact tables summarising the significance of social impacts during construction, operation, and decommissioning (with and without mitigation)

Construction Phase Impacts

Nature: *The creation employment opportunities and skills development* According to the information provided, the construction phase of the proposed Limestone PV1 Solar Energy Facility will extend over a period of 12 months. A total of between 750-900 people are expected to be employed during construction phase. This will provide a social benefit to the community. The construction phase will also be beneficial for the local service industry. The possible employment prospects would be related to transportation, security, cleaning, catering, and accommodation needs for the construction workers. The availability of lodging will also help the region's hospitality economy.		
	Without Enhancement	**With Enhancement**
Extent	Local- Regional (3)	Local- Regional (3)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly Probable (4)
Significance	**Low (27)**	**Medium (44)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A

Can impacts be enhanced?	Yes

Enhancement:

To enhance the local employment, skills development and business opportunities associated with the construction phase, it is recommended that the following measures be considered for implementation:

- Adoption of a local employment policy to maximise the opportunities made available to the local labour force. The AVG Projects (Pty) Ltd should make it a requirement for contractors to implement a 'locals first' policy, especially for semi and low skilled job categories.
- Enhance employment opportunities for the immediate local area, i.e., Kgatelopele Local Municipality. If this is not possible, then the broader focus areas should be considered for sourcing workers.
- The recruitment selection process must seek to promote gender equality, consideration must be given to women during the process.
- It is recommended that realistic local recruitment targets be set for the construction phase.

Residual Impacts:

The residual impacts associated with the creation of employment, business opportunities and training during the construction phase is that the workers can improve their skills by gaining more experience, improve quality of life and economic growth for small-scale entrepreneurs.

Nature: *The potential impact posed to farmers and farm workers due to the presence of construction workers on site. These impacts might include safety risks, damage to farming infrastructure and loss of livestock and theft.*

During the construction phase of the Limestone PV1 Solar Energy Facility the presence of construction workers on the project site poses potential risks to the local farmers. These possible risks could include stock theft, loss of livestock as a result of broken fences and open farm gates, damage to farming infrastructure including gates and fences, and so on. The owner of the farm who was interviewed for this SIA said that having staff on the property is a concern. Her worries are about potential damage to farming infrastructure, theft, security issues, and unauthorized trespassing on sites other than the project site. It is also recommended that if workers are moving to and from the site and also travel in vehicles that are clearly marked from which company they are.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2))
Probability	Medium Probability (3)	Improbable (1)
Significance	**Low (24)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, through compensation	Yes, through compensation
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:

- The movement of construction workers should be limited to the vicinity of the site. Create and implement a local procurement policy that prioritizes "locals first", as far as possible, to reduce the number of people migrating to the area in search of work.
- Transportation for the construction workers needs to be arranged by the contractor to ensure that there will be no trespassing of properties by any staff.
- Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses. Any form of theft, damaged infrastructure and trespassing will lead to immediate dismissal and the workers would be held liable for the costs thereof.

Residual Impacts:

No residual impacts because the potential losses can be compensated for.

Nature: Potential impacts associated with the Influx of job seekers

In the case of large construction projects, job seekers tend to migrate to the development area in search of work. In some cases, the job seekers' families accompany them. Whether or not the job seekers find work, they and their families may become economically stranded in the surrounding area. The influx of job seekers has no direct social impact, but their presence and behaviours can have an impact on community structures and social networks, competition for housing and jobs, which can lead to xenophobia and crime.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Minor (2))
Probability	Medium Probability (3)	Improbable (1)
Significance	**Low (24)**	**Low (6)**
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated	Yes	

Mitigation:

- In collaboration with the municipality and local community leaders, create and implement a recruitment protocol. Make certain that the procedures for applying for jobs are clearly communicated.
- Create and implement a local procurement policy that prioritizes "locals first" to prevent people from migrating to the area in search of work.
- Prior to construction, engage with local community representatives to facilitate the adoption of the "locals first" procurement policy.
- Provide workers with transportation (from towns such as Danielskuil, Postmasburg, and others) so that they can easily access their place of employment and do not need to relocate closer to the site.
- Prevent the recruitment of workers at the site.
- Create and implement a grievance procedure.
- Appoint a Community Liaison Officer (CLO) to assist with local labour procurement.
- Implement a method of communication in which procedures for lodging complaints are laid out so that the local community can express any complaints or grievances about the construction process.
- Establish clear access rules and regulations for the proposed site.
- Appoint a security company and put in place appropriate security procedures to ensure that employees do not remain on the premises after working hours.
- Inform local community organizations and law enforcement forums about construction activities, times, and duration.

Residual Impacts:

Possibility of outside workers remaining in the neighbourhood after construction is completed and subsequent pressures on local infrastructure.

Nature: Potential noise, dust, and safety impacts associated with construction-related activity movement and traffic movement to and from the site

The main entrance to the site is on a gravel road entrance. The gravel road (main entrance) provides access to the farms in the area. The movement of heavy construction vehicles during the construction phase might potentially damage the current farm roads and in the process also increase traffic, create dust and safety impacts in the associated area. The road surface of the gravel road may deteriorate and will have to be maintained. The contractor should thus repair all the damages to the gravel road before the end of construction phase. The landowner that was interviewed for the purpose of this SIA expressed her concern regarding the possible damage to the existing road.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	High Probability (4)	Probable (3)
Significance	**Medium (40)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:

- During the construction phase, working hours should ideally be limited to daylight hours. Where a change in working hours is required, the relevant authorities must approve it, and surrounding landowners must be notified.
- All vehicles must be roadworthy, and drivers must be licensed, follow traffic rules, adhere to speed limits, and be made aware of potential road safety issues.
- The EPC contractor should inspect construction vehicles on a regular basis to ensure their roadworthiness.
- For the duration of the construction period, it is necessary to establish traffic warning signs and control measures that are adequate and strategically located along the R385 and gravel access roads. At all times, but especially at night, warning signals must be seen.
- Ongoing communication with landowners and road users during construction period.
- It is necessary to create communication lines between the EPC contractor and the impacted and nearby landowners. A Community Liaison Officer should be recruited to carry out the suggested grievance mechanism.
- To allow the local community to voice any issues or grievances over the construction process, a mechanism of contact with clear processes for filing complaints should be created.
- Dust suppression measures must be implemented on un-surfaced roads, such as wetting on a regular basis and ensuring that vehicles used to transport building materials are fitted with tarpaulins or covers.
- Before construction begins, hold informational seminars to ensure that the nearby communities are fully informed about the project that will be produced in its finished form. This needs to be done via the Community Liaison Officer (CLO).

Residual Impacts:

If damage to local roads is not repaired, it will affect other road users and result in higher maintenance costs. The costs will be borne by road users who were not at fault for the damage.

Nature: Increased risk of potential veld fires

During the construction phase there is an increased risk of veld fires due to the presence of construction related activities as well as the presence of construction workers on site. The risk of veld fires poses further threats to the loss of livestock, crops and farmsteads in the area. This could result in the loss or damage of farm infrastructure and also threaten human lives. All farmers that were interviewed for the purpose of this SIA expressed their concern regarding the risk of veld fires during the construction phase. They have all suggested that the necessary mitigation measures should be taken, the site need to be equipped with the correct firefighting equipment and workers should be trained in firefighting and how to work with the equipment. They also mentioned that any damages caused due to veld fires borne from the construction phase need to be compensated for by the contractors.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated	Yes	

Mitigation:

- A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site.
- Adequate fire-fighting equipment should be provided and readily available on site and staff should be trained in fire-fighting and how to use the fire-fighting equipment.
- No staff (except security) should be accommodated over-night 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.
- 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.
- Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.
- 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.

Residual Impacts:

If damage to local roads is not repaired, it will affect other road users and result in higher maintenance costs. The costs will be borne by road users who were not at fault for the damage.

***Nature*: Assessment of potential impacts related to the presence of construction workers on local communities**

The potential impact posed to farmers and farm workers due to the presence of construction workers on local communities. These impacts include the risks posed to family structures and social networks of the local community. The potential impacts associated with the presence of the construction workers on the local economies include the posed risks associated with family structures and social networks. The manner in which construction workers conduct themselves might have an impact on the local communities. A review of previous solar PV stated that the potential impact is linked to risky behaviour like, the increase in alcohol and drug use, crime levels increasing, increased unwanted pregnancies and prostitution, and an increase in sexually transmitted diseases.

	Without mitigation	***with mitigation***
Extent	Local (2)	Local (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low(4)	Low (4)
Probability	Probable (3)	Probable (3)

Significance	**Low (24)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	Yes
Can impacts be enhanced?	Yes	

Mitigation:

The following mitigation measures can be implemented to effectively mitigate the potential impacts identified above, related to the presence of construction workers on the local community:

- The proposed site of the PV Facility should be fenced off and the movement of construction workers should be limited to the vicinity of the site.
- Transportation for the construction workers need to be arranged by the contractor to ensure that there will be no trespassing of properties by any staff. Necessary arrangements to enable workers to return to their hometowns over weekends should also be arranged in order to reduce the risks posed to local family structures and social networks.
- No staff should be accommodated over night on site, except for security staff.
- Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses. This code of conduct should also outline the acceptable behaviour and activities of construction workers.
- Awareness programmes for HIV/AIDS should be implemented for the construction workers.

Residual Risks:

No residual impacts

Operation Phase Impacts

Nature: Creation of local employment and business opportunities, skill development and training.

Low educational levels in the Kgatelopele Municipality make it beneficial for the community in the long run to execute a capacity building and skills development training program. As people receive training, their income will rise, and their material and economic well-being will advance. The majority of individuals in the area work in mining, agriculture, and then community services. Since the energy industry is new to the area, the available talent pool is small. Members of the community will be able to work at other similar projects in the region with the help of their acquired skills.

	Without Enhancement	**With Enhancement**
Extent	Local -Regional (3)	Local - Regional (3)
Duration	Long term (4)	Long-term (4)
Magnitude	Low (4)	Low (4)
Probability	Medium Probable (3)	High Probable (4)
Significance	**Medium (33)**	**Medium (44)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Enhancement measures:

- It is recommended that a local employment policy is adopted by the Project Developer to maximise the project opportunities made available to the local community. Enhancement of employment opportunities for the immediate local area, KLM, if this is not possible, then the broader focus areas should be considered for sourcing employees.

- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- Wherever practicable, vocational training programs ought to be implemented to support employee skill development.
- Proof of skills development must be provided to the upskilled and individual.

Residual Impacts:
Improved pool of skills and experience in the local area

Nature: development of infrastructure for the generation of renewable energy
Most South Africa's energy requirements are now satisfied by coal, according to an analysis of prior projects. Although the projected Limestone PV1 will only make a relatively small contribution to South Africa's overall electricity grid, it will help offset the country's overall carbon emissions from the energy generation sector. The projected Limestone PV 1 will benefit the energy sector in this regard as an Independent Power Provider (IPP) for renewable energy.

	Without Enhancement	**With Enhancement**
Extent	Local – Regional -National (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Highly Probable (4)	N/A
Significance	**Medium (40)**	**N/A**
Status (positive or negative)	Positive	N/A
Reversibility	Yes	N/A
Irreplaceable loss of resources?	Yes, impact of climate change on the ecosystem	N/A
Can impacts be mitigated	Yes	

Enhancement measures:
- None anticipated

Residual Impacts:
Reduce carbon emissions through the use of renewable energy and contributing to efforts to reduce global warming

Nature: Visual impact and impact on sense of place
The proposed development is located near Danielskuil, a densely populated industrial area which will absorbs the visual change that the proposed project brings about. Eskom's Olien Substation and high voltage power lines is a prominent feature when approaching town from the south R31 connecting Danielskuil with Kuruman and runs north-south through the town. The visual exposure for the Limestone PV1 Solar energy facility would largely be concentrated on the site itself and extend to the west, south and southeast.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	N/A
Duration	Long term (4)	N/A
Magnitude	Low (4)	N/A
Probability	Highly probable (4)	N/A
Significance	**Moderate (40)**	**N/A**
Status (positive or negative)	Negative	N/A
Reversibility	Yes, Solar facility can be removed	Yes, Solar facility can be removed
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:
- To successfully reduce the visual impact and the influence on sense of place during the operating phase of the planned project, it is advised that the recommendations provided in the Visual Impact Assessment (Specialist study) be followed in this regard.

Residual Impacts:
The Limestone PV1 Solar Energy Facility infrastructure will be visible until it is completely decommissioned and removed. Following that, the impact will be removed.

Nature: Impact on Tourism
In the Northern Cape province tourism is regarded as an important sector contributing to the provinces' economic sector. The main tourism in this area is linked to the mining sector. The impact however of the proposed facility on the tourism sector is likely to be low, but in some cases the Limestone PV1 may attract tourists to the proposed area and its surroundings.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (32)**	**Low (32)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:
- To effectively mitigate the impact on tourism during the operational phase of the proposed Limestone PV1, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard..

Residual Impacts:
No residual impact

Decommissioning Phase Impacts

Nature: Loss of income and employment
The most likely negative impact of the decommissioning phase is the loss of employment and income, which has a direct impact on the employees' households and the communities in which they live. The identified impacts associated with the decommissioning phase can be managed through the implementation of downscaling programs and retrenchment packages.

	Without Mitigation	**With Mitigation**
Extent	Medium term (4)	Short (1)
Duration	Local (2)	Local (2)
Magnitude	High (8)	Moderate (6)
Probability	Medium Probable (2)	Medium Probable (2)
Significance	**Medium (36)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Enhancement measures:
- During the decommissioning phase, retrenchment packages should be made available to all staff being retrenched.
- Limestone PV1 Solar Energy Facility should be dismantled and removed from the site. Funds should also be set aside for rehabilitation and the closure of Limestone PV1 Solar Energy Facility.

Residual Impacts:
No residual impacts

Nature: Impact on tourism		
In the Northern Cape province tourism is regarded as an important sector contributing to the provinces' economic sector. The main tourism in this area is linked to the mining sector. The impact however of the proposed facility on the tourism sector is likely to be low, but in some cases the Limestone PV1 may attract tourists to the proposed area and its surroundings.		
	Prior to Mitigation	***Post Mitigation***
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (32)**	**Low (32)**
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impacts be enhanced?	Yes	
Mitigation:		
To effectively mitigate the impact on tourism during the operational phase of the proposed Limestone PV1, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.		
Residual Risks:		
No residual impact		

9.8.4 Overall Result

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium significance pre-enhancement and post-enhancement. Negative impacts during both construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies. Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to.

9.9. Potential Traffic Impacts

Various positive and negative impacts have been identified with the development of Limestone PV1 from a traffic perspective. Potential traffic impacts and the relative significance of the impacts associated with the development of Limestone PV1 are summarised below (refer to **Appendix M**).

9.9.1 Results of the Traffic Impact Assessment

It is assumed that if components are to be imported to South Africa from one of four ports, namely, via the port of Richard's Bay or Durban in KwaZulu-Natal, the port of Saldanha in Western Cape or the port of Ngqura in the Eastern Cape. The ports of Richards Bay, Durban, Saldanha and Ngqura are respectively 1 100 kms, 950 kms, 790 kms and 1000 kms from the project site. Whilst a preferred port of entry is still to be determined, all of the above-mentioned ports are being considered as alternatives.

The proposed site is bounded by an unnamed gravel road and the R31 in the North, R385 in the south and west and gravel roads in the south and east. Access to the proposed site is being proposed via multiple routes, with the three most suitable mentioned below:

- Access route 1: The access route for Access option 1 turns from the R31 onto a gravel farm road to the south. The travel distance to site would be around 22kms.
- Access route 2: This access road turns off from the R385 onto an existing gravel road, which follows an existing railway line, for approximately 9kms.
- Access route 3: This access route turns from the R385 at Lime Acres towards the site onto a gravel road and follows this road for approximately 9kms to the site.

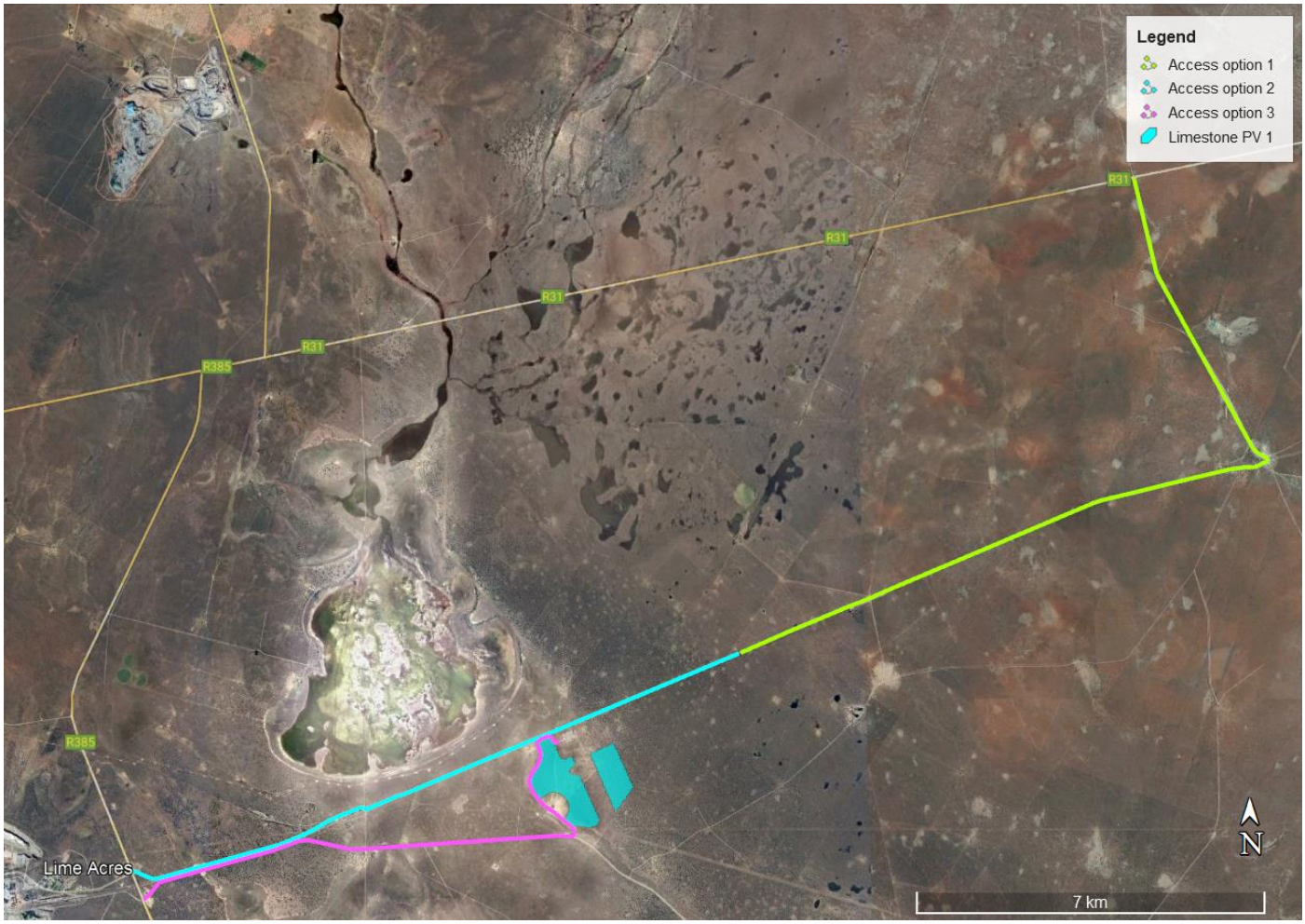


Figure 9.11: Map showing three most suitable access routes alternatives assessed for site access.

Suitable routes were selected based on the fact that they are mostly established gravel roads, and other considerations such as access spacing requirements, required sight lines and road safety considerations. Other access routes were identified but not investigated further due to various factors, such as having to traverse an Eskom Powerline or having to construct additional new access roads. The road considered most efficient and carrying the least traffic will be considered as the best option.

9.9.2 Description of Traffic Impacts

The traffic expected to be generated by the development of the Limestone PV1 can be divided into the three phases of the project, namely:

» *Construction Phase* – This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes the construction of the solar power facility and associated infrastructure, including grid connections, construction of footings, roads, excavations, trenching, and ancillary construction works. This phase will temporarily generate the most development traffic. The nature of the impact expected to be generated at this phase would be traffic congestion and delays on the surrounding road network as well as the associated noise, dust, and exhaust pollution due to the increase in traffic.

» *Operation Phase* – This phase includes the operation and maintenance of the Limestone PV 1 Facility throughout its life span. The nature of the impact expected to be generated at this phase would be traffic and the associated noise, dust and exhaust pollution due to the operational traffic trips.

» *Decommissioning Phase* – This phase will have similar impacts and generated trips as the Construction Phase.

9.9.3 Impact tables summarising the significance of traffic impacts during construction, operation, and decommissioning (with and without mitigation)

Construction Phase / Decommissioning Phase

Nature: *Temporary increase of development trips on the external road network; increase in construction related noise and dust pollution* Increase of construction vehicles on the roads will occur, which may have an impact on communities and general traffic; increase of noise and dust pollution		
	Without mitigation	**With mitigation**
Extent	Provincial (4)	Provincial (4)
Duration	Medium-term (2)	Medium-term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (36)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Stagger component delivery to site • Reduce the construction period where possible • Stagger the construction phase • The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. • Staff and general trips should occur outside of peak traffic periods as much aspossible • Maintenance of haulage routes • Design and maintenance of internal roads		
Residual Impacts: No residual impacts are expected.		

Operation Phase

Nature: *Slight increase in trips for permanent and periodically maintenance staff* Slight increase of vehicle trips due to permanent staff traveling to site, periodically (bi-annual) trips to site for transport of water and irregular maintenance trips		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low(2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: • Source on-site water supply if possible. • Utilise cleaning systems for the panels needing less vehicle trips. • Schedule trips for the provision of water for the cleaning of panels outside peak. traffic times as much as possible.		

9.9.4 Overall Result

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. The operation phase impacts would be minimal. The decommissioning phase will result in the same impact as the construction phase as similar trips are expected. The overall potential traffic impact significance can be mitigated to an acceptable level of low significance.

No impacts of high significance were identified and no fatal flaws are associated with the Limestone PV1 from a traffic perspective.

9.10. Risks Associated with Battery Energy Storage System

A Battery Energy Storage Systems (BESS) comprising a solid-state battery system will allow for energy storage for an extended period. The general purpose and utilisation of the BESS will be to save and store excess electrical output from the facility as it is generated, allowing for a timed release to the national grid when the capacity is required. The BESS will be contained within insulated containers and will connect to the on-site facility substation via underground cabling. **Figure 9.12** provides a general illustration of a BESS.

Figure 9.12: Example of battery storage units integrated as part of a wind farm (Source: http://ultrabattery.com/applications/stationary-energy-storage/)

The risks associated with battery technologies are generally well understood and researched. The primary risks relate to fire hazards and the potential for a condition known as 'thermal runaway'. Thermal runaway occurs in situations where an increase in temperature changes the conditions in a way that causes a further increase in temperature, often leading to a destructive result. The risks detailed in the table below considers only the risks associated with on-site use of battery energy storage systems.

Possible risks associated with the construction and operation of the BESS from a technical perspective within the development footprint of Limestone PV1 are limited to health and safety aspects during the project life cycle of the BESS. The risks identified for the construction and operation of the BESS are detailed below. Mitigation measures have been included within the project EMPr (refer to **Appendix N**).

Table 9.1: Risks associated with Battery Energy Storage Systems

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
1. Mechanical breakdown/ Exposure to high temperatures » Incidents where the batteries are broken or exposed to temperature above room temperature could lead to overheating as well as fires which can affect infrastructure components of the BESS. » Leakages of substances contained within the battery cells (should they not be assembled off-site).	Low	» Fires, electrocutions and spillage of toxic substances into the surrounding environment. » Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from spillages which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – spillages into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc) as a primary source of water.	Operators are trained and competent to operate the BESS. Training should include the discussion of the following: * Potential impact of electrolyte spills on groundwater; * Suitable disposal of waste and effluent; * Key measures in the EMPr relevant to worker's activities; * How incidents and suggestions for improvement can be reported. » Training records should be kept on file and be made available during audits. » Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. » 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. » 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.). » Firefighting equipment should readily be available at the BESS area and within the site. » Maintain strict access control to the BESS area. » Ensure all maintenance contractors / staff are familiar with the supplier's specifications. » 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. » Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices.

Nature of Risk	Likelihood	Impact	Mitigation / Management of Risk
			» Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment. » The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of the container wherein the batteries are placed. » Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant. » 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. » 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.
2. Generation of hazardous waste » The incorrect disposal of the batteries and the associated components could have an adverse impact on the environment.	Medium	» Spillage of hazardous substances into the surrounding environment. » Soil contamination – leachate from the disposed batteries into the soil, which could lead to an impact of the productivity of soil forms in affected areas. » Water pollution – leachate from the disposed batteries spilling into surrounding watercourses as well as groundwater. » Health impacts – on the surrounding communities, particularly those relying on watercourses (i.e. rivers, streams, etc.) as a primary source of water.	» Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal. » 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.

9.11. Assessment of the 'Do Nothing' Alternative

The 'do-nothing' alternative (i.e. no-go alternative) is the option of not constructing Limestone PV1. Should this alternative be selected, there would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar facility. All baseline information provided in this report relates to the current situation on site and in the surrounding area and can be considered the no-go alternative. Impacts are limited to the status quo. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise. In addition, positive impacts identified to be associated with the project will be foregone. These are described below.

a) Land use and agriculture

The land capability sensitivity (DAFF, 2017) indicates a range of sensitivities expected throughout the project focus area, which predominantly covers an area considered to be of very low to low capability with small areas of Moderate capability. In the assessment area there is no segregation of agricultural lands or crop fields with high potentials. The land capability withing the project site is in line within the DAFF, (2017) requirements for a compliance statement report only. It is the specialist`s recommendation that the proposed solar power project and the associated infrastructure may be favourably considered. However, it is not envisaged that the number of agricultural employment opportunities generated by the agricultural activities within the project site would exceed the number of skilled, semi-skilled and unskilled employment opportunities that would be created by the construction and operation of Limestone PV1 (between 750 – 900) temporary jobs during construction and between 45 - 70 permanent jobs during operation). The development of the solar energy facility would therefore result in a significant gain in employment numbers for the area in which the project site is located, albeit only for the construction phase, especially since the gain in employment numbers will not be accompanied by any losses in agricultural employment as a result of the proposed development.

In addition, the directly affected landowners would obtain an income from the solar farm (as the developer would pay a percentage of the revenue generated to the landowner in accordance with the lease agreement for the use of the land). This would contribute towards the financial stability of the landowners which would in turn contribute to the financial viability of the farming practices on the property. The implementation of the 'do nothing' alternative would retain the current land-use, fore-going the opportunity to generate renewable energy from the sun and at the same time continue the current agricultural activities on areas that fall outside of the solar energy facility footprint.

The 'do nothing' alternative would result in a lost opportunity for the landowners (in terms of implementing a compatible land use option, while still retaining the current land use, as well as a loss in long-term revenue) and the country (in terms of renewable energy). From this perspective the no-go alternative is not preferred when considering land use and agricultural aspects of the project site. Use of the identified site for the development of the proposed solar energy facility is considered to be a preferred land use as the benefits will outweigh the impacts.

From a visual perspective, however, the implementation of the 'do-nothing' alternative will conserve the landscape as it currently is. Transformation will lead to a change in the sense of place for the area. However, the area already contains a large number of power lines and the Olien Substation is located within the project site, adjacent to the proposed project footprint. No fatal flaws have been identified in terms of visual impacts.

b) Socio-economic impact

Social: The impacts of pursuing the no-go alternative are both positive and negative as follows:

- The benefits would be that there is no disruption from an influx of jobseekers into the area, nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.
- There would however be an opportunity lost in terms of job creation, skills development and associated economic business opportunities for the local economy, as well as a loss of the opportunity to generate energy from a renewable resource without creating detrimental effects on the environment.

New Business: Some of the positive spin off effects that are to ensue from the project expenditure will be localised in the communities located near the site, such as the towns of Lime Acres and Danielskuil. The local services sector and specifically the trade, transportation, catering and accommodation, renting services, personal services and business services are expected to benefit the most from the project activities during the construction phase. New business sales that will be stimulated as a result of the establishment of the solar farm, albeit for a temporary period, will be lost with the implementation of the 'do nothing' alternative. Therefore, from a business perspective, the 'do-nothing' alternative is not preferred as there is a loss of new business opportunities.

Employment: The development of Limestone PV1 within the Kgatelopele Local Municipality will aid in a reduction of the unemployment rate, however if the solar farm is not developed then the unemployment rate will not be positively influenced by the proposed development. The upliftment and socio-economic benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative. Therefore, from an employment perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of employment opportunities.

Skills development: The establishment of Limestone PV1 will offer numerous opportunities for skills transfer and development. This is relevant for both on-site activities and manufacturing activities. Various renewable energy facilities are proposed to be developed in the area and in the Northern Cape Province, which means that the transfer of skills from foreign experts to the local engineers and construction workers will take place, similar to what has taken place where other renewable energy facilities have been constructed and operated within the Province. The skills training and transfer benefits for individuals within local communities would be forfeited with the implementation of the 'do nothing' alternative.

Municipal goals: The opportunity to contribute to the innovative energy sourcing methods as identified by the ZF Mgcawu District Municipality as per a draft policy which sets out the criteria which will enable the evaluation of renewable energy generation infrastructure to be developed in a manner that will limit the potential negative impacts thereof will not be met should Limestone PV1 not be constructed with the implementation of the 'do nothing' alternative.

Foregoing the proposed development would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities at this location and within the surrounding area would be forfeited. The area has experienced social challenges which has resulted in the need for socio-economic upliftment. The Social Impact Assessment (SIA) concluded that there would be greater social benefits associated with the project than the 'do nothing' alternative.

Therefore, from a socio-economic perspective, the 'do-nothing' alternative is not preferred due to the loss of socio-economic benefits associated with the project when considering the current socio-economic conditions of the area.

c) Impact on electricity supply and targets regarding renewable energy

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although Limestone PV1 is only proposed to contribute a contracted capacity of up to 150MW maximum export capacity to the grid capacity, this would assist in meeting the electricity demand for the relevant private off-takers and would also assist in meeting the government's goal for renewable energy and the energy mix. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

» Increased energy security;
» Resource saving (i.e. fossil fuels and water);
» Exploitation of South Africa's significant renewable energy resource;
» Pollution reduction;
» Climate friendly development;
» Support for international agreements;
» Employment creation;
» Acceptability to society; and
» Support to a new industry sector.

At present, South Africa is some way off from fully exploiting the diverse gains from renewable energy and from achieving a considerable market share in the renewable energy industry. South Africa's electricity supply remains heavily dominated by coal-based power generation, with the country's significant renewable energy potential largely untapped to date.

The Integrated Resource Plan (IRP) (2019) provides for the development of 6 000MW of capacity from large scale solar energy facilities by 2030. The IRP essentially drives the assortment of energy to be implemented for South Africa which is known as the energy mix of the country, considering various generation technologies.

9.12. *Conclusion*

The no-go is the continuation of the existing land use, i.e., maintain the status quo. As detailed in the sections above, there would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Limestone PV1 would see such an opportunity being lost. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated directly into the Province's grid. As current land use activities can continue on the site once the project is operational, the loss of the land to

this project during the operation phase is not considered significant. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Limestone PV1 subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

- Job creation from the construction and operation phases.
- Economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
- Meeting of energy generation mix in a most economic and rapid manner.
- Provision of clean, renewable energy in an area where it is optimally available.

As detailed above, the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of Limestone PV1.

CHAPTER 10: ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS

As identified and assessed in Chapter 9, a solar facility development may have impacts (positive and negative) on natural resources, the social environment and on the people living in a project area. The preceding impact assessment chapter has reported on the assessment of the impacts associated with Limestone PV1 largely in isolation (from other similar developments).

Cumulative impacts are defined as the total impacts resulting from the successive, incremental, and/or combined effects of a project when added to other existing, planned and/or reasonably anticipated future projects, as well as background pressures (IFC 2013). This chapter assesses the potential for the impacts associated with the project to become more significant when considered in combination with the other operating or proposed renewable energy facility projects within the area.

10.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of the EIA Regulations, 2014 - Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(j)(i) an assessment of each identified potentially significant impact and risk, including cumulative impacts.	The cumulative impacts associated with the development of Limestone PV1 are included and assessed within this chapter.

10.2 Approach taken to Assess Cumulative Impacts

The cumulative impacts that have the potential to be compounded through the development of the solar facility and its associated infrastructure in proximity to other similar developments include impacts such as those listed below. The role of the cumulative assessment is to confirm if such impacts are relevant to Limestone PV1 within the project site being considered for the development. This assessment considers whether the cumulative impact will result in:

- Unacceptable loss of threatened or protected vegetation types, habitat, or species through clearing, resulting in an impact on the conservation status of such flora, fauna, or ecological functioning.
- Unacceptable risk to freshwater features through disturbance associated with construction activities and increased runoff and erosion during the operation phase.
- Unacceptable risk to avifauna through habitat loss, displacement, and collision with project infrastructure.
- Unacceptable loss of high agricultural potential areas presenting a risk to food security and increased soil erosion.
- Unacceptable loss of heritage resources (including palaeontological and archaeological resources and the cultural landscape).
- Complete or whole-scale change in the sense of place and character of an area and unacceptable visual intrusion.
- Unacceptable negative impact to socio-economic factors and components.

Further to the above, positive cumulative impacts are also expected and will be associated with socio-economic aspects and benefits.

Figure 10.1 indicates the location of Limestone PV1 in relation to all other proposed renewable energy facilities known to be located within the surrounding area of the project site. These projects were identified using the DFFE Renewable Energy Database and current knowledge of projects operating and being proposed in the area. For the assessment of cumulative impacts, only developments within a 30km radius from the proposed Limestone PV1 were considered (**Table 10.1** and **Figure 10.1**), which is in line with the DFFE requirements.

Table 10.1: Renewable energy facilities located within the broader area (within a 30km radius) of the Limestone PV1 project site

Project Name	Project Status
Limestone PV2 Solar Energy Facility	In Progress
Humansrus Photovoltaic (PV) 1 Solar Facility (12/12/20/1903)	Authorised
Photovoltaic Power Station At Ovaal Substation (12/12/20/1944)	Authorised
Ample Solar Groenwater (Concentrated Solar Power) Facility (12/12/20/2252/1)	Authorised
Humanrus 100MW concentrated solar power plant (12/12/20/2316)	Authorised
Welcome Wood substation PV power plant cluster 2 (12/12/20/2675)	Authorised
Welcome Wood PV Power Station 3 (12/12/20/2613)	Authorised
Arriesfontein 100MW concentrated solar power (CSP) (12/12/20/2646)	Authorised
Arriesfontein 3x Photovoltaic Solar Power Plants (12/12/20/2647)	Authorised
Arriesfontein Solar PV Power Plants: Phase 3 (12/12/20/2648)	Authorised
Danielskuil solar photovoltaic facility (14/12/16/3/3/1/1751)	Authorised
Acwa Power SolarReserve Redstone PV SEF (14/12/16/3/3/1/1916)	Authorised
PV solar power facility within Kgatelopele Local Municipality (14/12/16/3/3/2/453)	Authorised
Alpha PV Solar Energy Facility (14/12/16/3/3/2/671)	In Progress
120MW Manlenox Renewable Energy Generation Project (14/12/16/3/3/2/929)	Authorised
Manlenox 2 Renewable Energy Generation Project (14/12/16/3/3/2/930)	Authorised

It should be noted that not all renewable energy developments presently under consideration by various IPPs will be built for operation. Not all proposed developments will be granted the relevant permits by the relevant authorities (DFFE, DMRE, NERSA and Eskom) and this is because of the following reasons:

- There may be limitations to the capacity of the existing or future Eskom grid.
- Not all applications will receive a positive Environmental Authorisation.
- There are stringent requirements to be met by applicants in terms of the REIPPP Programme and private off-taker bids, and a highly competitive process that only selects the best projects.
- Not all proposed projects will be viable because of lower renewable resources on some sites.
- Not all proposed projects will be able to reduce the associated negative impacts to acceptable levels or be able to mitigate the impacts to acceptable levels (fatally flawed).
- Not all proposed facilities will eventually be granted a generation license by NERSA and sign a Power Purchase Agreement with Eskom or private off-taker.
- Not all developers will be successful in securing financial support to advance their projects further.

As there is uncertainty whether all the above-mentioned renewable energy projects will be implemented, it is also difficult to quantitatively assess the potential cumulative impacts. The cumulative impacts of other

known renewable energy projects in the broader area and Limestone PV1 are therefore qualitatively assessed in this Chapter.

It is important to explore the potential for cumulative impacts on a quantitative basis as this will lead to a better understanding of these impacts and the potential for mitigation that may be required. The scale at which the cumulative impacts are assessed is important. For example, the significance of the cumulative impact on the regional or national economy will be influenced by renewable energy developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influenced by renewable energy developments that are in closer proximity to each other, e.g., up to 30 km to 50 km apart. For practical purposes a sub-regional scale of 30km has been selected for this cumulative impact evaluation. This is in accordance with the DFFE requirements specified within the Acceptance of Scoping for the project.

In the sections below, a summary of the potential for a cumulative impact resulting from several renewable energy developments within a 30km radius of Limestone PV1 are explored (refer also to the specialist reports contained in **Appendix G** to **M**). Impacts are assessed accordingly in terms of the proposed project in isolation and the impact considering other projects within the area or the cumulative impact, assuming the implementation of mitigation, as was deemed relevant by the specialist. The approach taken by the various specialists in assessing cumulative impacts is informed by the scale at which the impact is likely to occur.

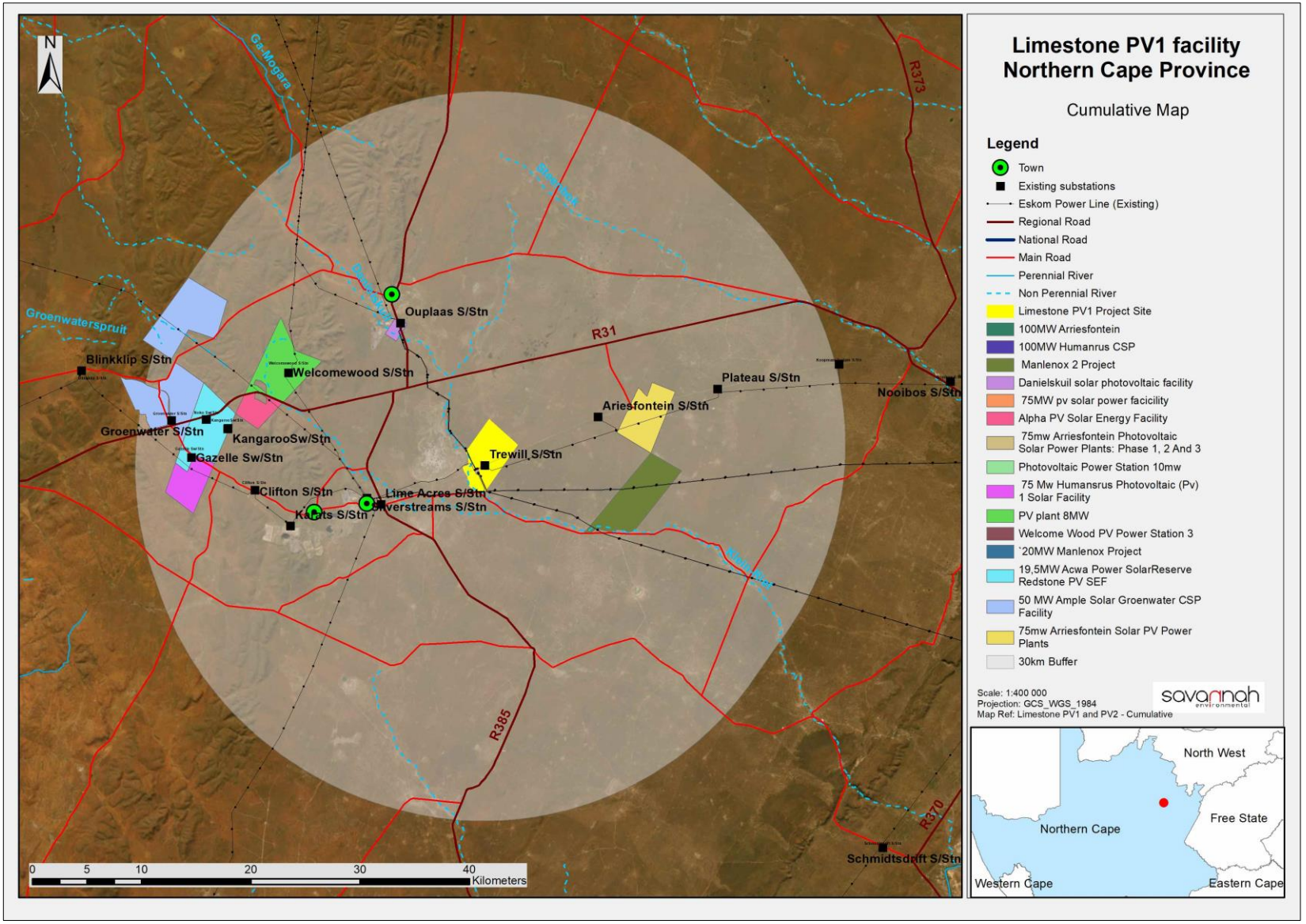


Figure 10.1: Cumulative map illustrating other approved and/or constructed renewable energy facilities located within a 30km radius of Limestone PV1.

10.3 Cumulative Terrestrial Ecology (including flora and fauna) and Freshwater Ecology Impacts

Localised cumulative impacts on ecology include the cumulative effects from operations that are close enough to potentially cause additive effects on that may result in the overall reduction of foraging and habitat where reproduction takes place, increased dust deposition, noise and vibration, disruption of functional corridors of habitat important for movement and migration, disruption of waterways, groundwater drawdown, increase risk of collisions; and groundwater and surface water quality depletion. Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.

An estimated total of 292 240.23ha of intact habitat is expected within a 30km radius. A total of 18206.70ha will form the development areas of renewable energy projects. The Limestone PV1 facility is estimated to result in a less than 1% loss of the total intact habitat in a 30km radius.

The overall cumulative impact of the proposed project when considered in isolation was rated with low significance. When considered in combination with other projects in the area, the overall cumulative impact of these were rated with medium significance.

Nature: Cumulative habitat loss within the region The development of the proposed infrastructure will contribute to cumulative habitat loss and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Very low (1)	Low (2)
Duration	Moderate term (3)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**Medium (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation measures: • Over and above all provided mitigation measures; ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

10.4 Cumulative Avifauna Impacts

Long-term cumulative impacts associated with the site development activities can lead to the loss of endemic and threatened species, including natural habitat and vegetation types, and these impacts can even lead to the degradation of conserved areas such as the adjacent game parks and reserves.
The total area within the 30 km buffer around the PV development area amounts to 297497,09 ha, but when considering the transformation (5256,86 ha) that has taken place within this radius, 292240,23 ha of intact habitat remains according to the 2018 National Biodiversity Assessment. Therefore, the area within 30 km of the project has experienced approximately 1.80 % loss in natural habitat. Considering this context, the PV infrastructure footprint for is 173.89 ha (as provided) and similar projects exists (which includes the project

area) in the 30 km region measuring a maximum of 94631.92 ha (as per the latest South African Renewable Energy EIA Application Database) which means that the total amount of remaining habitat lost as a result of the solar project amounts to 29.49% (PV developments as a percentage of the total remaining habitat).

The expected cumulative impact of PV development as a whole is expected to be of a 'Moderate' significance, however, the contribution of the project development footprint itself (173.89 ha) is calculated at 0.96% of the total (PV Development Projects), with overall low significance when considering the contribution in isolation.

Nature: Cumulative habitat loss within the region The development of the proposed infrastructure will contribute to cumulative habitat loss and thereby impact the ecological processes in the region.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Very low (1)	Low (2)
Duration	Moderate term (3)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Low (24)**	**Medium (60)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	To some degree, but most of the impact results from the presence of the various facilities which cannot be well mitigated.	
Mitigation measures: • Over and above, all provided mitigation measures; ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.		

10.5 Cumulative Soil and Agricultural impacts

The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.

10.6 Cumulative Heritage impacts (including Archaeology and Palaeontology)

As no direct impacts on heritage resources will occur as a result of the proposed project, the project will not contribute to impacts on heritage resources. It is preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise rural landscape. The proposed development is therefore likely to result in a change to the sense of place of the area.

Nature: Cumulative Impact to the sense of place The proposed project will result in loss of rural landscape		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Very low (1)	Very low (1)
Duration	Moderate term (3)	Long term (4)
Magnitude	High (7)	High (7)
Probability	Probable (3)	Probable (3)
Significance	**Moderate (33)**	**Moderate (36)**

Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Possible	Possible
Can impacts be mitigated	N/A	
Mitigation measures: • Implementation of recommendations in the VIA		

10.7 Cumulative Visual impacts

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

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

Figure 10.2 illustrates the anticipated cumulative visual impact of both Limestone PV 1 and Limestone PV 2 facilities and specifically the anticipated frequency of visual exposure. Areas shaded orange are likely to be exposed to both of the facilities while areas shaded in yellow are likely to be exposed to 1 of the facilities.

It is expected that the majority of the visually affected areas, especially between 1 and 6km will be exposed to both facilities. Within the site themselves, visual receptors will predominately only be exposed to a single facility.

There are a number of authorised renewable energy projects (namely concentrated solar power and photovoltaic) to the north west and east of the proposed Limestone PV Facilities. The proposed Limestone PV facilities will therefore certainly contribute to the increased cumulative visual impact of solar energy facilities within the region. The cumulative visual impact of the Limestone PV facilities is ultimately expected to be of moderate to high significance due to their remote location and the general low occurrence of potential sensitive visual receptors in the area.

Nature: Cumulative impacts of visual quality of the landscape The potential cumulative visual impact of the Limestone PV1 on the visual quality of the landscape.		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Medium distance (2)	Medium distance (2)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Very High (10)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Moderate (56)**	**High (64)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	No	
Mitigation measures: • N/A		

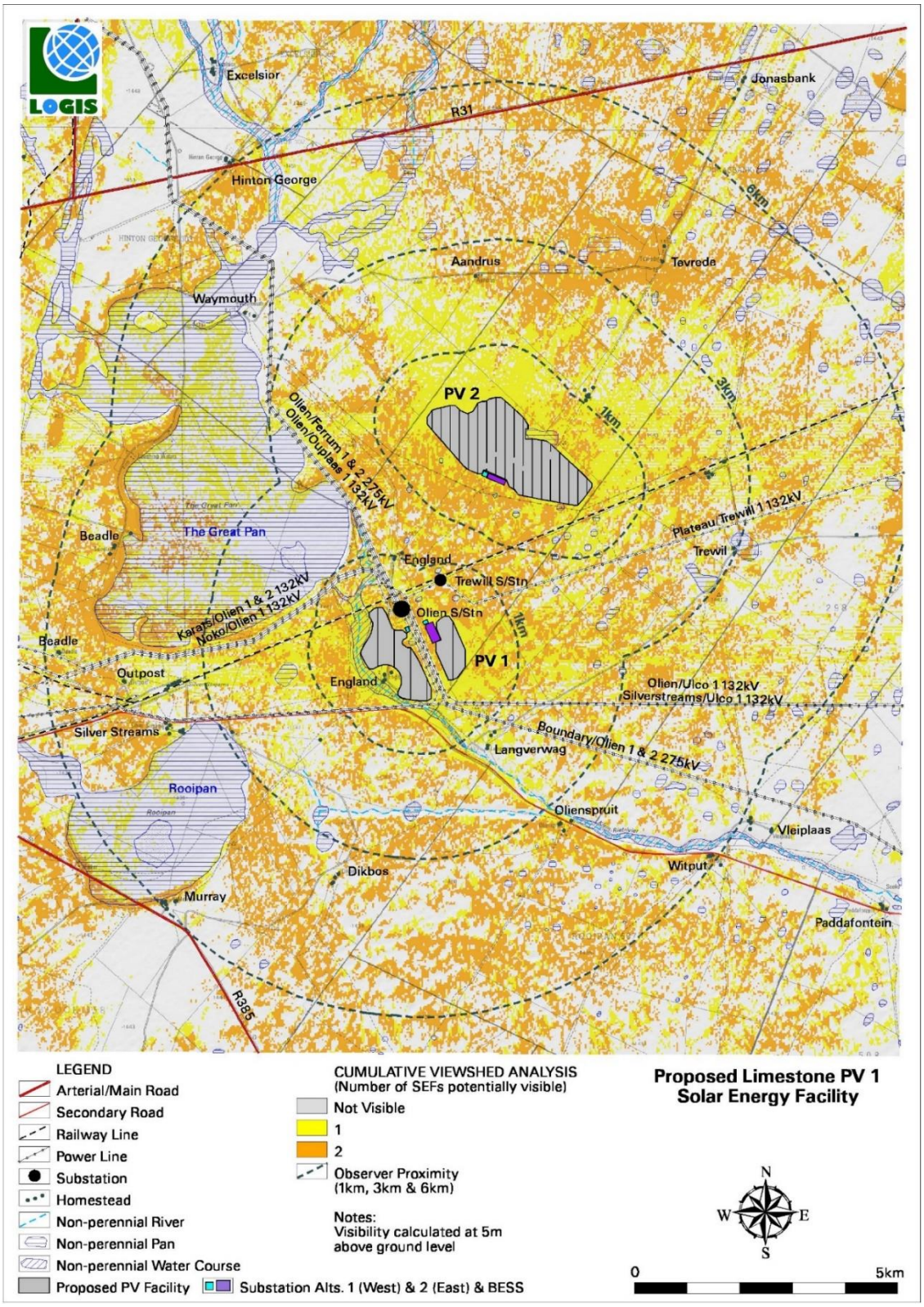


Figure 10.2: Cumulative viewshed analysis for the Limestone PV Facilities (PV 1 and 2)

10.8 Cumulative Social impacts

From a social impact perspective, cumulative impacts of both a positive and negative nature have been identified. The overall cumulative impact of the proposed project when considered in isolation was rated with a low negative significance when considered in isolation and a moderate cumulative negative significance. Positive impacts were noted as being of medium positive significance when considered in isolation and high cumulative positive significance.

Nature: Cumulative impact of employment opportunities, business opportunities and skills development

The development of renewable energy facilities and associated infrastructure, such as the proposed solar energy facility, will also create a number of socioeconomic opportunities for the Kgatelopele Local municipality. Positive cumulative opportunities include job creation, skill development and training, and downstream business opportunities. The potential cumulative benefits for the local and regional economies are thus associated with both the construction and operational phases of renewable energy projects and associated infrastructure and span a 20-25-year period. However, steps must be taken to increase employment opportunities for members of the surrounding communities and to support skill development and training programs.

	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (2)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Definite (5)
Significance	**Medium (44)**	**High (65)**
Status	Positive	Positive

Mitigation measures:

- The establishment of a number of solar power projects in the area has the potential to have a positive cumulative impact on the area in the form of job opportunities, skill development, business opportunities, and SED, where these opportunities are localized. The positive effects will be amplified if local employment policies are implemented, and local service providers are tapped by developers to maximize project opportunities for the local community.

Nature: Cumulative impact on sense of place and the landscape

Visual impact and impact on the sense of place and landscape character. The potential cumulative impacts on the area's sense of place will be largely linked to potential visual impacts. The proposed Solar Energy Facility and associated infrastructure is unlikely to have a significant impact on the area's sense of place. The cumulative effects are also likely to be minimal.

	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Short term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Medium (39)**
Status	Negative	Negative

Mitigation measures:

- To prevent deterioration of the area and its sites and an impact on the visual quality of the region, maintain and manage the facilities to be in excellent and orderly state.
- Apply the appropriate mitigation strategies as advised by the Visual Impact Assessment.

Nature: Cumulative impact associated with the large scale in-migration of people

While the development of a single solar power project may not result in a large influx of people, the development of several projects at the same time may have a cumulative effect on in-migration and movement of people. Additional pressure on municipal services and housing is another potential impact of in-migration to the area; however, this impact will need to be addressed in the municipal IDP process and considerations. Controlling an influx of people into a region is extremely difficult, especially in a country with high unemployment rates. To reduce the possibility of such an impact occurring, it is critical that project proponents implement and strictly adhere to a local employment policy.

	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Short term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Medium (39)**
Status	Negative	Negative

Mitigation measures:

- Create a recruitment policy / process (to be implemented by contractors) for sourcing labour locally.
- Collaborate with government agencies to ensure that service delivery is in line with local development needs.
- Create and implement a recruitment protocol in collaboration with the municipality and local community leaders.
- Ensure that the procedures for applying for jobs are clearly communicated.

10.9 Cumulative Traffic impacts

To assess the cumulative impact, it was assumed that all renewable energy projects within 30km currently proposed and authorized would be constructed at the same time. This is the precautionary approach as in reality these projects would be subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom or private offtaker, and construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). The construction and decommissioning phases will result in impacts of a medium significance whilst the operation phase will result in low significance impacts. Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

Cumulative (Construction and Decommissioning Phase)

Nature: Further temporary increase of development trips on the external road network; increase in construction related noise and dust pollution, should all planned developments go ahead at the same time (unlikely event). Further increase of construction vehicles on the roads will occur, which may have an added impact on communities and general traffic; increase of noise and dust pollution		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Provincial (4)	Provincial (4)
Duration	Medium-term (2)	Medium-term (2)
Magnitude	Low (4)	Low (6)
Probability	Improbable (2)	Probable (3)
Significance	**Low (20)**	**Medium (36)**
Status	Negative	Negative
Mitigation measures: • Stagger component delivery to site • Reduce the construction period where possible • Stagger the construction phase • The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network. • Staff and general trips should occur outside of peak traffic periods as much as possible • Maintenance of haulage routes • Design and maintenance of internal roads • 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.		

Cumulative (Operational Phase)

Nature: Slight increase in trips for permanent and periodically maintenance staff Slight increase of vehicle trips due to permanent staff traveling to site, periodically (bi-annual) trips to site for transport of water and irregular maintenance trips		
	Overall impact of the proposed development considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low(2)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	**Low (16)**	**Low (16)**
Status	Negative	Negative
Mitigation measures: • Source on-site water supply if possible. • Utilise cleaning systems for the panels needing less vehicle trips. • Schedule trips for the provision of water for the cleaning of panels outside peak. traffic times as much as possible. • It is noted that it is unlikely that all developments will be services at the same time. However, to ensure limiting the traffic impact, it is recommended to agree on a maintenance schedule between the respective projects.		

10.10 Conclusion regarding Cumulative Impacts

Cumulative impacts are expected to occur with the development of Limestone PV1 throughout all phases of the project life cycle and within all areas of study considered as part of this EIA report apart from soils and agricultural potential. The main aim for the assessment of cumulative impacts considering Limestone PV1 is to test and determine whether the development will be acceptable within the landscape proposed for the development, and whether the loss, from an environmental and social perspective, will be acceptable without whole-scale change.

The following conclusions can be drawn regarding the cumulative impacts associated with the project:

- There will be no unacceptable loss or impact on ecological aspects (vegetation types, species, and ecological processes) due to the development of Limestone PV1 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The contribution of the project to cumulative impacts is low. The cumulative impact is therefore acceptable.
- There will be no significant loss of sensitive and significant aquatic features. The cumulative impact is therefore acceptable.
- There will be no unacceptable risk to avifauna with the development of Limestone PV1 and other renewable energy projects within the surrounding area, provided the recommended mitigation measures are implemented. The contribution of the project to cumulative impacts is low. The cumulative impact is therefore acceptable.
- The project will not impact on any high potential agricultural land and will therefore not contribute to impacts on this resource or food security.
- Change to the sense of place and character of the area is expected with the development of the proposed Limestone PV1 and other renewable energy facilities within a 30km radius of the site. Whilst the proposed project will create a new industrial operation and change the character of an area of rural landscape, this is not entirely out of character with the region due to the presence of transmission infrastructure including power lines and the Olien Substation. The cumulative impact is therefore considered to be acceptable.
- There will be no unacceptable loss of heritage resources associated with the development of Limestone PV1. There will also be no unacceptable impacts to the cultural landscape as a result of the development of the facility provided that the recommended development buffers along major routes are adhered to. The cumulative impact is therefore acceptable.
- Both positive and negative social cumulative impacts are expected to occur with the establishment of the Limestone PV1. No unacceptable social impacts are expected to occur. The cumulative impact is therefore acceptable.
- No unacceptable impacts to the traffic network are expected to occur with the development of the Limestone PV1 and other facilities within the surrounding areas. The cumulative impact is therefore acceptable.

A summary of the cumulative impacts is included in **Table 10.3**.

Table 10.3: Summary of the cumulative impact significance for Limestone PV1.

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Moderate
Avifauna	Low	Moderate
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Moderate	Moderate
Visual	Moderate	High
Socio-Economic	*Positive impacts:* Medium *Negative impacts:* Low	*Positive impacts:* High *Negative impacts:* Medium
Traffic	Low	Moderate

Based on the specialist cumulative assessment and findings, the development of Limestone PV1 and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that the contribution of Limestone Solar PV1 to cumulative impacts will be of mostly low to moderate significance. The cumulative visual impact will be high but is still considered acceptable by the specialist. Based on all other areas of study considered as part of this EIA report, the development of Limestone PV1 will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment.

CHAPTER 11: CONCLUSIONS AND RECOMMENDATIONS

K2022578784 (SOUTH AFRICA) (Pty) Ltd is proposing the development of a commercial Solar Energy Facility and associated infrastructure on a site located ~16km south-east of the town of Danielskuil and 10km east of Lime Acres in the Northern Cape Province. The site is located within the Kgatelopele Local Municipality and the ZF Mgcawu District Municipality. The project site consists of a single property, Portion 4 of Farm Engeland 300. The facility will be known as the Limestone PV1 Solar Energy Facility. The project is planned as part of a larger cluster of renewable energy projects, which includes another 150MW Maximum Export Capacity PV Solar Energy Facility (Limestone PV2) located on the same property as Limestone PV1, and a 360MW Wind Energy Facility (Oryx Wind Energy Facility) also located near Danielskuil.

The development footprint[15] will contain the following infrastructure to enable the solar facility to generate up to 150MW Maximum Export Capacity:

- PV modules mounted on either a single axis tracking or fixed structure, dependent on optimisation, technology available and cost (up to 167ha).
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation with a capacity up to 250 MVA (up to 0.75ha)
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings to either be situated within the onsite farmhouse or alternative proposed site, including workshop areas for maintenance and storage as well as parking for staff and visitors (up to 1ha).
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) with a length of up to 3km (up to 1.8ha)
- Internal distribution roads (up to 5m wide) with a length of 13km (up to 6ha)
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.

The overarching objective for Limestone PV1 is to maximise electricity production through exposure to the available solar resource, while minimising infrastructure, operational and maintenance costs, as well as potential social and environmental impacts in accordance with the principles of sustainable development. Local level environmental and planning issues have been assessed through the EIA process with the aid of site-specific specialist studies in order to delineate areas of sensitivity within the project site. These site-specific specialist studies have assisted in informing and optimising the design of the solar farm.

A summary of the recommendations and conclusions for the proposed project from the specialist studies undertaken within the EIA process is provided in this chapter.

[15]The development footprint is the result of detailed design by the developer which the consideration of sensitive environmental features which are required to be avoided by the solar facility infrastructure.

11.1. Legal Requirements as per the EIA Regulations, 2014 (as amended), for the undertaking of an Environmental Impact Assessment Report

This chapter of the EIA Report includes the following information required in terms of Appendix 3: Scope of Assessment and Content of Environmental Impact Assessment Reports:

Requirement	Relevant Section
3(1)(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report.	A summary of the findings of the specialist studies undertaken for Limestone PV1 has been included in **section 11.2**.
3(1)(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 development footprint on the approved site as contemplated in the accepted scoping report 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.	An environmental impact statement containing the key findings of the environmental impacts of Limestone PV1 has been included as **section 11.5**. An Environmental Sensitivity and Layout map of Limestone PV1 has been included as **Figure 11.1** which overlays the development footprint (as assessed within the EIA) of the solar facility with the environmental sensitive features located within the development area. A summary of the positive and negative impacts associated with Limestone PV1 has been included in **section 11.2**.
3(1)(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.	All conditions required to be included in the Environmental Authorisation of Limestone PV1 have been included in **section 11.6**.
3(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.	A reasoned opinion as to whether Limestone PV1 should be authorised has been included in **section 11.5**.

11.2 Evaluation of Limestone PV1

The preceding chapters of this report, together with the specialist studies contained within **Appendices G-M** provide a detailed assessment of the potential impacts that may result from the development of Limestone PV1. This chapter concludes the environmental assessment of the solar facility by providing a summary of the results and conclusions of the assessment of both the project site and development footprint for the solar energy facility. In so doing, it draws on the information gathered as part of the EIA process, the knowledge gained by the environmental specialists and the EAP and presents a combined and informed opinion of the environmental impacts associated with the project.

No environmental fatal flaws or unacceptable impacts were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint and the undertaking of the construction and operational bird monitoring, as specified by the specialists.

The potential environmental impacts associated with Limestone PV1 assessed through the EIA process include:

- Impacts on terrestrial ecology (flora and fauna) and freshwater ecology.
- Impacts on avifauna.
- Impacts on soils and agricultural potential.
- Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
- Visual impacts on the area imposed by the components of the facility.
- Positive and negative social impacts.
- Traffic impacts on the area

The development footprint, as assessed in the EIA Report is presented in **Figure 11.1**. A sensitivity map including all sensitivities determined for the site is included as **Figure 11.2.**

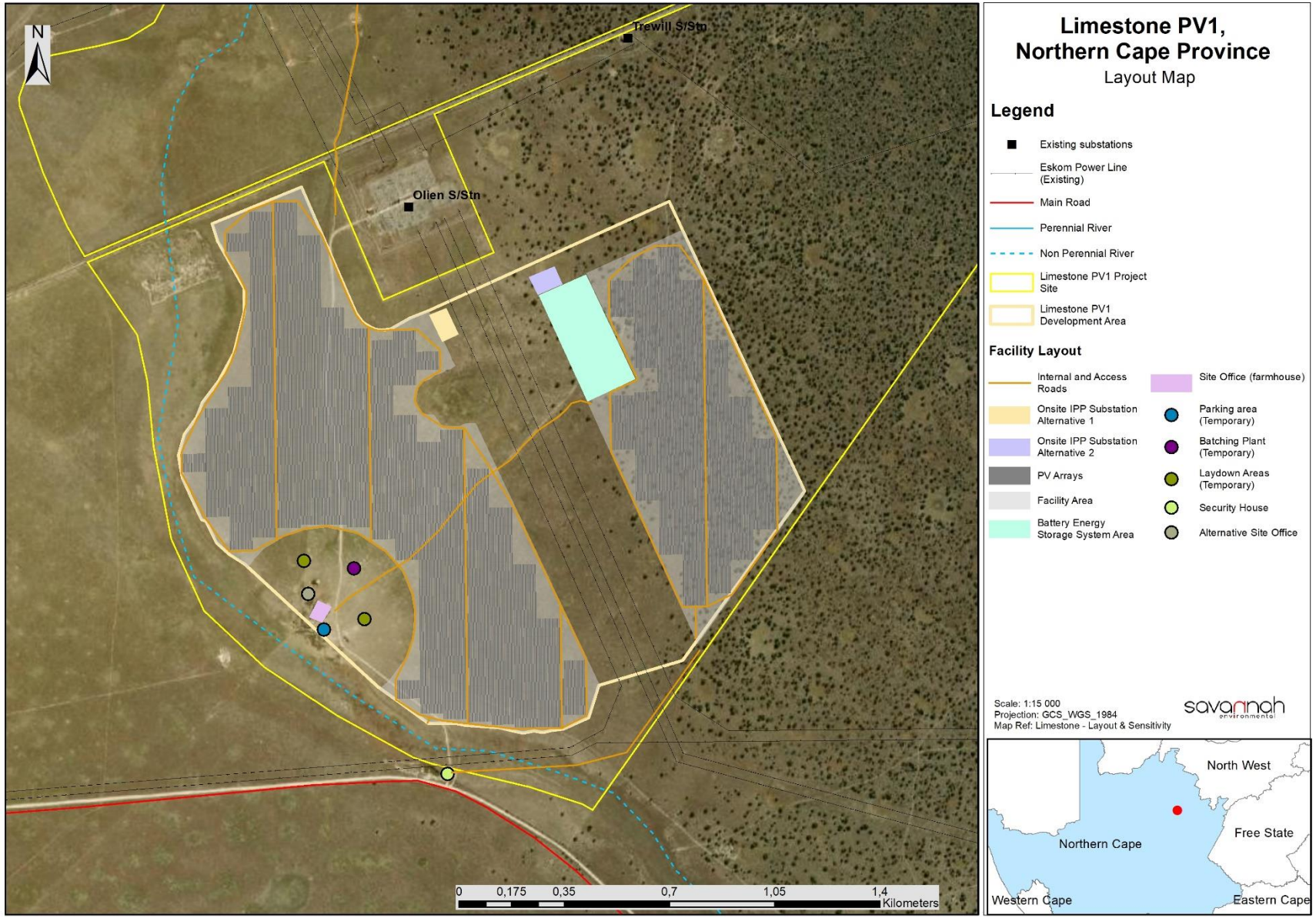


Figure 11.1: The development footprint of Limestone PV1, as assessed within the EIA Report

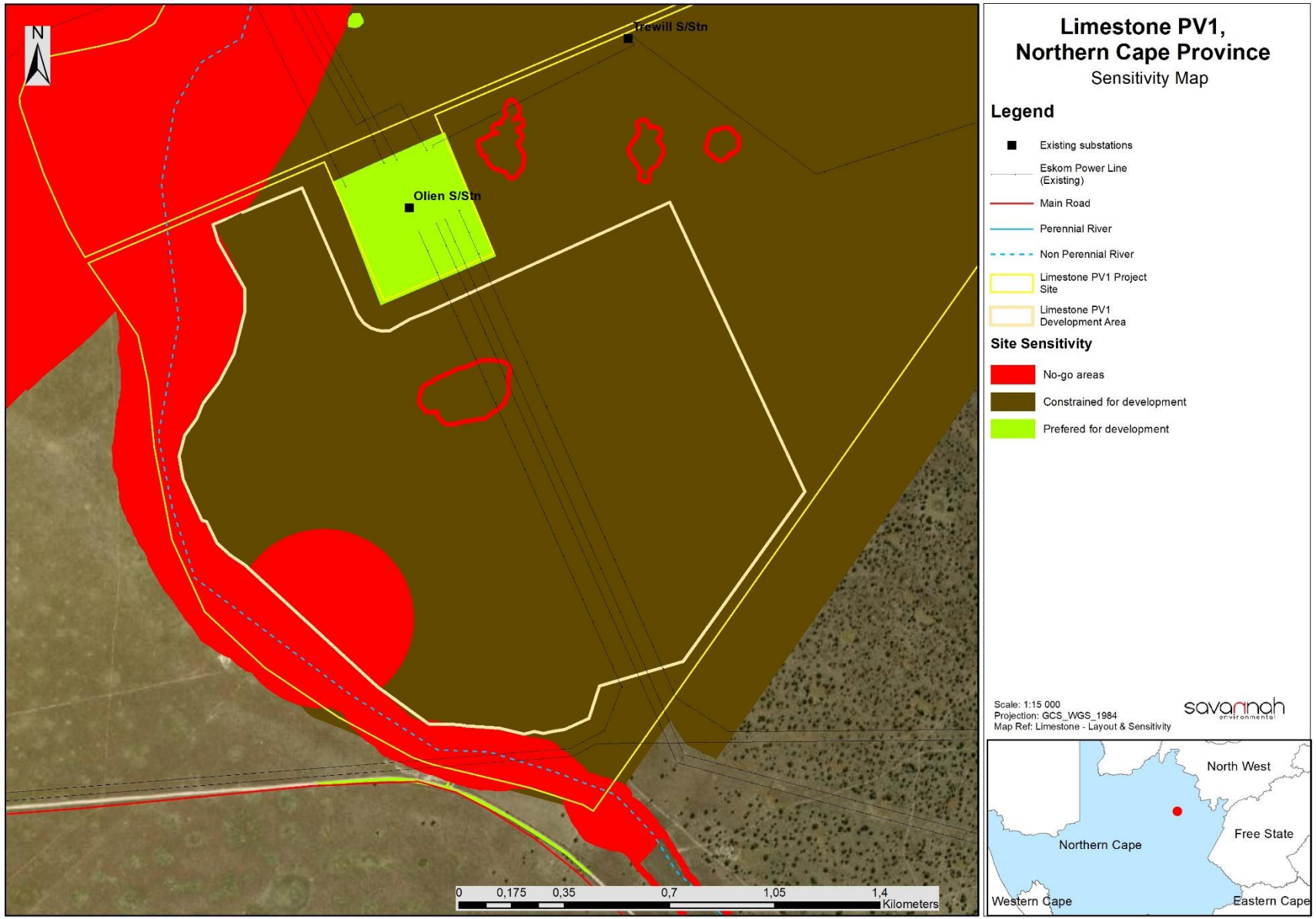


Figure 11.2: The sensitivity determined within the Limestone PV1, as assessed within the EIA Report

11.2.1 Impacts on Terrestrial Ecology (including flora and fauna) and Freshwater Ecology

Six habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld, Open Grassland, Water Resources (Depression/ Pan) and Transformed. Watercourses/Rivers were identified as no-go areas where no development should take place. These areas provide surface water resources within the landscape, corridors for fauna dispersion within the landscape and important foraging and nesting habitat. These features also form part of CBA1, CR and FEPA rivers and FEPA wetlands. The remaining habitats were identified as having high sensitivity, with the exception of the transformed habitat which is considered to be very low sensitivity.

A total of 55 tree, shrub and herbaceous plant species were recorded in the project site during the field assessment, of which two were identified as being provincially protected trees:

- *Prepodesma orpenii*
- *Olea europaea subsp. cuspidata*

Seven (7) mammal species were observed. *Suricata suricatta* (Suricate) and *Geosciurus inauris* (South African Ground Squirrel) are ecosystem engineers within the region. The former species is also regarded as a keystone species within the Nama Karoo biome. The burrows they create are also utilised as shelter by an array of faunal species, which is pertinent in the climatically variable and semi-arid environment of the PAOI and surrounding landscape:

- Common Mole-rat (*Cryptomys hottentotus*)
- Common duiker (*Sylvicapra grimmia*)
- Black-backed jackal (*Lupulella mesomelas*)
- Yellow mongoose (*Cynictis penicillata*)
- Suricate (*Suricata suricatta*)
- Scrub Hare (*Lepus capensis*)

One species of amphibian (Boettger's dainty frog - *Cacosternum boettgeri*) was recorded within the project site during the survey period.

Five (5) species of reptile were recorded within the project site during the survey period. However, there is the possibility of more species being present, as certain reptile species are secretive and require long-term surveys to ensure capture. None of the species recorded are regarded as threatened. Species found include:

- Common Ground Agama (*Agama aculeata aculeata*)
- Cape Gecko (*Pachydactylus capensis*)
- Leopard Tortoise (*Stigmochelys pardalis*)
- Wahlberg's Snake-eyed Skink (*Panaspis wahlbergii*)
- Cape Skink (*Trachylepis capensis*)

In terms of the guideline for interpreting Site Ecological Importance in the context of the development, it is indicated that "*Offset mitigation may be required for high impact activities*". Renewable energy projects can be considered low intensity developments with the correct implementation of the mitigation hierarchy. Referring to the mitigation hierarchy, the project will achieve avoidance by means of revised and reduced spatial planning, suggested seasonal constraints for construction to prioritise the dry season period and also the 'avoidance' of vegetation clearing beneath the panels.

The primary expected impacts of the proposed project will be the loss of habitat and emigration of fauna. Based on the outcomes of the SEI determination, there are areas within the PAOI that possess a 'Very High' SEI. This indicates that avoidance mitigation is the only appropriate option for these areas and no destructive development activities should be considered. Avoidance of these designated areas has been achieved by the project layout. The maintenance of basal vegetation cover beneath the solar panels will contribute to achieving avoidance, so complete clearance is not recommended. Project alternatives, planning and technology considered provides favourable avoidance mitigation. The overall low residual impact does not present a fatal flaw for the development, and the project may be favoured for authorisation. Due to the low residual impacts expected for the project, no biodiversity offset strategy is required.

Considering the above-mentioned information, 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 supporting recommendations are implemented.

11.2.2 Impacts on Avifauna

A field assessment was conducted 13-16 September 2022 (dry season) and 14 – 16 February 2023 (wet season), during this survey the 106 bird species (of the recorded 125 in the general area) were recorded of which four were SCCs, namely *Phoenicopterus roseus* (Greater Flamingos), *Cursorius rufus* (Burchell's Courser), *Falcon biarmicus* (Lanner Falcon) and *Ciconia nigra* (Black Stork). 25 species were identified that would be at risk for collisions, electrocutions or habitat loss due to the development.

Five habitat units were identified during the assessment and included Watercourses/Rivers, Wooded Vaalbosveld, Open Shrubveld and Open Grassland. Some of the area within the project site was also transformed. Watercourses/Rivers were identified as no-go areas where no development should take place. The remaining habitats were identified as having high sensitivity, with the exception of the transformed areas which is considered to be very low sensitivity.

A detailed assessment of the development footprint confirms that there is no infrastructure located within the Very High avifauna sensitivity areas. As a result, the development of the Limestone PV1 facility would avoid significant impact on the major avifaunal features of the site. Majority of the infrastructure is proposed in high sensitivity areas. Development of low impact such as that proposed is supported within these areas as long as mitigation measures are implemented. As a result, there are no fatal flaws and with the avoidance of very high sensitive features by the facility layout, no high impacts are likely to occur as a result of the development. It is the specialist's opinion that development may proceed but with caution and only with the implementation of mitigation measures.

11.2.3 Impacts on Soils and Agricultural Potential

The most sensitive soil forms identified within the assessment area are the Etosha and Vaalbos soil forms, with other associated soils also occurring. The Etosha soil form has an orthic topsoil with a neocutanic subsurface horizon underlain by a soft carbonate horizon. The Vaalbos soil form consists of an orthic topsoil horizon on top of a red apedal horizon merging into a hard rock substratum below.

The land capability of the above-mentioned soils has been determined to have land capability classes of "III" and "IV" with a climate capability level 8 given the low Mean Annual Precipitation (MAP) and the high

Mean Annual Potential Evapotranspiration (MAPE) rates. The combination between the determined land capability and climate capability results in land potential "L6". The "L6" land potential level is characterised by a very restricted potential. Regular and/or severe limitations occur due to soil, slope, temperatures or rainfall. These areas are non-arable. The "L6" land potential of the assessment area is characterized with an overall "Low" sensitivity following the baseline findings. Land capability and land potential in the assessed area concur. The "Very Low to Moderate" sensitivities also fall within the DAFF, (2017) requirements for a compliance statement report only. The DEA screening tool, (2022) shows that there are no crop fields with "High" sensitivity within the assessment area and as a result there will be no segregation of crop production. It is the specialist's opinion that the proposed solar power project will have limited impact on the agricultural production ability of the land. Therefore, the proposed solar power project may be favourably considered.

11.2.4 Impacts on Heritage Resources (including Archaeology and Palaeontology)

Specific heritage resources and recommended buffers which needs to be considered for the placement of PV panels have been identified within the project site. Of these, the majority are low density Middle Stone Age or Later Stone Age artefact scatters that have been determined to have limited scientific value and have been determined to be not conservation worthy. The Limestone PV1 Solar Energy Facility is anticipated to have an overall moderate impact on heritage resources as a result. The most significant site identified in the vicinity of the development is the farmhouse werf. It is recommended that a 300m buffer around farm werf is exercised for PVs. It would be appropriate for the farmhouse to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.

With the opportunities presented for the reduction of impact through the implementation of the recommended mitigation measures, no unacceptable impacts of a high significance are expected to occur. No fatal flaws are therefore associated with the Limestone PV1 Solar Energy Facility from a heritage perspective. The specialist indicates that the Limestone PV1 Solar Energy Facility can proceed, subject to the implementation of the recommended mitigation measures. These include:

- The recommendations in the VIA are implemented.
- A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.
- The Chance Fossil Finds Procedure must be implemented for the duration of construction activities.
- Should any buried archaeological resources or human remain or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. The South African Heritage Resources Agency (SAHRA) must be contacted immediately in order to determine an appropriate way forward.

11.2.5 Visual Impacts

The findings of the Visual Impact Assessment undertaken for the proposed Limestone PV 1 Facility is that the visual environment surrounding the site, especially within a 1km radius (and potentially up to a radius of 3km) of the proposed facility, may be visually impacted during the anticipated operational lifespan of the facility (i.e. a minimum of 20 years).

The following is a summary of impacts remaining:

- Construction activities may potentially result in a high temporary visual impact, that may be mitigated to moderate
- The operation of the proposed PV facility is expected to have a high visual impact that may be mitigated to moderate on sensitive visual receptors within a 1km radius of the PV facility.
- The operational facility could have a moderate visual impact (significance rating = 45) which may be mitigated to low (significance rating = 26) on residents/visitors to the homestead of Langverwag as well as observers travelling along the secondary road within 1 – 3km radius of the facility.
- The operational facility could have a moderate visual impact (significance rating = 36) which may be mitigated to low (significance rating = 24) on residents/visitors to the various homesteads as well as observers travelling along the secondary road within 3 – 6km radius of the facility.
- The operational facility could have a low visual impact both pre and post mitigation on residents/visitors to various homesteads as well as observers travelling along the various secondary roads beyond the 6km radius of the facility.
- This anticipated lighting impact is likely to be of moderate significance and may be mitigated to moderate especially within 0-3 km radius of the PV facility.
- The potential visual impact related to solar glint and glare as a rail travel hazard is expected to be of moderate significance.
- There are two (2) affected residences within a 1km radius of the proposed PV facility, namely England. The potential visual impact related to solar glint and glare on static ground-based receptors (residents of homesteads) is therefore expected to be of moderate significance before mitigation and low post mitigation.
- The anticipated visual impact resulting from ancillary infrastructure is likely to be of low significance both before and after mitigation.
- Decommissioning activities may potentially result in a high pre mitigation and moderate post mitigation.
- The anticipated significance of the visual impacts on the sense of place within the region (i.e. beyond a 6 km radius of the development and within the greater region) is expected to be of Moderate significance.
- The anticipated cumulative visual impact of the proposed facility is expected to be of high significance.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from prominently moderate to low significance. One visual impact of high is anticipated in terms of the cumulative visual impact of the proposed Limestone PV facilities. Anticipated visual impacts on sensitive visual receptors (if and where present) in close proximity to the proposed Limestone PV 1 Facility are not considered to be fatal flaws for the proposed PV facility.

A number of mitigation measures have been proposed. Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed facility.

11.2.6 Social Impacts

Both positive and negative impacts are expected throughout the construction and operation of the proposed solar energy facility. Positive impacts during both construction and operation are expected to be of medium significance pre-enhancement and post-enhancement. Negative impacts during both

construction and operation are expected to be of medium and low significance pre-mitigation and can be reduced to low significance post-mitigation, depending on the type of impact.

The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies. Due to this imbalance, it is recommended that the mitigation measures suggested, be strictly adhered to.

11.2.7 Traffic Impacts

Traffic impacts have been identified for the construction, operation and decommissioning phases, with the most significant impact expected to occur during the construction phase.

The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation. During the operation phase impact would be minimal. The traffic generated during the decommissioning phase will be similar but less than the construction phase traffic and the impact on the surrounding road network will also be considered negative and of low significance before and of low significance after mitigation.

No impacts of high significance were identified, and no fatal flaws are associated with the Limestone PV1 from a traffic perspective.

11.2.8 Assessment of Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site-specific developments. The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

Limestone PV1 will contribute to the cumulative impact experienced within the area. The cumulative impacts associated with the facility have been assessed to be acceptable, with no unacceptable loss or risk expected.

Table 11.1: Summary of the cumulative impact significance for the Limestone PV1 Facility

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Terrestrial and Freshwater Ecology	Low	Moderate

Specialist assessment	Overall significance of impact of the proposed project considered in isolation	Cumulative significance of impact of the project and other projects in the area
Avifauna	Low	Moderate
Soils and Agricultural Potential	Low	Low
Heritage (including archaeology, palaeontology and sense of place)	Moderate	Moderate
Visual	Moderate	High
Socio-Economic	*Positive impacts:* Moderate *Negative impacts:* Low	*Positive impacts:* High *Negative impacts:* Moderate
Traffic	Low	Moderate

Based on the specialist cumulative assessment and findings, the development of Limestone PV1 and its contribution to the overall impact of all renewable energy projects to be developed within a 30km radius, it can be concluded that Limestone Solar PV1 cumulative impacts will be of mostly low to moderate significance. The cumulative visual impact will be high but is still considered acceptable by the specialist. Based on all other areas of study considered as part of this EIA report, the development of Limestone PV1 will not result in unacceptable, cumulative impacts and will not result in a whole-scale change of the environment.

11.2.9 Assessment of 'Do nothing' Alternative

The no-go is the continuation of the existing land use, i.e. maintain the status quo. There would be no environmental impacts on the site or to the surrounding local area due to the construction and operation activities of a solar farm with the implementation of this alternative. All negative impacts, specifically related to the development of the solar farm, discussed in this report will not materialise.

The 'do-nothing' alternative will do little to influence the renewable energy targets set by government. However, as the project site experiences ample solar resource and optimal grid connection opportunities, not developing Limestone PV1 would see such an opportunity being lost. In addition, the Northern Cape Province will not benefit from additional generated power being evacuated directly into the Province's grid. Therefore, from a regional perspective, the 'do-nothing' alternative is not preferred as there is a perceived loss of benefits for the regional area.

From the specialist studies undertaken, no environmental fatal flaws were identified to be associated with Limestone PV1 subject to implementation of the recommended mitigation measures. All impacts associated with the project can be mitigated to acceptable levels. If the solar energy facility is not developed, the following positive impacts will not be realised:

- Job creation from the construction and operation phases.
- Economic benefit to participating landowners due to the revenue that will be gained from leasing the land to the developer.
- Meeting of energy generation mix in a most economic and rapid manner.
- Provision of clean, renewable energy in an area where it is optimally available.

As detailed above, the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of Limestone PV1.

11.3. Assessment of the Facility Layout

The indicative facility layout/development footprint assessed within this EIA Report (**Figure 11.3**) was designed by the project developer in order to respond to and avoid the sensitive environmental and social features located within the project site, which were identified by the specialists during the Scoping Phase of the EIA process. This approach ensured the application of the mitigation hierarchy (i.e., avoid, minimise, mitigate, and offset) to the proposed project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the project site. Areas of very high sensitivity and recommended heritage buffers have been avoided by the proposed development as recommended by the specialists.

Although the proposed layout overlaps with areas of sensitivity, the specialists have concluded that the project is acceptable within the proposed area as proposed can be authorised on condition that the recommended mitigation measures are implemented. As such, the impact of this proposed Facility Layout is considered to be acceptable, and the layout is recommended for approval. Final micro-siting must however be undertaken prior to construction considering all mitigation measures recommended within this EIA Report and associated specialist studies.

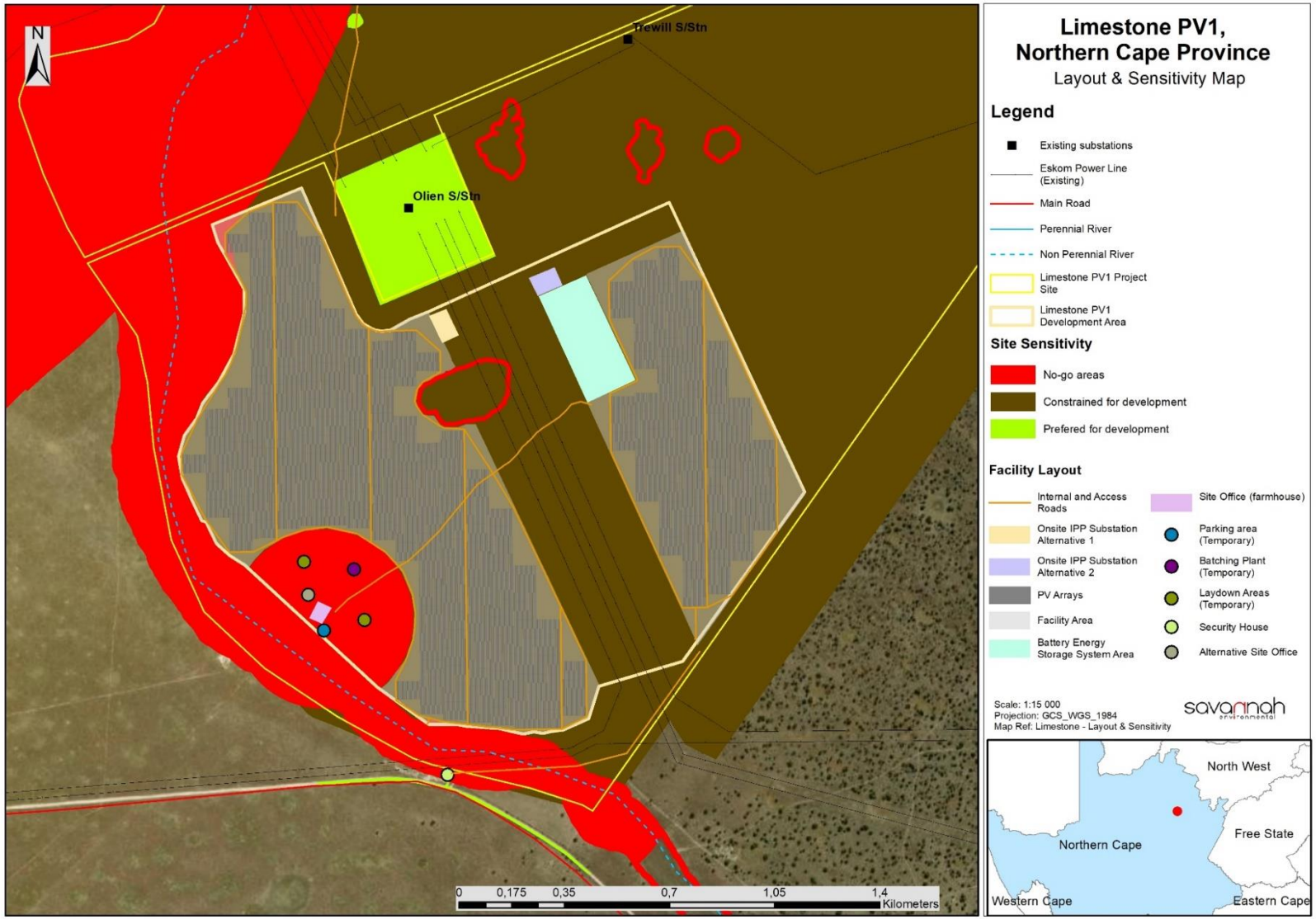


Figure 11.3: The development footprint of Limestone PV1, as assessed within this EIA Report, overlain on the identified sensitive environmental features (also refer to **Appendix D)**

11.4. Environmental Costs versus Benefits of Limestone PV1

Environmental costs (including those to the natural environment, economic and social environment) can be anticipated at a local and site-specific level and are considered acceptable provided the mitigation measures as outlined in the EIA Report and the EMPr are implemented and adhered to. No fatal flaws have been identified. These environmental costs could include:

- *Loss of biodiversity*, flora and fauna due to the clearing of land for the construction and utilisation of land for the solar facility and impacts on freshwater resources – The cost of loss of biodiversity can be minimised through the implementation of the recommended mitigation measures including the avoidance of very high sensitivity areas.
- *Impacts on birds*– loss of bird species due to collision with infrastructure and disturbance associated with construction and operation of the facility. Mitigation measures as described in this report can be implemented to reduce the significance of the risk. The impact is considered to be acceptable without any impact of high significance.
- *Loss of land for agriculture* – The development will not result in the segregation of any high production agricultural land. As a result of the low to moderate agricultural potential of the site the proposed solar power project will have limited impact on the agricultural production ability of the land.
- *Visual impacts associated with the solar facility/impacts to the sense of place* – Limestone PV1 will be visible to receptors up to a distance of 6km from the site. Overall, the significance of the visual impacts is expected to range from moderate to low, as a result of the very low occurrence of sensitive visual receptors, with the exception of the cumulative impacts which is anticipated to be of high significance. No mitigation of this impact is possible (i.e., the structures will be visible in the landscape), but general mitigation and management are required as best practise to minimise secondary visual impacts which may arise from mismanagement of the site.
- *Loss of heritage and palaeontological resources* – based on the outcomes of the Heritage Impact Assessment, it is not anticipated that the proposed development of the solar energy facility and its associated infrastructure will negatively impact on significant heritage resources on condition that the recommended buffers are implemented.
- *An increase in traffic* – The Limestone PV1 construction will create an increase in traffic. This impact will however be short-term in extent and is not considered to be significant.

Benefits of Limestone PV1 include the following:

- The project will result in important economic benefits at the local and regional scale through job creation, income and other associated downstream economic development, supporting the Just Energy Transition in the region. These will persist during the pre-construction, construction, operation and decommissioning phases of the project.
- The project provides an opportunity for a new land use on the affected property which would result in additional financial benefits to the directly affected landowners through compensation. It is important to note that the construction and operation of a solar facility can occur in tandem with crop production.
- The project contributes towards the Provincial and Local goals for the development of renewable energy.
- The project serves to diversify the economy and electricity generation mix of South Africa through the addition of up to 150MW of solar energy, in line with national policy regarding energy generation.
- The water requirement for a solar facility is negligible compared to the levels of water used by coal-based technologies. This generation technology is therefore supported in dry climatic areas.

» South Africa's per capita greenhouse gas emissions are amongst the highest in the world due to the reliance on fossil fuels. Limestone PV1 will contribute to achieving goals for implementation of renewable energy and sustaining a 'green' economy within South Africa.

The benefits of Limestone PV1 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility, provided that the mitigation measures, as recommended by the specialists are adhered to.

11.5. Overall Conclusion (Impact Statement)

The preferred activity was determined by the developer to be the development of a renewable energy facility on site using solar PV as the preferred technology, due to the availability of a strong solar resource, available grid connection, benign topography and good site access, amongst others. A technically viable development footprint was proposed by the developer considering environmental sensitivities identified in the scoping study and assessed as part of the EIA process. The assessment of the development footprint within the project site was undertaken by independent specialists and their findings have informed the results of this EIA Report.

From a review of the relevant policy and planning framework, it was concluded that the project is well aligned with the policy framework, and a clear need for the project is seen from a policy perspective at a local, provincial and National level.

The specialist findings from the EIA studies undertaken have indicated that there are no identified fatal flaws associated with the implementation of the development footprint within the project site subject to implementation of the recommended mitigation measures. Although the proposed layout for the PV facility and associated infrastructure overlaps with areas of sensitivity, the specialists have concluded that the project as proposed is acceptable within the development area, and can be authorised on condition that the recommended mitigation measures are implemented. Impacts can be mitigated to acceptable levels or enhanced through the implementation of the recommended mitigation or enhancement measures. The layout assessed within this EIA Report is therefore considered to be acceptable for implementation. Due to the low residual ecological impacts expected for the project, no biodiversity offset strategy is required.

As detailed in the cost-benefit analysis, the benefits of Limestone PV1 are expected to occur at a national, regional and local level. As the costs to the environment at a site-specific level can be appropriately managed and minimised as detailed in this report, the benefits of the project are expected to partially offset the localised environmental costs of the solar facility. From a social perspective, both positive and negative impacts are expected. The implementation of the 'do-nothing' alternative will result in a number of lost opportunities. The 'do nothing' alternative is therefore not preferred and not proposed to be implemented for the development of Limestone PV1.

Through the assessment of the development footprint within the project site, it can be concluded that the development of Limestone PV1 will not result in unacceptable environmental impacts (subject to the implementation of the recommended mitigation measures).

11.6. Overall Recommendation

Considering the findings of the independent specialist studies, the impacts identified, the development footprint proposed by the developer and the potential to minimise the impacts to acceptable levels through mitigation, it is the reasoned opinion of the EAP that Limestone PV1 is acceptable within the landscape and can reasonably be authorised subject to implementation of the refined optimised facility layout and the mitigation and enhancement measures recommended by the specialists.

Limestone PV1 with a maximum export capacity of up to 150MWincludes the following infrastructure (to be included within an authorisation issued for the project):

- PV modules mounted on either a single axis tracking & fixed structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- Low voltage cabling between the PV modules to the inverters.
- Fence around the project development area with security and access control.
- Camera surveillance.
- Internet connection.
- 33kV cabling between the project components and the facility substation.
- 33/132kV onsite facility substation.
- Battery Energy Storage System (BESS) with a footprint of up to 6ha.
- Site offices and maintenance buildings, including workshop areas for maintenance and storage as well as parking for staff and visitors.
- Laydown/staging area on-site in front of mounting structures during installation. Temporary store area close to site entrance (Less than 2ha).
- Access roads (up to 6m wide) and internal distribution roads (up to 5m wide).
- Temporary concrete batching facility.
- Stormwater management infrastructure as required.

The following key conditions would be required to be included within an authorisation issued for Limestone PV1:

- All mitigation measures detailed within this EIA Report, as well as the specialist reports contained within **Appendices G to M** are to be implemented.
- IPP Substation Alternative 1 (preferred alternative) be approved.
- The EMPrs (for the facility and onsite substation) as contained within **Appendix N** of this EIA Report should form part of the contract with the Contractors appointed to construct and maintain the solar facility in order to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of Limestone PV1 is considered key in achieving the appropriate environmental management standards as detailed for this project.
- Following the final design of Limestone PV1, a final layout must be submitted to DFFE for review and approval prior to commencing with construction. Micro-siting must take all recommended mitigation measures into consideration. No development is permitted within the identified no-go areas as detailed in **Figure 11.3**.
- A pre-construction walk-through of the final layout, including roads and underground cables, should be undertaken before construction commences and adjusted where required to ensure avoidance of

development on sensitive habitats and associated species of concern. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species.

- All other relevant environmental permits must be obtained prior to the construction of the facility.
- Vegetation under the panels must be retained.
- Do not clear areas of indigenous vegetation outside of the direct project footprint.
- Areas of very high sensitivity as identified within the EIA Report must be considered as no-go areas
- Compile and implement an alien vegetation management plan from the onset of construction. The plan must identify areas for action (if any) and prescribe the necessary removal methods and frequencies to be applied. This plan must be also prescribing a monitoring plan and be updated as/when new data is collated;
- Implementation of a waste management plan, this plan must be also prescribe a monitoring plan and be updated as/when new data is collated. Waste management must be a priority and all waste must be collected, stored and disposed of adequately. It is recommended that all waste be removed from site on a weekly basis (as a minimum) to prevent rodents and pests entering the site.
- A 300m buffer around farm werf is recommended for PVs. It would be appropriate for Site 117 to form part of the operational infrastructure for the PV facility on condition that sufficient screening between the Site infrastructure and Site 117 and the burial ground at SAHRIS Sites 91009 and 85442 is implemented.

A validity period of 10 years of the Environmental Authorisation is requested, should the project obtain approval from DFFE.

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Nid	Report Type	Author/s	Date	Title
109815	HIA Phase 1	Wouter Fourie	22/03/2012	132 kV Power line connection to the Humasrus Solar Thermal Energy Power plant, postmasburg.
114648	PIA Desktop	John E Almond	01/09/2012	Palaeontological specialist assessment: desktop study PROPOSED 16 MTPA EXPANSION OF TRANSNETâ€™S EXISTING MANGANESE ORE EXPORT RAILWAY LINE & ASSOCIATED INFRASTRUCTURE BETWEEN HOTAZEL AND THE PORT OF NGQURA, NORTHERN & EASTERN CAPE. Part 1: Hotazel to Kimberley, Northern Cape
122772	HIA Phase 1	Wouter Fourie	01/09/2011	Heritage Impact Assessment for the Humansrus Solar Thermal Energy Power Plant, Postmasburg
129751	HIA Phase 1	Elize Becker	20/02/2013	Phase 1 Heritage Impact Assessment Hotazel to Kimberley and De Aar to Port of Ngqura
145149	HIA Phase 1	Louisa Hutten	01/11/2013	HERITAGE IMPACT ASSESSMENT REPORT FOR THE FARMS PLAAS 438 PORTION 1 & PLAAS 588 RE
155262	PIA Desktop	John E Almond	22/12/2013	Palaeontological Heritage Basic Assessment: Desktop Study - Proposed construction of a 132 kV power line and switchyard associated with the Redstone Solar Thermal Energy Plant near Postmasburg, Northern Cape Province
162535	AIA Phase 1	David Morris	02/03/2012	Archaeological Impact Assessment Phase 1: Proposed development of a PV Power Station at Welcome Wood (extended area), near Owendale, Northern Cape
162542	PIA Desktop	John E Almond	01/02/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY Proposed PV power stations Welcome Wood II and III adjacent to Welcome Wood Substation, near DaniÃ«lskuil, Northern Cape Province
163992		Wouter Fourie	03/12/2013	Proposed Construction of the Limestone 1 - 132kV Power Line and the associated Switchyards on Portion 0 (remaining extent) of the Farm 267, Northern Cape Province
173943	Heritage Impact Assessment Specialist Reports	Marko Hutten, John Almond	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the ACWA Power SolarReserve Redstone Solar Thermal Power Plant with the Olien Substation â€“ Option 1: ACWA Power SolarReserve Redstone Solar Thermal Power Plant to Olien Substation, in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment
173967	Heritage Impact Assessment Specialist	Marko Hutten	15/07/2014	Proposed Construction of two 132kV Power Lines and Switchyards to connect the Redstone Solar Thermal Energy Plant with the Olien Substation in the ZF Ngcawu District Municipality â€“ Heritage Impact Assessment

	Reports			Option 2: Silverstreams substation to Olien Substations
344620	PIA Phase 1	John E Almond	09/11/2015	Palaeontological Heritage Report for the proposed 132 kV power lines between the ACWA Power SolarReserve Redstone Solar Thermal Energy Plant Site and Olien Main Transmission Substation near Lime Acres, Northern Cape Province
361351	AIA Phase 1	Karen Van Ryneveld	20/03/2016	Archaeological Impact Assessment Report
361357	PIA Phase 1	Lloyd Rossouw	03/05/2016	Palaeontological Impact Assessment
4604	AIA Phase 1	David Morris, Peter Beaumont	01/10/1994	Ouplaas 2 Rock Engravings, Danielskuil
6958	AIA Phase 1	Wouter Fourie	10/06/2011	Humansrus Solar Thermal Energy Power Plant, Postmasburg
73252	HIA Phase 1	Wouter Fourie	13/09/2012	Heritage Impact Assessment - Proposed Construction of 132kv Power Line and Switchyard Associated with the Redstone Solar Thermal Energy Plant in the Northern Cape Province
7842	AIA Phase 1	Cobus Dreyer	19/11/2007	Archaeological and Historical Investigation of the Proposed Mining Activities at the Farm Rosslyn, Lime Acres, Northern Cape
8240	AIA Phase 1	David Morris	11/06/2010	Proposed development of PV Power Station at Welcome Wood, near Owendale, Northern Cape
83272	HIA Phase 1	David Morris	01/08/2012	Archaeological & Cultural Heritage Impact Assessment Phase 1: Proposed Olien Solar Project development on Portion 4 of Farm 300, Barkly West, near Limeacres, Northern Cape
83273	PIA Desktop	Jennifer Botha-Brink	26/06/2012	PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED OLIEN SOLAR PROJECT ON FARM 300, BARKLY WEST, NORTHERN CAPE PROVINCE
8899	PIA Phase 1	John E Almond	04/05/2011	Recommended exemption from further palaeontological studies: Proposed Humansrus Solar Thermal Energy Power Plant development on Farm 469, near Postmasburg, Northern Cape Province
9047	PIA Phase 1	John E Almond	11/06/2010	Proposed photovoltaic power station adjacent to Welcome Wood Substation, Owendale near Postmasburg, Northern Cape Province

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