

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS  
DRAFT EIA REPORT

PROPOSED ILANGA LETHEMBA PV SOLAR  
ENERGY FACILITY, NEAR DE AAR,  
NORTHERN CAPE PROVINCE  
(DEA Ref No: 12/12/20/2048)

DRAFT FOR PUBLIC REVIEW  
16 September 2011 to 17 October 2011

Prepared for:

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## PROJECT DETAILS

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**DEA Reference No.** : 12/12/20/2048

**Title** : Environmental Impact Assessment Process  
Draft Environmental Impact Assessment Report:  
Proposed Ilanga Lethemba PV Solar Energy Facility,  
near De Aar, Northern Cape Province

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## INVITATION TO COMMENT ON THE DRAFT EIA REPORT

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The draft Environmental Impact Assessment (EIA) Report is available for review and comment by Interested and Affected Parties (I&APs) and stakeholders from:

**16 September 2011 – 17 October 2011** at:

Emthanjeni local Municipality Offices

De Aar Public Library

[www.savannahsa.com](http://www.savannahsa.com)

### PUBLIC MEETING

In order to facilitate comments on the Draft EIA Report and provide feedback on the findings of the studies undertaken, a public feedback meeting will held during the review period for the Draft EIA Report as follows:

Date: **27 September 2011**

Time: **18:00**

Venue: **De Aar Country Club, De Aar**

Please submit your comments to
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The due date for comments on the Draft EIA Report is 17 October 2011

Comments can be made as written submission via fax, post, or e-mail.

## EXECUTIVE SUMMARY

Solar Capital (Pty) Ltd is proposing the establishment of a commercial solar energy facility and associated infrastructure for the purpose of electricity generation on a site on portion 3 of Farm Paarde Valley 145, which is located approximately 7 km northeast of De Aar Northern Cape Province. The proposed facility is envisaged to have a maximum generating capacity of up to 300 MW, which will be developed in phases as indicated below. The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

- » An **array of photovoltaic panels** with a generating capacity of up to 300 MW, which will be developed in phases. It is envisaged that 75 MW will be installed in a first phase and the remaining three phases will be developed at 75 MW each.
- » **Support structures** to mount the photovoltaic panels. The angle of the panels will be tilted at 25° from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2.8 m from ground level.
- » An on-site **substation** (within an area of 100m x 100m) and new short overhead **power lines** between each phase and the on-site substation. Four (4) new

overhead **22kV** power lines connecting the four proposed phases to the proposed on-site substation will be required.

- » A **short power line** (few meters) from the on-site substation to turn into the existing Hydra MTS-Behrshoek 132kV power line that traverses the site, therefore connecting directly into the Eskom electricity network.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between project components, to be laid underground where practical.
- » **Access roads** with a width of less than 5 m within the site (for the purposes of construction and limited maintenance during operation). The southern road (existing) will be approximately 6 394 m in length, while the western road parallel to the R48 will be approximately 1 025 m in length.
- » Temporary **laydown** and **storage areas** in an area less than 1 hectare close to an existing house to be used as the site office

A broader site of 2 778 ha (i.e. portion 3 of Farm Paarde Valley 145) was identified by the project developer for the purpose of establishing the proposed Ilanga Lethemba PV Solar facility. However, the developmental footprint will cover an extent of approximately 787 ha, which has been sited considering the identified environmental sensitivities and technical preferences (refer to Figure 1). This portion is likely to suffer disturbance, particularly during

the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The proposed PV facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. In terms of Section 24(1) of NEMA, the potential impact on the environment must be considered, investigated, assessed, and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. An application form for environmental authorisation was accepted by DEA under application reference number **12/12/20/2048**.

The following key phases have been involved thus far in the EIA Process

- » *Notification Phase* - organs of state, stakeholders, and interested and affected parties (I&APs) were notified of the proposed project using adverts, site notices, background information documents, and stakeholders letters. Details of registered parties have been included within an I&AP database for the project.
- » *Scoping Phase* – potential issues associated with the proposed project and environmental sensitivities (i.e. over the broader study site), as well as the extent

of studies required within the EIA Phase were identified.

- » *EIA Phase* – potentially significant biophysical and social impacts<sup>1</sup> and identified feasible alternatives put forward as parts of the project have been comprehensively assessed. Appropriate mitigation measures have been recommended as part of a draft Environmental Management Programme (EMP).

The following potentially significant environmental impacts have been identified through the EIA Phase:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on social environment.

The positive implications of establishing a solar energy facility on the identified site include:

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It

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<sup>1</sup> Direct, indirect, cumulative that may be either positive or negative.

does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.

- » The facility has a novel and futuristic design that invokes a curiosity factor not generally present with other conventional power generating facilities. The advantage being that the solar facility can become an attraction or a landmark within the region that people would actually want to come and see. It could become a major tourist attraction in its own right and could complement the existing tourism attractions in the area, thereby resulting in promoting a positive image of the area with resultant positive impact on the local tourism industry, economy, and environment.
- » The project is anticipated to have positive social and health related impacts through the "greener" technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.
- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures as detailed within the draft Environmental Management Programme (EMP) for the project. With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable**.

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the developmental impacts of the proposed Ilanga Lethemba Solar Energy Facility can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

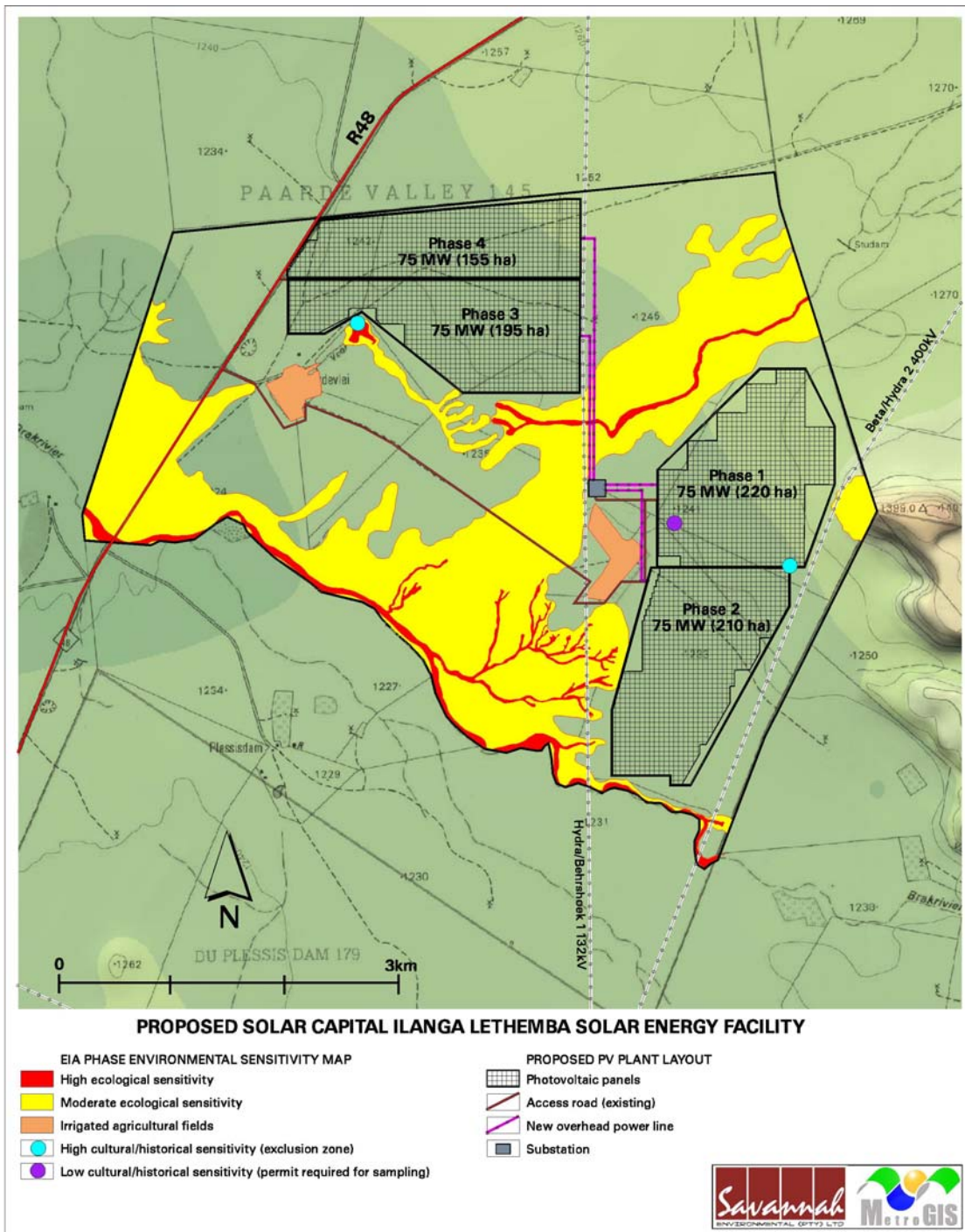
The following conditions would be required to be included within an authorisation issued for the project:

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices E to J should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix K of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.
- » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
- » Delineate all heritage sensitive/exclusion areas as identified with a buffer of approximately 30 m. These areas must be excluded from the development footprint.
- » Apply for permits from SAHRA and/or the PHRA for the removal

and/or sampling of heritage resources.

- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Where drainage lines are required to be crossed by access roads, the relevant permits (or water use licences) must be applied for from the DWA.
- » Ensure that power line towers are constructed at least 50 m from the drainage lines (i.e. span the watercourses).
- » Alien invasive plants should be controlled on site.
- » A permit is required for the removal of some of the archaeological artefacts that occur on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.





**Figure 1:** Sensitivity map illustrating the sensitive areas across the site, in relation to the proposed layout for the proposed development

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<b>Appendix D:</b>	Public Participation Information
<b>Appendix E:</b>	Ecological Study
<b>Appendix F:</b>	Soil and Agricultural Potential Study
<b>Appendix G:</b>	Heritage Study
<b>Appendix H:</b>	Palaeontological Study
<b>Appendix I:</b>	Visual Study
<b>Appendix J:</b>	Social Specialist Study
<b>Appendix K:</b>	Draft Environmental Management Programme

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## ABBREVIATIONS AND ACRONYMS

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BID	Background Information Document
DEA	National Department of Environmental Affairs
DEDTEA	Department of Economic Development, Tourism and Environmental Affairs
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EPC	Engineering, Procurement and Construction
FIT	Feed-in Tariffs
GDP	Gross Domestic Profit
GG	Government Gazette
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km <sup>2</sup>	Square kilometres
kV	Kilovolt
LUPO	Land Use Planning Ordinance, (Ordinance 15 of 1985)
MA	Million years before present
MAR	Mean Annual Rainfall
m <sup>2</sup>	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NGO	Non-Governmental Organisation
NT	Near Threatened
NWA	National Water Act (Act No. 36 of 1998)
PV	Photovoltaic
REFIT	Renewable Energy Feed-in Tariff
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
VAC	Visual Absorption Capacity
VU	Vulnerable

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## DEFINITIONS AND TERMINOLOGY

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**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.

**Archaeological material:** Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

**Concentrating solar power:** Solar generating facilities use the energy from the sun to generate electricity. Concentrating Solar Power facilities including concentrating PV collect the incoming solar radiation and concentrate it (by focusing or combining it) onto a single point, thereby increasing the potential electricity generation capacity.

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

**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

**'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.

**Early stone age:** A very early period of human development dating between 300 000 and 2.6 million years ago.

**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.

**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 (EIA), 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.

**Feed-in tariffs:** Feed-in Tariffs (FIT) have been set to promote socio-economic and environmentally sustainable growth. They are essentially guaranteed prices for electricity supply as opposed to conventional consumer tariffs. The basic economic principle underpinning the FIT is the establishment of a tariff that covers the cost of generation plus a "reasonable profit" to entice independent power producers to invest in generation projects.

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

**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 as a result 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 as a result of the activity.

**Integrated energy plan:** A plan commissioned by the DME in response to the requirements of the National Energy Policy, in order to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a balance between the energy demand and resource availability to provide low cost electricity for social and economic development, while taking into account health, safety and environmental parameters.

**Integrated strategic electricity planning:** Eskom's planning process which provides strategic projections of supply-side and demand-side options to be implemented to deal with the energy management issues and meet long-term load forecasts.

**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 general public.

**Late stone age:** In South Africa this time period represents fully modern people who were the ancestors of southern African Khoekhoen and San groups (40 000 – 300 years ago).

**Middle stone age:** An early period in human history characterised by the development of early human forms into modern humans capable of abstract thought process and cognition 300 000 – 40 000 years ago.

**National integrated resource plan:** Commissioned by NERSA in response to the National Energy Policy's objective relating to affordable energy services, in order to provide a long-term, cost-effective resource plan for meeting electricity demand, which is consistent with reliable electricity supply and environmental, social and economic policies.

**Optics:** Concentrating PV technology typically consists of different optical elements, such as mirrors and Fresnel lenses which are used to concentrate solar radiation

onto a point where a photovoltaic cell is located. Concentrating the solar radiation serves to maximise the potential electricity generation.

**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.

**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).

**Renewable energy feed-in tariff:** Renewable Energy Feed-In Tariffs (REFITs) are used to promote renewable energy and have been adopted in over 36 countries worldwide. The establishment of the REFIT in South Africa provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector, and to promote competitiveness between renewable and conventional energies in the medium and long-term. Under the National Energy Regulator Act (Act No. 40 of 2004), the Electricity Regulation Act (Act No. 4 of 2006), and all subsequent relevant amendment acts, the National Energy Regulator of South Africa (NERSA) has the mandate to determine the prices at and conditions under which electricity must be supplied by licence.

**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.

## INTRODUCTION

## CHAPTER 1

**Solar Capital (Pty) Ltd** is proposing the establishment of a commercial solar energy facility and associated infrastructure for the purpose of electricity generation on a site northeast of De Aar in the Northern Cape Province. The facility will be referred to as the **Ilanga Lethemba PV Solar Energy Facility** and will have a generating capacity of up to **300 MW<sup>2</sup>**, which will be developed in phases. It is envisaged that **75 MW** will be installed in a **first phase** and the remaining three phases will be developed at **75 MW** each.

From a regional perspective, this region of the Northern Cape is preferred for solar energy development by virtue of its **climatic conditions** (primarily due to the economic viability of a solar energy facility being directly dependent on the annual direct solar irradiation values for a particular area). A study of available radiation shows that the proposed site is uniformly irradiated by the sun. From a local perspective, the site is preferred by Solar Capital due to its suitable topography, relative proximity to a suitable grid connection (i.e. existing power lines as well as Hydra Substation), access, proximity to a potential labour source at De Aar, as well as the extent of the site (over 2778 ha in area).

The nature and extent of this facility, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Draft Environmental Impact Assessment (EIA) Report.

### 1.1. Summary of the proposed Development

The facility is proposed on portion 3 of Farm Paarde Valley 145 (SG Code C0570000000014500003), which is located approximately 7 km northeast of De Aar within the jurisdiction of the Emthanjeni Local Municipality. The southern border of the study site is bordered by the Brak River, with the R48 to Philipstown traversing the western section of the site and the Hydra Substation approximately 10 km from the site (refer to Figure 1.1). A broader study area of approximately 2778 ha has been considered within which the facility is to be constructed, although the actual development footprint of the proposed facility would be smaller in extent (approximately 787 ha for 300 MW will be permanently affected by the PV panels). Therefore, the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid any identified environmental sensitivities.

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<sup>2</sup> The facility was initially proposed to have a maximum generating capacity of 500MW and has now been reduced 300MW in order to avoid sensitive areas.

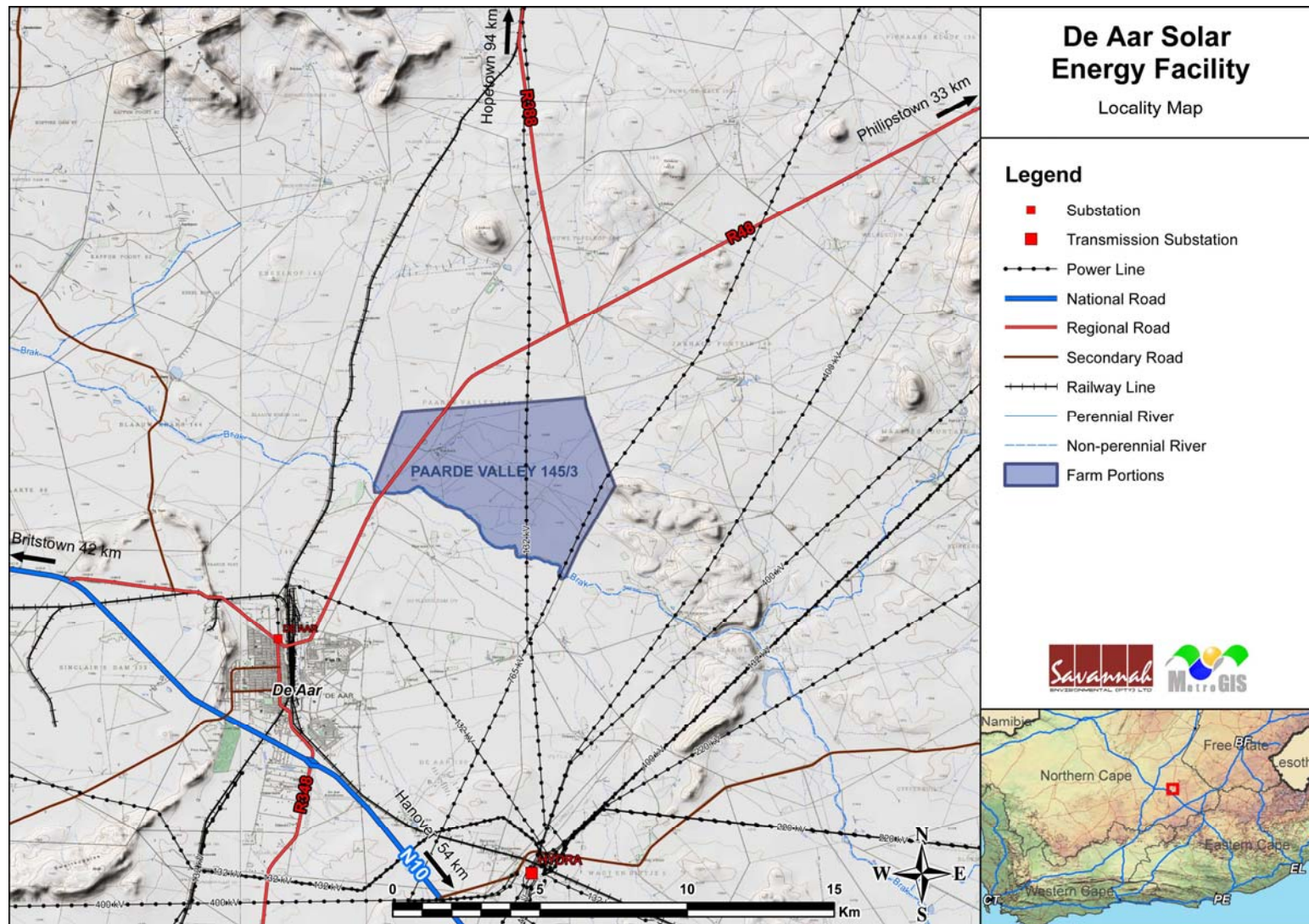
The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

- » An array of **photovoltaic panels** with a generating capacity of up to **300 MW**, which will be developed in phases. The following phases are currently proposed:
  - \* Phase 1: 75 MW over an area of approximately 220 ha
  - \* Phase 2: 75 MW over an area of approximately 210 ha
  - \* Phase 3: 75 MW over an area of approximately 195 ha
  - \* Phase 4: 75 MW over an area of approximately 155 ha
- » **Support structures** to mount the photovoltaic panels. The angle of the panels will be tilted at 25° from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2.8 m from ground level.
- » An on-site **substation** (within an area of 100m x 100m) and new short overhead **power lines** between each phase and the on-site substation. Four (4) new overhead **22kV** power lines connecting the four proposed phases to the proposed on-site substation will be required.
- » A **short power line** (few meters) from the on-site substation to turn into the existing Hydra MTS-Behrshoek 132kV power line that traverses the site, therefore connecting directly into the Eskom electricity network<sup>3</sup>.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between project components, to be laid underground where practical.
- » **Access roads** with a width of less than 5 m within the site (for the purposes of construction and limited maintenance during operation). The southern road (existing) will be approximately 6 394 m in length, while the western road parallel to the R48 will be approximately 1 025 m in length.
- » Temporary **laydown** and **storage areas** in an area less than 1 hectare close to an existing house to be used as the site office.

The scope of the proposed Ilanga Lethemba PV Solar Energy Facility, including details of all elements of the project (for the design/planning, construction, operation and decommissioning phases) is discussed in more detail in Chapter 2.

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<sup>3</sup> A power line to turn in to the existing Hydra MTS-Behrshoek 132kV power line that traverses the site is the preferred connection alternative. In order to evacuate the power from the subsequent phases of the project, a new power line to connect directly to the Hydra Substation may be required. This would be the subject of a separate application for authorisation (as is not considered further in this EIA).



**Figure 1.1:** Locality map showing Paarde Valley 145/3, the proposed site for the establishment of the solar facility

## 1.2. Conclusions from the Scoping Phase

The broader study area (i.e. the farm portion in its entirety) was evaluated within the scoping study (Savannah Environmental, June 2011). No environmental fatal flaws were identified to be associated with the site. However, from the preliminary sensitivity analysis undertaken, potentially sensitive areas within the study site were identified. In order to reduce the potential for on-site environmental impacts, it was recommended that these areas be avoided as far as reasonably possible through the facility design/micro-siting exercise. These potentially sensitive areas identified through the scoping study include:

- » *Non-perennial streams/ drainage lines within the site* - the site is in an arid area and although there are no permanent wetlands on site, there are a number of non-perennial streams / drainage lines that occur on the site<sup>4</sup>.
- » *Ecologically sensitive areas (terrestrial) that occur on the site* - ecologically sensitive areas that could support the occurrence of the following species
  - \* Karoo Padloper (listed as Vulnerable), three threatened bird species, Ludwig's Bustard, Martial Eagle and Lesser Kestrel (all classified as Vulnerable) of which one species may use the site for breeding purposes (Ludwig's Bustard) and three near threatened bird species that may be found on site (Secretarybird, Lanner Falcon and Blue Korhaan).
  - \* Possibly the Giant Bullfrog.
  - \* Protected trees species *Boscia albitrunca* (Shepard's Tree / Witgatboom / !Xhi.)
- » *Social and visual impacts on Homesteads / settlements on the site and in the broader study area* - from a social (security issues), visual (visibility of the facility), reflection of panels (glint/ glare), health and safety (operation risks such as fire due to presence of infrastructure) and economic (job creation although limited) perspective, impacts could occur on people in close proximity to the PV facility.
- » *Agricultural potential of current irrigation areas* - areas of current irrigation were identified as having a potentially high agricultural potential.

It was therefore recommended within the scoping study that these areas of sensitivity be avoided as far as possible. This has been achieved through an effective design process of the different components of the facility during the EIA Phase.

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<sup>4</sup> According to the National Water Act, these are classified as wetlands or water resources.

### 1.3. Requirement for an Environmental Impact Assessment Process

The proposed solar plant is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998). This section provides a brief overview of the EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of “listed activities”. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority who has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the Northern Cape Department of Environment and Nature Conservation (NCDENC) will act as a commenting authority for the application. An application for authorisation has been accepted by DEA under application reference number **12/12/20/2048**.

Compliance with the requirements of the EIA Regulations ensures that decision-makers are provided with an opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision. Solar Capital appointed Savannah Environmental (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to conduct the EIA process for the proposed project.

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 developer with the opportunity of being fore-warned of potential environmental issues. Subsequently it may assist with the resolution of issues reported on in the Scoping and EIA Phases as well as promoting dialogue with interested and affected parties (I&APs) and stakeholders. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations R543, a Scoping Phase and an EIA are required to be undertaken for this proposed project as the proposed project includes the following “listed activities” in terms of GN R544, R545 and R546 (GG No 33306 of 18 June 2010).

Number and date of the relevant notice:	Activity No(s) (in terms of the relevant notice):	Description of listed activity from Regulations	Relevance of Regulation to Project
GN544 <sup>5</sup>	10(i)	The construction of facilities or infrastructure for the transmission and distribution of electricity – (i) Outside urban areas or industrial complexes with a capacity of more than 33kV but less than 275kV;	Construction of a 132KV power line (outside an urban area between the onsite substation and the existing Eskom 132 kV power line).
GN544	11 (iii)(x)(xi)	The construction of: (iii) bridges; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 square metres or more  Where such construction occurs within a watercourse or within 32 metres of a watercourse, measures from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	Potential construction of bridges, buildings, infrastructure or structures within 32m of a watercourse
GN544	23(ii)	The transformation of undeveloped, vacant or derelict land to: (ii) residential, retail, commercial, recreational, industrial or institutional use, outside an urban area and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares.	The transformation of up to 1200ha of undeveloped, vacant or derelict land for a solar energy facility outside an urban area
GN545 <sup>6</sup>	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.	The construction of a photovoltaic (PV) solar energy facility with a maximum generating capacity of 300MW.

<sup>5</sup> Activities requiring a Basic Assessment

<sup>6</sup> Activities requiring a Scoping and EIA Study



			Invertors and substations are ancillary infrastructure for this facility.
GN545	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; Except where such physical alteration takes place for: (i) Linear development activities. (ii) Agriculture or afforestation where activity 16 in this schedule will apply.	The transformation of up to 787ha of undeveloped, vacant or derelict land for a solar energy facility  The proposed development footprint of the proposed facility would be approximately 787 ha for 300 MW. Therefore, the footprint of physical alternation will exceed 20ha.
GN 546	4(a)ii	The construction of a road wider than 4 metres with a reserve less than 13.5 meters  (a) In the Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape Provinces (ii) Outside an urban area	The construction of a gravel access road wider than 4 m with a reserve less than 13,5 m
GN 546	10(a)(ii)	The construction 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 (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape Provinces (ii) outside urban areas.	Potential construction of facilities or infrastructure for the storage, or storage and handling of a dangerous goods, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in the Northern Cape Province outside urban areas.
GN 546	13(c)ii	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (c) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape and Western Cape.	Potential clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation

The EIA phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of NEMA.

#### **1.4. Objectives of the EIA Process**

The Scoping Phase which was completed in July 2011 (i.e. with the acceptance of scoping) and served to identify potential impacts associated with the proposed project and to define the extent of studies required within the EIA Phase. The Scoping Phase included input from the project proponent, specialists with experience in the study area and in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

The EIA Phase (i.e. the current phase) addresses identified environmental impacts (direct, indirect, and cumulative as well as positive and negative) associated with the different project development phases (i.e. design, construction, operation, and decommissioning). The EIA Phase also recommends appropriate mitigation measures for potentially significant environmental impacts. The release of a draft EIA Report provides stakeholders with an opportunity to verify that issues they have raised through the EIA Process have been captured and adequately considered. The final EIA Report will incorporate all issues and responses raised during the public review phase prior to submission to DEA.

#### **1.5. Details of the Environmental Assessment Practitioner**

Savannah Environmental was contracted by Solar Capital as the independent EAP to undertake the EIA process for the proposed project. Neither Savannah Environmental nor any of its specialist sub-consultants are subsidiaries of or are affiliated to Solar Capital. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consultancy which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures. The proposed project team members include:

- » *Karen Jodas* - a registered Professional Natural Scientist and holds a Master of Science degree. She has 14 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.
  
- » *Bongani Darryl Khupe* – the principle author of this report is a registered Professional Natural Scientist who holds a Bachelor of Science Honours degree and has more than 5 years' experience in the environmental field. His key focus is on environmental impact assessments, environmental permitting, public participation, environmental management plans and programmes, strategic environmental advice, rehabilitation advice and monitoring, environmental compliance advice & monitoring as well as providing technical input for projects in the environmental management field. He is currently the responsible EAP for several renewable energy projects and other EIAs across the country.

Savannah Environmental has gained extensive knowledge and experience on potential environmental impacts associated with electricity generation projects through their involvement in related EIA Processes. Savannah Environmental has completed the EIA process for the following solar facility projects:

- » EIA and EMP for the proposed Upington Solar Thermal Plant, Northern Cape (environmental authorisation received from DEA)
- » EIA and EMP for the proposed Pofadder Solar Thermal Plant, Northern Cape (environmental authorisation received from DEA)
- » EIA and EMP for the proposed Kathu Solar Energy Facility, Northern Cape (EIA complete)
- » EIA and EMP for the proposed Sishen Solar Energy Facility, Northern Cape (EIA complete)
- » EIA and EMP for the proposed Waterberg Solar Energy Facility, Limpopo Province. (EIA complete)
- » BA and EMP for the proposed Photovoltaic Installation at the OR Tambo Airport, Gauteng Province (BA process complete)
- » BA and EMP for the proposed Photovoltaic Installation at the Kimberley Airport, Northern Cape (BA process complete)
- » BA and EMP for the proposed Photovoltaic Installation at the Upington Airport, Northern Cape (BA process complete)

- » BA and EMP for the proposed Photovoltaic Installation at the Bloemfontein Airport, Free State Province (BA complete)
- » EIA and EMP for the proposed Khi CSP Solar Thermal Plant near Upington, Northern Cape Province (environmental authorisation received from DEA)
- » The proposed KaXu CSP Solar Thermal Plant near Pofadder, Northern Cape Province (environmental authorisation received from DEA).
- » The proposed Thupela Energy PV Plant near Vaalwater, Limpopo Province (environmental authorisation received from DEA).

The following projects are in progress and in various stages of the EIA process:

- » EIA and EMP for the proposed Wag'nbiekiespan Solar Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Aggeneys Photovoltaic Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Loeriesfontein Photovoltaic Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Ritchie Photovoltaic Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Karoo Renewable Wind and Solar Energy Facility, Northern and Western Cape
  - » EIA and EMP for the proposed Lephallale Solar Energy Facility, Limpopo Province
  - » EIA and EMP for the proposed Ilanga Solar Thermal Power Plant, Northern Cape
  - » BA and EMP for the proposed Kabi Kimberley PV Solar Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Upington Photovoltaic Facility, Northern Cape
  - » EIA and EMP for the proposed Kleinbegin Photovoltaic Facility, Northern Cape
  - » EIA and EMP for the proposed Vredendaal Photovoltaic Facility, Northern Cape
  - » EIA and EMP for the proposed Kakamas Photovoltaic Facility, Northern Cape
  - » BA and EMP for the proposed RustMo1 Photovoltaic Plant, North West Province
  - » BA and EMP for the proposed Koingnaas Wind Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Geelkop Solar Energy Facility, Northern Cape.
  - » EIA and EMP for the proposed OfirZX Solar Energy Facility, Northern Cape
  - » EIA and EMP for the proposed Sonnenburg Solar Energy Facility, Northern Cape

Savannah Environmental has developed a valuable understanding of impacts associated with the construction and operation of renewable energy facilities. In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed specialist consultants as required. Curricula vitae for

the Savannah Environmental project team and its specialist sub-consultants are included in Appendix A.

## OVERVIEW OF THE PROPOSED PROJECT

## CHAPTER 2

This chapter provides an overview of the proposed Ilanga Lethemba PV Solar Energy Facility. The project scope includes the planning/design; construction; operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also explores the “Do-Nothing” alternative - that is the alternative of not establishing the facility.

### 2.1. Description of the Proposed Solar Energy Facility

The solar energy facility is proposed to accommodate an array of **photovoltaic** (PV) panels with a generating capacity of up to **300 MW**. It is envisaged that 75 MW will be installed in a first phase and the remaining three phases will each be developed as a 75 MW plant. A broader study area of approximately 2778 ha has been considered within which the facility is to be constructed. An average area of approximately 787 ha will be required for the installation of 300 MW. The actual development footprint of the proposed facility is therefore smaller in extent, such that the PV panels as well as associated infrastructure have been appropriately placed within the boundaries of the broader site to avoid identified environmental sensitivities.

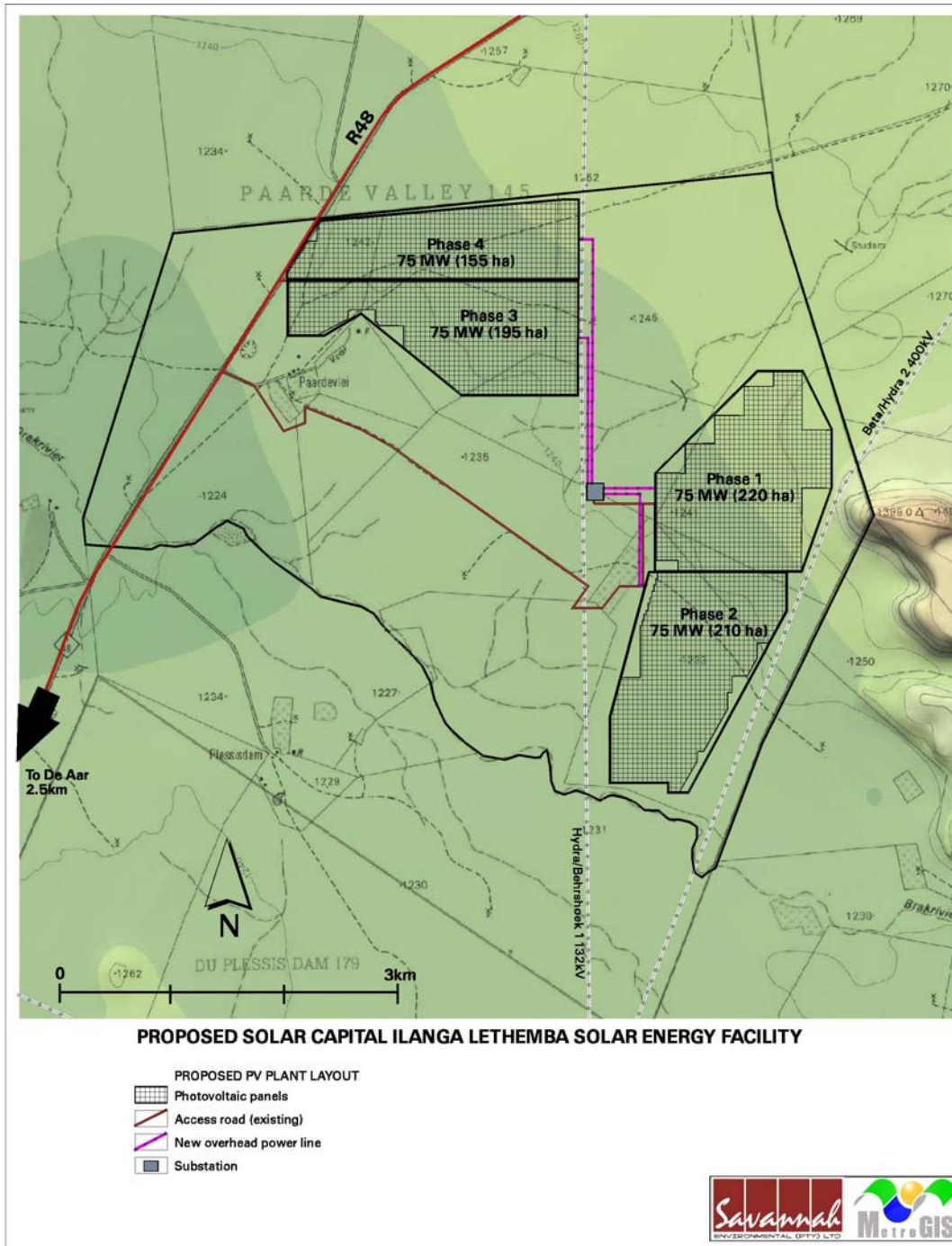
The facility is proposed to accommodate the following:

- » An array of **photovoltaic panels** with a generating capacity of up to **300 MW**, which will be developed in phases. The following phases are currently proposed:
  - \* Phase 1: 75 MW over an area of approximately 220 ha
  - \* Phase 2: 75 MW over an area of approximately 210 ha
  - \* Phase 3: 75 MW over an area of approximately 195 ha
  - \* Phase 4: 75 MW over an area of approximately 155 ha
- » **Support structures** to mount the photovoltaic panels. The angle of the panels will be tilted at 25° from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2.8 m from ground level.
- » An on-site **substation** (within an area of 100m x 100m) and new short overhead **power lines** between each phase and the on-site substation. Four (4) new overhead **22kV** power lines connecting the four proposed phases to the proposed on-site substation will be required.

- » A **short power line** (few meters) from the on-site substation to turn into the existing Hydra MTS-Behrshoek 132kV power line that traverses the site, therefore connecting directly into the Eskom electricity network<sup>7</sup>.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between project components, to be laid underground where practical.
- » **Access roads** with a width of less than 5 m within the site (for the purposes of construction and limited maintenance during operation). The southern road (existing) will be approximately 6 394 m in length, while the western road parallel to the R48 will be approximately 1 025 m in length.
- » Temporary **laydown** and **storage areas** in an area less than 1 hectare close to an existing house to be used as the site office.

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<sup>7</sup> A power line to turn in to the existing Hydra MTS-Behrshoek 132kV power line that traverses the site is the preferred connection alternative. In order to evacuate the power from the subsequent phases of the project, a new power line to connect directly to the Hydra Substation may be required. This would be the subject of a separate application for authorisation (as is not considered further in this EIA).



**Figure 2.1:** Preliminary layout for the proposed Ilanga Lethemba PV Solar Energy Facility



## 2.2. Solar Energy as a Power Generation Technology

The generation of electricity can be easily explained as the conversion of energy from one form to another. Solar energy facilities operate by converting solar energy into a useful form (i.e. electricity). Solar technologies can be divided into two categories, those that use thermal energy from the sun and those that use the light energy. The former uses water (i.e. solar thermal) whereas the latter does not (i.e. photovoltaic technology which is proposed for the proposed Ilanga Lethemba PV Solar Energy Facility).

The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. 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 now is ensuring solar energy projects are able to meet all economic, social, and environmental sustainability criteria.

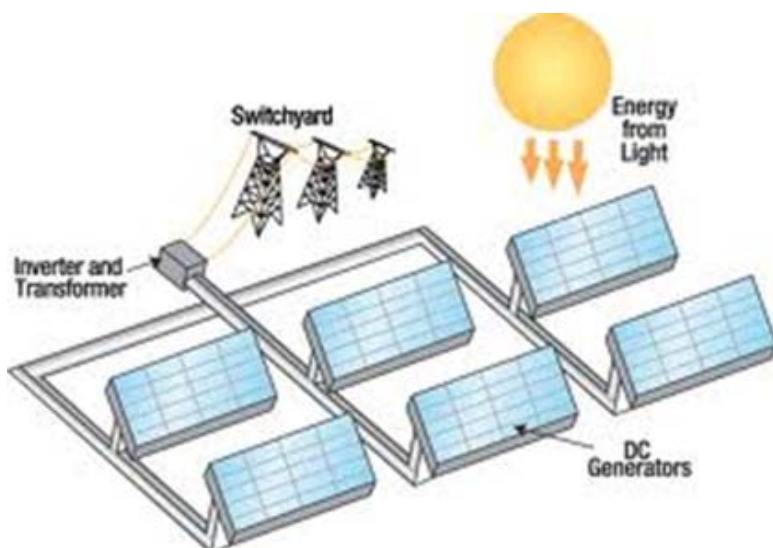
### 2.3.1 How do Grid Connected Photovoltaic Facilities Function?

Photovoltaic facilities generate electricity through the use of photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells which 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**". The individual photovoltaic cells are commonly constructed from silicon, are linked together and placed behind a protective glass sheet to operate in unison as a photovoltaic panel.



**Figure 2.2:** Photo showing view of photovoltaic panels.

In order to produce 300 MW of power, the proposed plant will require numerous panels arranged in multiples/arrays which will be fixed to a support structure. In order to maximise the amount of electricity generated the panels need to be angled in such a fashion so to receive the maximum amount of solar radiation throughout the year. The preferred angle of the panels (which is dependent on the latitude of the proposed facility) may be adjusted to optimise for summer or winter solar radiation characteristics. Lastly, an **inverter** will be used to convert the electricity, which is produced as direct current, into alternating current.



**Figure 2.3:** Schematic diagram of a PV plant (Sourced from: <http://www.solar-green-wind.com/archives/tag/solar-cells>)

### 2.3. Rationale for developing a PV Solar Energy Facility

The primary rationale for the proposed Ilanga Lethemba PV Solar Energy Facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of a 42% share of all new installed generating capacity (new build) being derived from renewable energy forms, as targeted by the Department of Energy (DoE) (Integrated Resource Plan 2010 – 2030). In terms of the Integrated Resource Plan (IRP), approximately 8.4% of the renewable energy mix is planned to be generated from PV technologies over the next thirty years. This is, however, dependent on the assumed learning rates and associated cost reductions for renewable options.

In the event of the project being developed, it will contribute to the local electricity grid, as well as to the target for renewable energy as detailed in the IRP. In addition, the implementation of the proposed project will provide both economic stimulus to the local economy through the construction process and employment for the operational phase of the facility.

In addition, the project location was specifically chosen for the construction of a PV facility for the following reasons:

- » Close proximity to the Hydra Substation and the presence of an existing 132kV powerline that traverses the site. This will make it easy for the facility to turn-in to this 132kV power line, evacuating the power directly to Hydra Substation.
- » A study of available radiation shows that the proposed site is uniformly irradiated by the sun hence has the required solar resource.
- » The site is relatively flat as preferred for the installation of PV panels.

## 2.4. Project Alternatives

In accordance with the requirements of the EIA Regulations<sup>8</sup>, alternatives are required to be considered within the EIA process, and may refer to any of the following:

- » Site alternatives
- » Activity alternatives
- » Design or layout alternatives
- » Technology alternatives
- » Operating alternatives
- » No-go alternative

### 2.4.1. Site Alternatives

No site alternatives have been assessed as part of the EIA process as the placement of a solar facility is strongly dependent on several factors including climatic conditions, relief and orography, grid connection, the extent of the site, as well as access to the site. This site has been identified by Solar Capital through extensive pre-feasibility investigations as being highly desirable for the establishment of a photovoltaic plant. Various other locations in the greater Karoo were considered however, this site was found to be favourable as per the following technical, logistical and environmental characteristics.

- » **Climatic conditions:** The economic viability of a photovoltaic plant is directly dependent on the annual direct solar irradiation values. The Northern Cape receives the highest average daily direct normal irradiation in South Africa, which indicates that the region location of the project appropriate for solar energy facility. A study of available radiation shows that the proposed site is uniformly irradiated by the sun.

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<sup>8</sup> GNR543 27(e) calls for the applicant to identify feasible and reasonable alternatives for the proposed activity.

- » **Topography:** A level surface area is preferred for the installation of PV panels. This reduces the need for extensive earthworks associated with the levelling of a site, thereby minimising environmental impacts. The topography of the area proposed for the PV facility is relatively gentle and slopes gently towards the south as well as westwards away from the hill in the eastern part of the site.
- » **Power transmission considerations:** Eskom's Hydra MTS-Behrshoek 132kV power line traverses the site. Therefore a substation can be established on the development site, and the Solar Capital facility can turn-in to this 132kV power line, evacuating the power directly to Hydra Substation. It has been determined through preliminary discussions with Eskom that this power line has capacity to receive the power generated from the first phases of the proposed facility. In addition, it is possible to construct a new power line to connect directly to the Hydra Substation 13 km to the south of the site if the need arises. This power line would be the subject of a separate application for authorisation.
- » **Environmentally suitable:** The majority of the identified site falls within a vegetation type categorised as 'least threatened' according to Driver et al. 2005 and Mucina *et al.*, 2006. The identified site has been transformed as it is used for grazing purposes. This lends itself to the establishment of the solar facility as it is preferable, from an ecological perspective, to utilise a transformed site. In addition, only 1% of the site is used for irrigated agriculture and there was enough space to avoid these areas for the proposed development. The majority of the site in which the facility will be placed is viewed to be of low agricultural potential.
- » **Site accessibility:** The site can be accessed directly from the R48 to Philipstown and is approximately 7 km northeast of De Aar. The site is therefore appropriately located for easy transport of components and equipment as well as labour movement to and from De Aar.

Based on these considerations, Solar Capital considers the proposed site as being highly suitable for the development of the Ilanga Lethemba PV Solar Energy Facility. No alternative sites are considered further in the EIA process.

#### **2.4.2. Activity Alternatives**

No activity alternatives were assessed because the site has been identified by Solar Capital as being highly desirable for the establishment of a photovoltaic plant and not any other development or renewable technologies such as wind or concentrated solar power (CSP).

- » Wind energy installations were not considered as a feasible and reasonable alternative as the proposed developmental area does not have the required wind resource.

- » CSP installations were not considered as a feasible and reasonable alternative as they require a large amount of water for cooling, unlike PV where water is only required for cleaning purposes (considering the fact that the site is in an arid area.). PV is also relatively easier to construct as opposed to CSP.

Therefore, a PV facility is considered by Solar Capital to be the only feasible activity for the proposed site.

### **2.4.3. Design or Layout Alternatives**

This alternative was not assessed in the EIA Phase, however technical, social and environmental issues were considered, prior to the layout design/micro-siting exercise. The rationale for not considering alternatives in this category is explained below.

- » *PV panels positioning* – space is a restricting factor on site considering the proposed generating capacity of the facility. In order to meet the proposed generating capacity within the proposed development area and maximise all available space after considering environmental, technical and social issues as identified in the Scoping phase, all available space will be utilised for the PV facility. In order to accommodate and avoid site sensitivities the proposed generating capacity for the full facility (i.e. all four phases) has been reduced from the 500MW originally proposed to 300MW.
- » *Site access* - the study site is accessible via an existing access point off the R48 from De Aar to Philipstown. In order to reduce the environmental impact from construction of new internal access roads, an existing internal access road (to the south of the site, approximately 6394 m long) will be used to access the proposed first and second phases of the development (see figure 2.1 above). This access road is currently being used by the landowner to access agricultural fields that will be next to the area proposed for PV installation. Therefore, no other feasible or reasonable alternative access was available for consideration for access to this section of the site. In addition, in order to meet the requirements of the South African National Roads Agency Limited (SANRAL) the same access point (off the R48) will be used to access the third and fourth phases of the proposed development. A short internal access road will be created to access this section of the site in order to reduce the environmental impacts of this new access road (to the west of the site parallel to the R48, approximately 1025 m).
- » *Operations centre and site office* – Solar Capital has engaged with the landowner that they use an existing building on site as a construction equipment camp and temporary laydown area during construction and as their operations centre during the operational phase. No reasonable or feasible alternative was therefore identified by Solar Capital in this regard, as the

alternative proposed is the best practicable environmental solution as a disturbed area is proposed to be used to avoid further disturbance on the site.

#### **2.4.4. Technology Alternatives**

Very few technological options exist in as far as PV technologies are concerned; those that are available are usually differentiated by weather and temperature conditions that prevail – so that optimality is obtained by the final choice. The PV technological options available include monocrystalline, polycrystalline and thin film modules. The impacts of any of the PV technology choices are the same. Therefore, the choice of technology does not affect the environmental impact of the proposed development. The construction, operation and decommissioning of the facility will also be the same irrespective of the technology chosen. Therefore, no alternatives were assessed in this regard.

#### **2.4.5. Operating Alternatives**

No operational alternatives were assessed as no feasible and reasonable operational alternatives were identified.

#### **2.4.6. No-go Alternative**

The 'Do-Nothing' alternative is the option of not constructing the proposed Ilanga Lethemba PV Solar Energy Facility. In this scenario the potential environmental and social impacts will not occur and the status quo will be maintained. If the status quo remains unchanged vegetation degradation due to overgrazing will continue on site. Furthermore, should the project not proceed, the contribution of 300 MW from this project towards the Government target for renewable energy will not be realised. As a result the range of socio-economic and environmental benefits for South Africa would not be realised. These include:

- » **Increased energy security:** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
- » **Resource saving:** Conventional coal fired plants are major consumers of water during their requisite cooling processes. 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, when compared with wet cooled conventional power stations; this translates into revenue savings of R26.6 million. 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.

- » **Exploitation of our significant renewable energy resource:** At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
- » **Pollution reduction:** The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.
- » **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 greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for ~1% of global GHG emissions and is currently ranked 9<sup>th</sup> worldwide in terms of per capita CO<sub>2</sub> 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 for cementing its status as a leading player within the international community.
- » **Employment creation:** The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa.
- » **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.
- » **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.

## 2.5. Proposed Activities during the Project Development Stages

In order to construct the proposed facility and its associated infrastructure, a series of activities will need to be undertaken during the design, pre-construction construction, operation, and decommissioning phases which are discussed in more detail below.

### 2.5.1. Construction Phase

The construction of the facility will be phased. Approximately 75 MW would be installed in the first phase. The construction phase is expected to extend over a period of 12 months and create approximately 800 employment opportunities at

peak construction. It is anticipated that approximately 80% (640) of the employment opportunities will be available to low skilled (construction labourers, security staff etc.), 10% (80) to semi-skilled workers (drivers, equipment operators etc.) and 10% (80) to skilled personnel (engineers, land surveyors, project managers etc.). The low skilled personnel are likely to be sourced from the nearby town of De Aar and are likely to commute from their homes on a daily basis. Therefore any overnight on-site employees would be limited to security and skilled construction staff. Workers not living in the area, including those for skilled positions, will not be housed on site.

The construction phase will entail a series of activities including:

### **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 and the plant's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed site. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

A power line servitude survey will also be conducted for the proposed 22kV powerlines once the placement of the towers for the power line has been finalised, a walk through survey will be undertaken for ecological, archaeology and heritage resources which may necessitate certain towers to be moved to avoid on-the-ground sensitivities.

### **Establishment of Access Roads**

The identified farm portion for the proposed facility can be accessed via the R48 road to Philipstown. It is not envisaged that any new access roads will be required to be constructed in order to access the site. However, internal access roads will be required to access the individual components within the facility during construction and operation. There is an **existing** internal access road to south of the site (approximately 6394 m) that is proposed to be used to access the first and second phases of the proposed development. Where necessary, it may be required, in some areas, to upgrade this road in order to suite bigger vehicle movement requirements. A new access road to the west of the site along the R48 approximately 1025 m long and 4.75 m in width will need to be constructed. The extent of earthworks and compaction required in the upgrade or construction of the access roads will be established through the detailed geotechnical study which will be undertaken as part of the design phase.



### **Undertake Site Preparation**

Site preparation activities will include clearance of vegetation at the footprint of each support structure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site. If the terrain is undulating, then the ground may have to be levelled to one slope, if the land is not flat enough. Rocks may also be removed as well as trees that may be obstacles. No protected trees were found on site. However, a licence will be required to remove any indigenous trees on site in terms of the National Forests Act (Act no 84 of 1998).



**Figure 2.4:** An example of site preparation activities that required the levelling some sections of the site.

The components for the proposed facility will be transported to site, in sections, by road. Some of the substation components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)<sup>9</sup> by virtue of the dimensional limitations (i.e. length and weight). The 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 establishment of the substation and power line.

### **Establishment of Construction Equipment Camps**

Once the required equipment has been transported to site, a dedicated construction equipment camp will need to be established. The purpose of this camp is to confine activities and storage of equipment to one designated area to limit the potential ecological impacts associated with this phase of the project. The laydown area(s)

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<sup>9</sup> A permit will be required for the transportation of these abnormal loads on public roads.

will be used for assembly purposes and the general placement/storage of construction equipment. The storage of fuel for the on-site construction vehicles and equipment will need to be secured in a temporary bunded facility so to prevent the possibility of leakages and soil contamination.

### **Establishment of the PV Panels**

The PV panels will be constructed in individual 'strings' each with its own dedicated inverter. The rationale behind this layout is that if one 'string' should require maintenance or should it break down, then the generation capabilities of the whole facility will not be compromised. Each 'string' will be sited a certain distance away from each other so as to prevent shadows falling in an easterly direction from shading adjacent panels.

The PV panels will be mounted via steel structures which will be attached to uprights which are stabilised by concrete foundations where necessary. The foundation holes will be mechanically excavated to a depth of approximately 150 - 180 cm. The concrete foundations where necessary will be poured and then be left for up to a week to cure. Aggregate and cement to be transported from the closest centre to the development. The installation of the underground cables will require the excavation of trenches of approximately 40 cm – 100 cm deep within which they can then be laid.



**Figure 2.5:** Example of erected steel mounting structures awaiting the installation of the PV panels (SunEdison Photovoltaic Power Plant, Rovigo, Italy)



**Figure 2.6:** Trenching for underground cables for the PV panels.

### **Establishment of Ancillary Infrastructure**

Ancillary infrastructure includes invertors, a single substation which will accommodate all 4 phases of the proposed development, a short (less than 1 km) turn-in overhead 132kV power line feeding from the onsite substation into the existing Hydra MTS-Behrshoek 132kV power line which traverses the site, a security room, and a temporary contractor's equipment camp. In addition, 22kV powerlines will be constructed to link all the proposed phases to the proposed onsite substation which will be centrally located.

The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

### **Construct on-site substation**

An on-site substation of approximately 100 x 100 m will be required to be established on the site. This substation would connect to the Eskom grid via a "turn in" into Eskom's existing Hydra MTS-Behrshoek 132kV power line, which

traverses the site. The power generated at this facility would therefore be evacuated directly to Eskom's Hydra Transmission Substation. The substation is to be constructed in close proximity to the existing 132kV power line servitude, and would require a short turn-in line of less than 1km. The construction of the substation would include the construction of the foundations, erection and installation of equipment (including the transformer) and connection of the necessary conductors.

### **Undertake Site Remediation**

As construction is completed in an area, and as all construction equipment is removed from the site, the site must be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

#### ***2.5.2. Operational Phase***

The electricity that is generated from the PV panels will be stepped up through the on-site inverters and transformers at the on-site substation. Thereafter the power will be evacuated from the on-site substation to the Eskom existing overhead power line to feed into the grid.

The proposed operational phase is expected to run for a period of approximately 30 - 50 years with plant maintenance. It is anticipated that during this time a full time security, maintenance, supervision and monitoring teams will be required on site. Maintenance activities will include *inter alia*, replacement and cleaning of the panels (using pressurised air). The photovoltaic plant will be operational during daylight hours only. However, it will not be operational under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities. No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed.

#### ***2.5.3. Decommissioning Phase***

Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to continue, existing components would be disassembled and replaced with more appropriate technology/infrastructure available at that time. However, if the decision is made to decommission the facility the following activities will form part of the project scope.

### **Site Preparation**

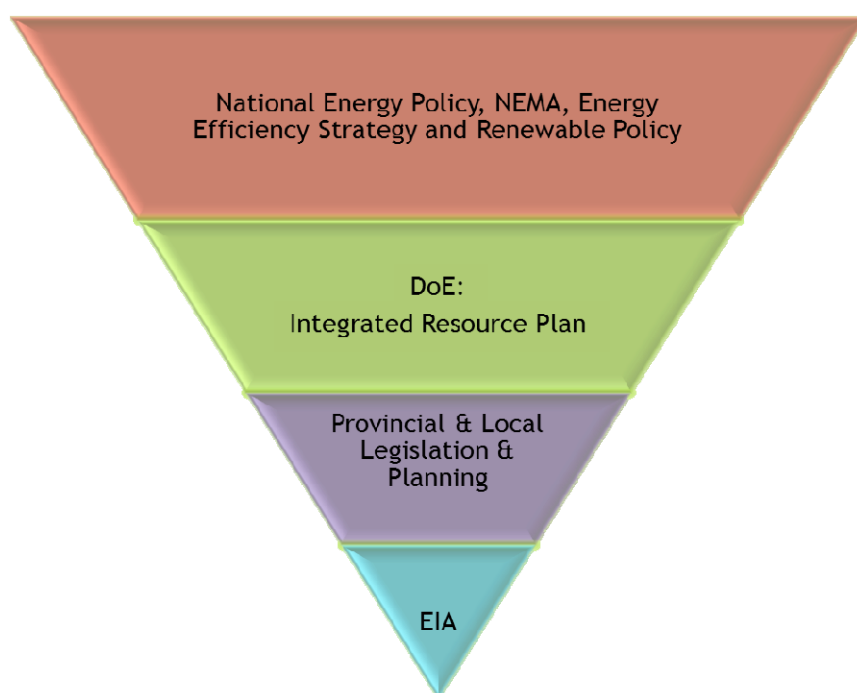
Site preparation activities will include confirming the integrity of the access to the site to accommodate the required decommissioning equipment.

### **Disassemble and Replace Existing Components**

The components of the plant will be disassembled and removed. Thereafter they will be reused and recycled (where possible) or disposed of in accordance with regulatory requirements.

### 3.1 Policy and Planning Context

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 Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as solar energy facilities is illustrated in Figure 4.1. 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 solar energy facility.



**Figure 3.1:** Hierarchy of electricity policy and planning documents

#### ***3.1.1 White Paper on the Energy Policy of South Africa, 1998***

Development within the South African energy sector is governed by the White Paper on a National Energy Policy (DME, 1998). The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversity.

As such, investment in renewable energy initiatives is supported, based on an understanding that renewable energy sources have significant medium - long-term commercial potential and can increasingly contribute towards a long-term sustainable energy future.

### **3.1.2 Renewable Energy Policy in South Africa, 1998**

The White Paper on Renewable Energy (DME, 2003) supplements the Energy Policy, and sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. Government policy on renewable energy is therefore concerned with meeting economic, technical and other constraints on the development of the renewable industry.

In order to meet the long-term goal of a sustainable renewable energy industry, the South African Government has set the following 10-year target for renewable energy: *"10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1 667 MW) of the estimated electricity demand (41 539 MW) by 2013"* (DME, 2003).

The White Paper on Renewable Energy states *"It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having profound impacts on our planet. Solar energy is a clean, renewable resource and should be developed in South Africa on the basis of national policy as well as provincial and regional guidelines."*

### **3.1.3 Final Integrated Resource Plan, 2010 - 2030**

The Energy Act of 2008 obligates the Minister of Energy to develop and publish an integrated resource plan for energy. Therefore, the Department of Energy (DoE), together with the National Energy Regulator of South Africa (NERSA) has compiled the Integrated Resource Plan (IRP) for the period 2010 to 2030. The objective of the IRP is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next twenty years. The IRP is intended to:

- » Improve the long term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development;
- » Ascertain South Africa's capacity investment needs for the medium term business planning environment;



- » Consider environmental and other externality impacts and the effect of renewable energy technologies;
- » Provide the framework for Ministerial determination of new generation capacity (inclusive of the required feasibility studies)

The objective of the IRP is to evaluate the security of supply, and determine the least-cost supply option by considering various demand side management and supply-side options. The IRP also aims to provide information on the opportunities for investment into new power generating projects.

The outcome of the process confirmed that coal-fired options are still required over the next 20 years and that additional base load plants will be required from 2010. The first and interim IRP was developed in 2009 by the Department of Energy. The initial four years of this plan was promulgated by the Minister of Energy on 31 December 2009, and updated on 29 January 2010. The Department of Energy released the Final IRP in March 2011, which was accepted by Parliament at the end of March. This Policy-Adjusted IRP is recommended for adoption by Cabinet and subsequent promulgation as the final IRP. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9.6 GW of nuclear; 6.3 GW of coal; 17.8 GW of renewables (including 8,4GW solar); and 8.9 GW of other generation sources.

#### **3.1.4 Electricity Regulation Act, 2006**

Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of Amendment, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by licence to Independent Power Producers (IPPs). NERSA has recently published a request for qualification and proposals for new generation capacity under the IPP procurement programme, and is in the process of updating and developing its process in relation to the awarding of electricity generation licences.

### **3.2. Regulatory Hierarchy for Energy Generation Projects**

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.



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

- » *Department of Energy (DoE)*: This Department is responsible for policy relating to all energy forms, including renewable energy. Solar energy is considered under the White Paper for Renewable Energy and the Department undertakes research in this regard. This Department is the controlling authority in terms of the Electricity Act (Act No 41 of 1987). In order to initiate the renewable energy procurement process, the department has released the South African Renewable Energy Independent Power Producers Request for Proposals.
- » *National Energy Regulator of South Africa (NERSA)*: This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for wind energy developments to generate electricity.
- » *Department of Environmental Affairs (DEA)*: This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this application for authorisation, and charged with granting the relevant environmental authorisation.
- » *The South African Heritage Resources Agency (SAHRA)*: The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provide legislative protection for listed or proclaimed heritage sites.
- » *Department of Transport - Civil Aviation Authority (CAA)*: This Department is responsible for aircraft movements and radar.
- » *South African National Roads Agency Limited (SANRAL)*: This body is responsible for all National road routes.
- » *Department of Agriculture, Forestry and Fisheries*: This Department is responsible for agriculture, forestry and fishery matters. In order, to protect agricultural resources, reports detailing agricultural potential of proposed areas for development are to be submitted to the department for comments.
- » *Department of Water Affairs*. This Department will be involved should water resources be required or if any activities in terms of S21 of the National Water Act are triggered (i.e. the crossing of drainage lines and water abstraction for use in the facility).

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

- » *Northern Cape Department of Environment and Nature Conservation (NCDENC)*. This Department is the commenting authority for this application for authorisation, and will provide comment to DEA regarding the EIA reporting.
- » *Department of Transport and Public Works -Northern Cape Province*. This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » *Northern Cape Department of Agriculture*. This Department's involvement relates specifically to sustainable management of the agricultural resources in the Northern Cape.

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, both Municipalities i.e. *Emthanjeni Local Municipality* and the *Pixley Ka-Seme District Municipality* play a role.

- » In terms of the Municipal Systems Act (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. The plans are therefore used to determine if proposed developments are in line with the relevant municipality's strategic developmental plans.
- » Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans.

By-laws and policies have been formulated by these local authorities and include amongst others:

- » Pixley Ka-Seme Disaster Management Policy
- » Pixley Ka-Seme Employment Equity Policy
- » Pixley Ka-Seme Health and Safety Policy
- » Pixley Ka-Seme Skills Development Policy
- » Pixley Ka-Seme Skills Recruitment Policy
- » Emthanjeni Tourism Strategy

### 3.3 Relevant Legislation and Guidelines

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, published under Chapter 5 of the NEMA (GN R385, GN R386 and GN R387 in Government Gazette 28753 of 21 April 2006)
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - \* Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
  - \* Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006)
  - \* Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
  - \* Integrated Environmental Management Information Series (published by DEA)

- » International guidelines – the Equator Principles and the International Finance Corporation and World Bank Environmental, Health, and Safety Guidelines for Wind Energy (2007)

Several other acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows:

**Table 3.1:** Relevant legislative permitting requirements applicable to the proposed solar energy facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
<b>National Legislation</b>			
National Environmental Management Act (Act No 107 of 1998)	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 387 of 21 April 2006, a Scoping and EIA Process is required to be undertaken for the proposed project.</p>	<p>Department of Environmental Affairs – competent authority</p> <p>Department of Environment and Nature Conservation – commenting authority</p>	<p>The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA).</p> <p>This EIA Report will be submitted to the competent and commenting authority in support of the application for authorisation.</p>

<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>Department of Environmental Affairs</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.</p>
<p>Environment Conservation Act (Act No 73 of 1989)</p>	<p>National Noise Control Regulations (GN R154 dated 10 January 1992)</p>	<p>Department of Environmental Affairs</p> <p>Department of Environment and Nature Conservation</p> <p>Local Authorities</p>	<p>Noise impacts are expected to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation.</p> <p>On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays).</p> <p>Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and</p>

			appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation.	Department of Water Affairs  Provincial Department of Water Affairs	Compressed air will be used to clean the panels. Water is proposed to be sourced from an existing borehole, and will only be used at the operations centre. This water use will need to be registered (water use as defined in terms of S21 of the NWA).
National Water Act (Act No 36 of 1998)	In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	Department of Water Affairs  Provincial Department of Water Affairs	This section of the Act will apply with respect to the potential impact on drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.
Atmospheric Pollution Prevention Act (Act No 45 of 1965)	In terms of S27, the Minister may declare certain areas dust control areas.  Part V of Act regulates	Department of Environmental Affairs	The project study area has not been declared a dust control area.  Although there is no legal obligation relating

	pollution generated by vehicle fumes.		to the activities to be undertaken best practice measures should be used to prevent dust generation from the roads and excavations during construction.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<p>S18, S19, and S20 of the Act allow certain areas to be declared and managed as “priority areas.”</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p>	Department of Environmental Affairs	<p>No permitting or licensing requirements arise from this legislation.</p> <p>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p>
National Heritage Resources Act (Act No 25 of 1999)	<p>S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including:</p> <ul style="list-style-type: none"> <li>» The construction of a road, powerline, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and</li> <li>» Any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent.</li> </ul> <p>Stand alone HIAs are not required where an EIA Process is carried out as long as the EIA contains an adequate HIA component that fulfils</p>	South African Heritage Resources Agency	<p>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p> <p>A HIA has been undertaken as part of the EIA Process to identify heritage sites.</p>

	<p>the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>		
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p>	<p>Department of Environmental Affairs</p>	<p>As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard.</p> <p>Specialist flora and fauna studies have been undertaken as part of the EIA Phase. As such the potentially occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while</p>	<p>Department of Agriculture</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application throughout the life cycle of the project. In this regard, soil erosion</p>

	<p>invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>		<p>prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998)</p>	<p>In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p> <p>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>	<p>Department of Water Affairs</p>	<p>While no permitting or licensing requirements arise from this legislation, this act will find application during the construction and operational phase of the project.</p>
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<p>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</p>	<p>Department of Health</p>	<p>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department</p>



	<p>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.</p> <p>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</p> <p>Group IV: any electronic product; and</p> <p>Group V: any radioactive material.</p> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		<p>of Health.</p>
<p>Development Facilitation Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p> <p>S(2 - 4) provide general principles for land development and conflict</p>	<p>Local Municipality  District Municipality</p>	<p>The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish</p>

	resolution.		a land development area must comply with procedures set out in the Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province	Local Municipality  District Municipality	Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list.</li> </ul> <p>In terms of the Regulations published in terms of this Act (GN 718), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to</p>	<p>National Department of Water and Environmental Affairs</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP (refer to Appendix K).</p> <p>The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).</p>

	<p>ensure that:</p> <ul style="list-style-type: none"> <li>» The containers in which any waste is stored, are intact and not corroded or in</li> <li>» any other way rendered unfit for the safe storage of waste.</li> <li>» Adequate measures are taken to prevent accidental spillage or leaking.</li> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul>		
Promotion of Access to Information Act (Act No 2 of 2000)	All requests for access to information held by state or private body are provided for in the Act under S11.	Department of Environmental Affairs	No permitting or licensing requirements.
Promotion of Administrative Justice Act (Act No 3 of 2000)	<p>In terms of S3 the government is required to act lawfully and take procedurally fair, reasonable, and rational decisions.</p> <p>Interested and affected parties have right to be heard.</p>	Department of Environmental Affairs	No permitting or licensing requirements.
Northern Cape Nature Conservation 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	Department of Environment and Nature Conservation	No permitting or licensing requirements.

	<p>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:</p> <ul style="list-style-type: none"><li>» Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property;</li><li>» Aquatic habitats may not be destroyed or damaged; and</li><li>» 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.</li></ul> <p>The Act provides lists of protected species for the Province.</p>		
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## APPROACH TO UNDERTAKING THE EIA PHASE

## CHAPTER 4

An EIA Process is dictated by the EIA Regulations which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project. The EIA process which comprises a **Scoping** and an **EIA Phase** culminates in the submission of an EIA Report, including an Environmental Management Programme (EMP)) to the competent authority for decision-making.



**Figure 4.1:** Phases within the EIA Process

The EIA Phase for the proposed Ilanga Lethemba Solar Energy Facility has been undertaken in accordance with the EIA Regulations published in Government Notice GN33306 of 18 June 2010, in terms of Section 24(5) of NEMA (Act No. 107 of 1998). The environmental studies for this proposed project were undertaken in two phases, in accordance with the EIA Regulations.

### 4.1. Scoping Phase

The Scoping Report aimed at detailing the nature and extent of the proposed facility, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA Phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and I&APs. In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives were investigated for consideration within the EIA process. However, no feasible and reasonable alternatives were identified for some aspects of the project. Details of alternatives considered and reasons for not considering some of the alternatives is detailed in Chapter 2.

The Scoping Phase also provided interested and affected parties (I&APs) with the opportunity to receive information regarding the proposed project, to participate in

the process and to raise issues or concerns. To further facilitate this, the draft Scoping Report was made available for public review and comment at the De Aar Public Library, the offices of the Emthanjeni Local Municipality, and on the Savannah Environmental website ([www.savannahSA.com](http://www.savannahSA.com)) between May and June 2011.

All the comments, concerns, and suggestions received during the Scoping Phase and the review period were included within the Final Scoping Report, which was submitted to the National Department of Environmental Affairs (DEA) together with a Plan of Study for the EIA Phase for acceptance. The Scoping Phase concluded in July 2011 with the acceptance of the final Scoping Report. In terms of this acceptance, an EIA was required to be undertaken for the proposed project as per the accepted plan of study. In addition, comments from the relevant organs of state are to be submitted with the Final Environmental Impact Report (EIR). The EIR report is to contain a construction operational phase Environmental Management Programme (EMPr).

#### **4.2. Environmental Impact Assessment Phase**

Through the Scoping Study, a number of issues requiring further study during the EIA Phase were highlighted. Aside from this the EIA Phase aimed to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- » Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the proposed facility.
- » Comparatively assess identified feasible alternatives put forward as part of the project.
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public participation process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA addresses potential environmental impacts and benefits associated with all phases of the project including design, construction, operation, and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

### 4.3. Overview of the EIA Phase

The EIA Phase has been undertaken in accordance with the EIA Regulations published in GN 33306 of 18 June 2010, in terms of NEMA. Key tasks undertaken within the EIA phase included:

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Undertaking a public participation process throughout the EIA process in accordance with Regulation 54 of GN R543 of 2010 in order to identify any additional issues and concerns associated with the proposed project.
- » Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of GN R543 of 2010).
- » Undertaking of independent specialist studies in accordance with Regulation 32 of GN R543 of 2010.
- » Preparation of a Draft EIA Report in accordance with the requirements of the Regulation 31 of GN R543 of 2010.

These tasks are discussed in detail below.

#### 4.3.1 Authority Consultation

The National DEA is the competent authority for this application. A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the Scoping Report and this EIA report. Consultation with the regulating authorities (i.e. DEA and NCDENC) has continued throughout the EIA process. On-going consultation included the following:

- » Submission of a final Scoping Report following a 30-day public review period and consideration of stakeholder comments received)
- » Ad hoc discussions with DEA and NCDENC in order to clarify the findings of the Scoping Report and the issues identified for consideration in the EIA Phase.

The following will also be undertaken as part of this EIA process:

- » Submission of a final EIA Report following the 30-day public review period.
- » Provision of an opportunity for DEA and NCDENC representatives to visit and inspect the proposed site, and the study area.
- » Consultation with Organs of State that may have jurisdiction over the project, including:
  - \* Provincial and local government departments (including South African Heritage Resources Agency, Department of Water Affairs, South African National Roads Agency Limited, Department of Agriculture, etc.).

- \* Government Structures (including the Department of Public Works, Roads and Transport, etc)

A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the Scoping Report. A record of the consultation in the EIA process is included within Appendix B.

#### 4.3.2 Public Involvement and Consultation

The aim of the public participation process was primarily to ensure that:

- » Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&APs.
- » Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
- » Comment received from stakeholders and I&APs was recorded and incorporated into the EIA process.

Below is a summary of the key public participation activities conducted thus far.

- » **Identification of I&APs and establishment of a database**  
 Identification of I&APs was undertaken by **Sustainable Futures** (specialist public participation consultants) through existing contacts and databases, recording responses to site notices and the newspaper advertisement, as well as through the process of networking. The key stakeholder groups identified include authorities, local and district municipalities, public stakeholders, Parastatals and Non-Governmental Organisations (refer to Table 4.1 below).

**Table 4.1:** Key stakeholder groups identified during the EIA Process

Stakeholder Group	Department
National and Provincial Authorities	<ul style="list-style-type: none"> <li>» National Department of Environmental Affairs</li> <li>» Northern Cape Department of Environment and Nature Conservation</li> <li>» Northern Cape – Department Economic Development</li> <li>» Department of Water Affairs</li> <li>» Department of Agriculture Forestry and Fisheries</li> <li>» Northern Cape Provincial Government</li> <li>» Department of Public Transport, Roads and Works</li> <li>» SAHRA</li> </ul>
Municipalities	<ul style="list-style-type: none"> <li>» Emthanjeni Local Municipality</li> <li>» Pixley Ka Seme District Municipality</li> </ul>
Public stakeholders	<ul style="list-style-type: none"> <li>» Adjacent and surrounding landowners (see attached landowner map)</li> </ul>



	» Farmers Unions
	» De Aar residents and local business owners
Parastatals & service providers	» Eskom Distribution
NGOs/Business forums	» Wildlife Society of South Africa (Northern Cape)
	» Birdlife South Africa

Through on-going consultation with key stakeholders and I&APs, issues raised through the Scoping Phase for inclusion within the EIA Phase were confirmed. All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C). While I&APs were encouraged to register their interest in the project from the onset of the process, the identification and registration of I&APs has been on-going for the duration of the EIA Process and the project database has been updated on an on-going basis.

» **Newspaper Advertisements**

As part of the EIA phase newspaper adverts have been placed in the De Aar Echo, a local newspaper, as well as on the Volksblad, a regional newspaper, on 16 September 2011 to inform the public and I&APs of the availability of the Draft Environmental Impact Report (EIR) for review as well as the proposed public meeting (refer to Appendix D).

In order to accommodate the varying needs of stakeholders and I&APs, the following opportunities have been provided for I&AP issues to be recorded and verified through the EIA phase, including:

- » Focus group meetings (stakeholders invited to attend)
- » Public meeting (advertised in the local press )
- » Written, faxed or e-mail correspondence

A public meeting will serve to provide feedback of the findings of the EIA studies undertaken. Stakeholders are invited to attend the public meeting to be held on:

**Date:** 27 September 2011  
**Time:** 18:00 – 20:00  
**Venue:** De Aar Country Club

Records of all consultation undertaken will be included within Appendix D.

### 4.3.3 Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into Comments and Response Reports (refer to Appendix D for the Comments and Response Reports compiled from the EIA Process to date).

The Comments and Response Report includes responses from members of the EIA project team and/or the project proponent. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

### 4.3.4 Assessment of Issues Identified through the Scoping Process

Issues which require further investigation within the EIA Phase, as well as the specialists involved in the assessment of these impacts are indicated below.

**Table 4.1:** Specialist studies undertaken within the EIA Phase

Specialist	Area of Expertise	Refer Appendix
David Hoare Consulting cc	Ecology, flora and fauna	Appendix E
Terrasoil Science	Soil, agricultural potential and land capacity	Appendix F
McGregor Museum	Heritage	Appendix G
Bruce Rubidge	Palaeontological	Appendix H
MetroGIS	Visual	Appendix I
Tony Barbour	Social	Appendix J

Specialist studies considered direct, indirect, cumulative, and residual environmental impacts associated with the development of the proposed Ilanga Lethemba PV Solar Energy Facility. Issues were 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:

$$S = (E+D+M) P; \text{ where}$$

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)

As Solar Capital has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations), 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 draft EMP is included as Appendix K.

#### ***4.3.5 Assumptions and Limitations***

The following assumptions and limitations are applicable to the studies undertaken within this EIA Phase:

- » All information provided by Solar Capital and I&APs to the environmental team was correct and valid at the time it was provided.
- » It is assumed that the development site identified by Solar Capital represents a technically suitable site for the establishment of the proposed solar facility.
- » It is assumed correct that the proposed connection to the National Grid is correct in terms of viability and need.
- » Studies assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
- » This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

Refer to the specialist studies in Appendices E – J for specialist study specific limitations.

## DESCRIPTION OF THE RECEIVING ENVIRONMENT

## CHAPTER 5

This section of the Draft Environmental Impact Assessment Report provides a description of the environment that may be affected by the proposed photovoltaic plant. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is proposed to be situated. Features of the biophysical, social and economic environment that could directly or indirectly be 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, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices F - K.

### 5.1. Regional Setting and the Study Area

#### *5.1.1 Regional Settings*

The identified site proposed for the Ilanga Lethemba PV Solar Energy Facility is in De Aar within the jurisdiction of the Emthanjeni Local Municipality. The Emthanjeni Local Municipality is one of the eight B municipalities that constitute the Pixley ka Seme District Municipality. The District Municipality also includes one District Management Area (DMA) located in the north western region of the District.

The Emthanjeni Local Municipality is approximately 11 390 km<sup>2</sup> in size (~11% of the greater Pixley ka Seme District Municipality) and is bordered in the north by the DMA, in the east by the Renosterberg Local Municipality and Umsobomvu Local Municipality, in the south by the Ubuntu Local Municipality and in the west by the Kareeberg Local Municipality. The largest towns within the Emthanjeni Local Municipality are De Aar, Britstown and Hanover. The administrative centre of the Municipality is De Aar, which lies approximately 300 km south east of the provincial capital of Kimberley.

The dominant land use activity in the area is farming, specifically livestock farming (sheep). Small game farming (springbok) is also prevalent in the broader area. The N10 national road traverses the study area, which also includes arterial roads (i.e. the R48 and R388) and secondary roads. Access to the proposed site is via the R48 which links De Aar and Philipstown. The R48 is predominantly utilised by local farmers to access the facilities and services in De Aar and the local abattoir located to the north of De Aar. Rail infrastructure is prominent in the area, with De Aar representing the second most important railway junction in South Africa.

Railway lines run from the north, the west the south and the south east, converging in the town. These lines include both freight and passenger lines.

Other industrial infrastructure includes the aerodrome just south of the N10, the existing Hydra Transmission Substation to the south of the proposed site, and an extensive network of power lines extending in all directions except the north-west.



**Figure 5.1:** A distant view of Hydra Substation and surrounding power lines

### **5.1.2 The study area**

The proposed site is located on Portion 3 of Farm Paarde Valley 145, which is a private farm that is bounded to the east by a series of small, low lying hills and koppies, to the south by the Brak River and the west by the R48, which links De Aar to the south and Philipstown to the north-east. There is one homestead, and associated Bed & Breakfast and labourer's cottages located on the property. These buildings are clustered together near the entrance to the site. Known homesteads / farm houses and small farming settlements on/around the site include *Paardevlei*, *Plessisdam*, *Merino*, *Carouluspoort*, *Ebenezer*, *Tafelkop*, *Vetlaagte*, *Lochinaver*, *Grasbult*, *Bellary* and *Loskop*

The local landowner and his family have been farming in the area since the Voortrekkers arrived in the area in the late 1700s. There is a burial ground on the site (~300m south west of the farmstead building) that has graves dating back to 1822. The surrounding farms are owned and farmed by the landowner's family. As discussed later, the dominant land use on the site is livestock grazing and the secondary land use is irrigated agriculture.

## 5.2. Climatic Conditions

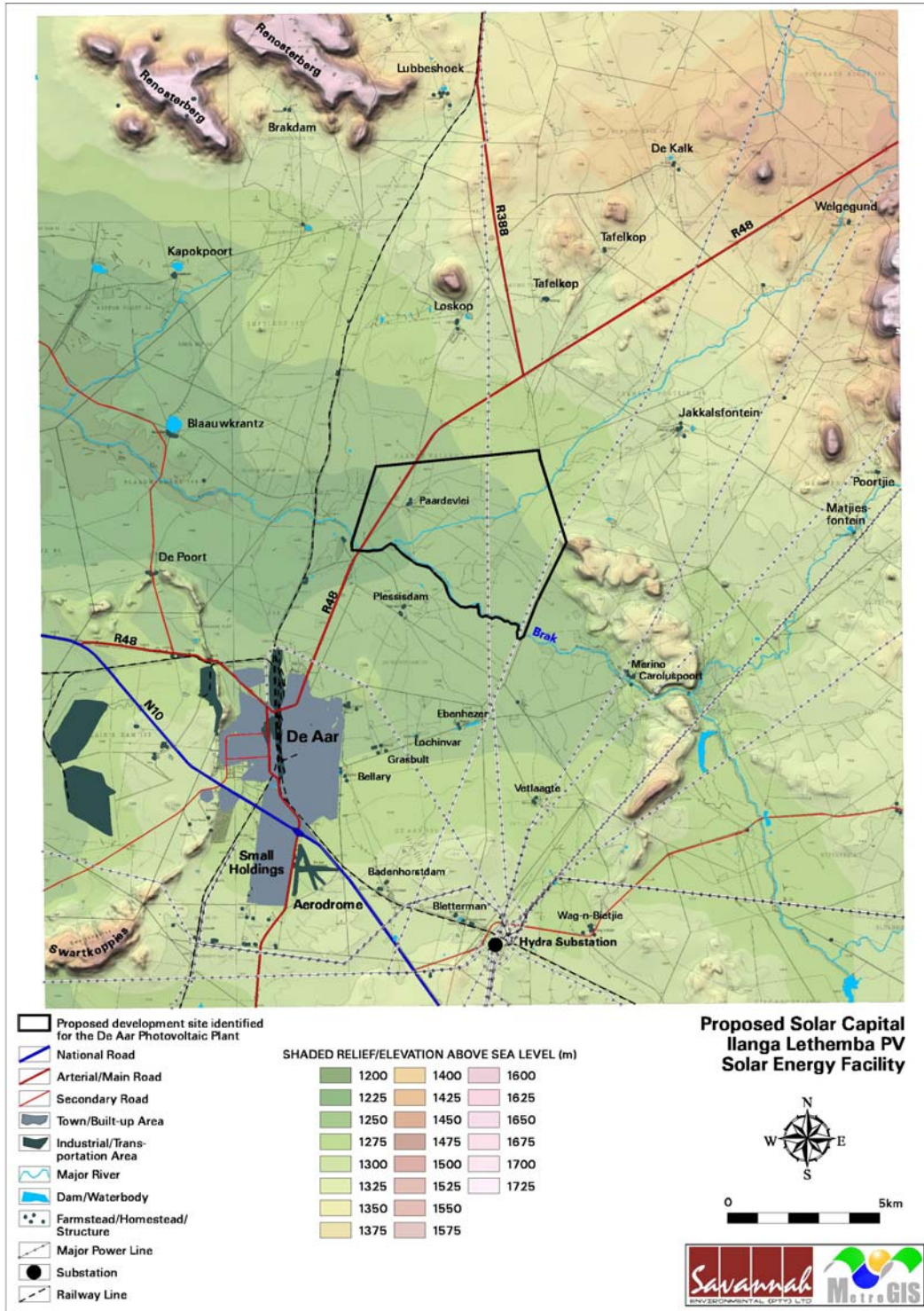
The climate is arid to semi-arid. Rainfall occurs from November to March, but peaks in mid- to late summer (February / March). Mean annual rainfall is 275 mm per year. All areas with less than 400 mm rainfall are considered to be arid. The study area can therefore be considered to be arid.

## 5.3. Biophysical Characteristics of the Study Site and Surrounds

### 5.3.1 Topography

The terrain type of the region is relatively homogenous and is described as predominantly lowlands with hills. Some prominent hills and koppies occur in the north and north east of the study area (refer to Figure 5.2 below). The topography of the site is relatively gentle and slopes gently towards the south as well as westwards away from the hill in the eastern part of the site. The elevation on site varies from 1200 m (along the drainage lines) to 1650 m above sea level (at the top of the nearby koppies).

There are various drainage lines draining the larger study area, and all of these are classified as non-perennial. A main non-perennial drainage line (the Brak River) runs along the southern boundary of the study area. A second non-perennial drainage line enters the site on the north eastern side, and traverses a portion of the site.



**Figure 5.2:** Shaded relief map (indicating the location of the proposed facility and the topography and elevation above sea level) of the study area

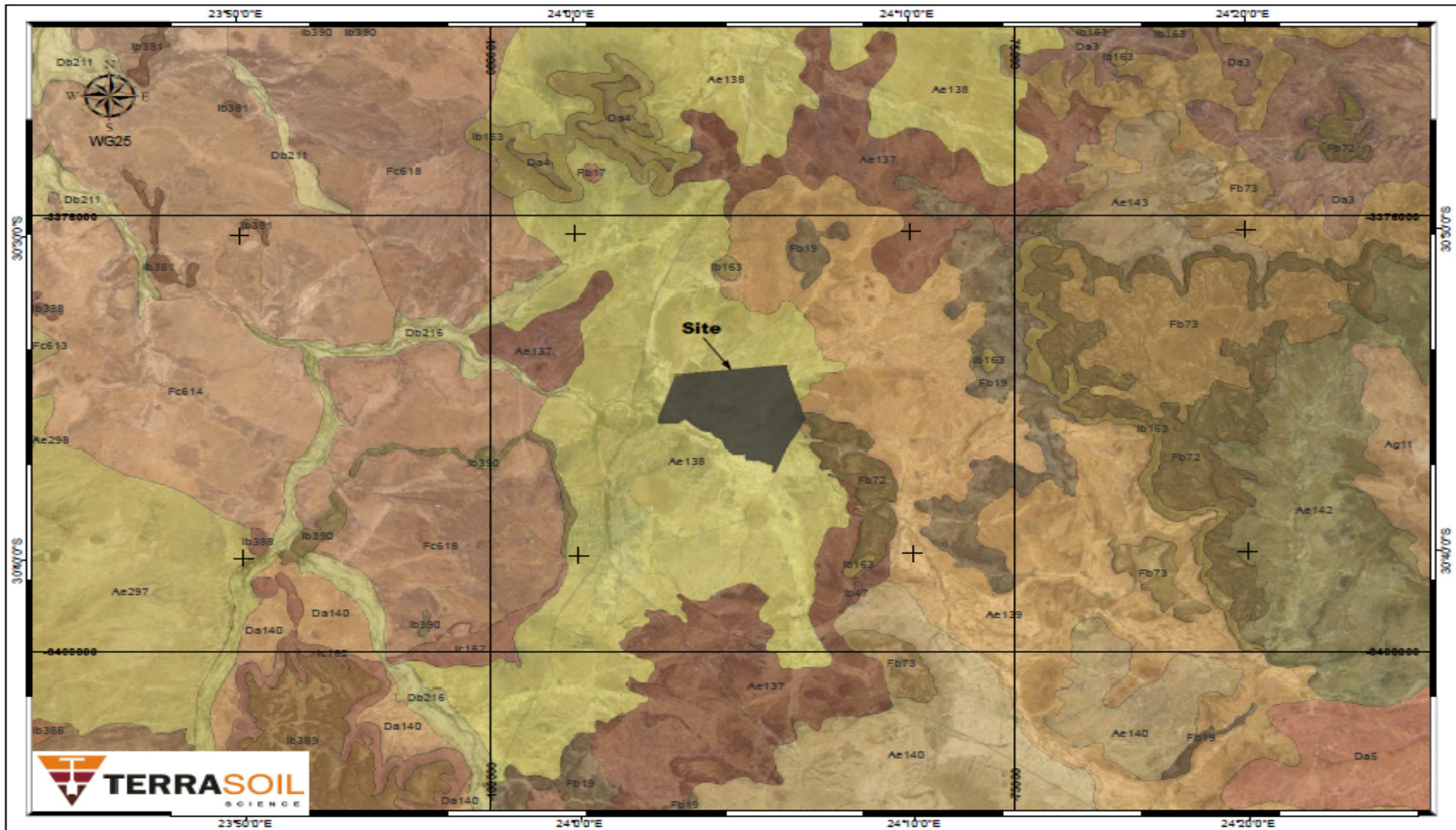


### **5.3.2 Land Types (Soils) and Agricultural Potential**

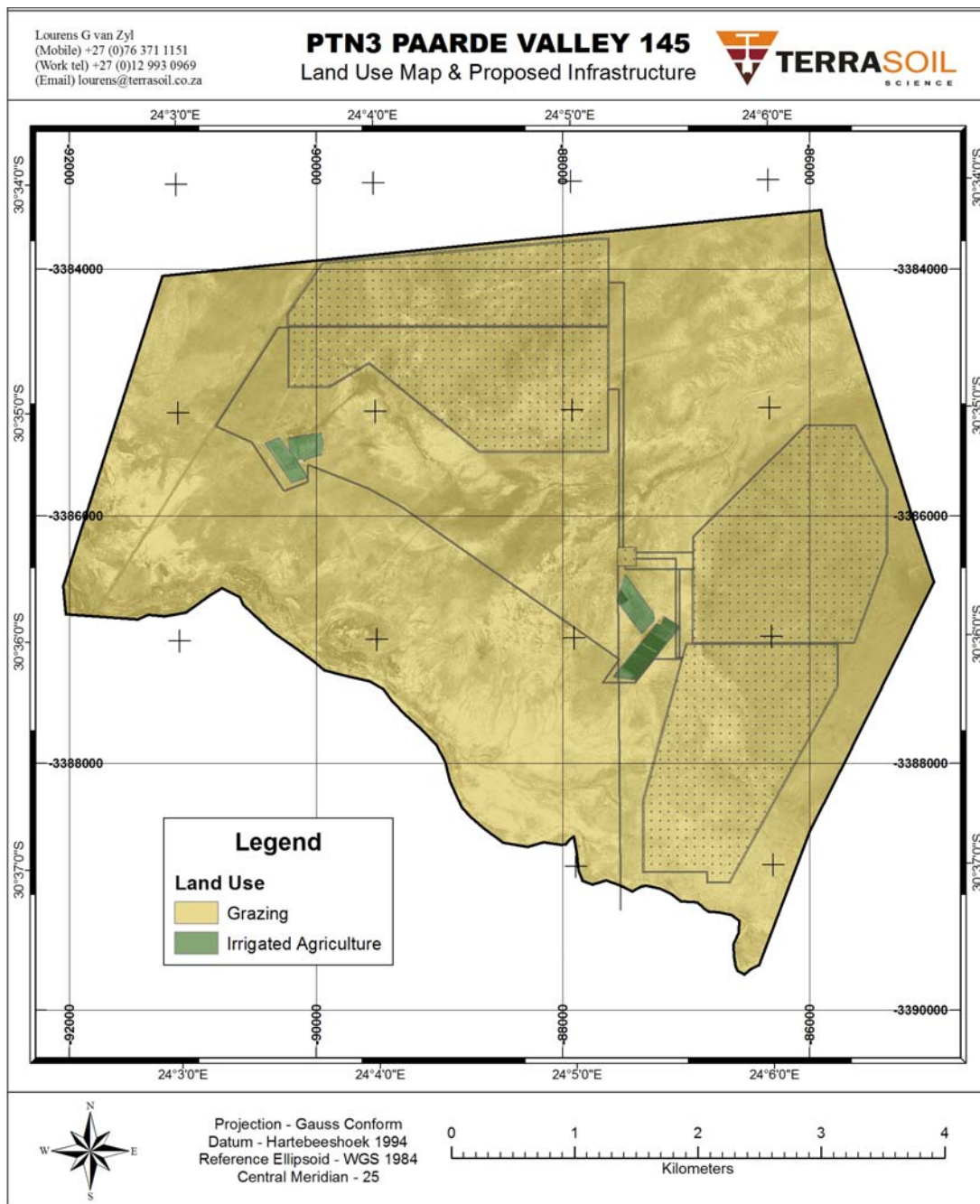
The study site lies predominantly in the **Ae138** land type, with the eastern sections lying in the **Ae139** and **Fb72** land types (refer to Figure 5.3 below). The Ae138 land type consists of shallow apedal (structureless) to structured soils in higher lying and midslope landscape positions and rocky outcrops occur throughout. The Ae139 land type consists of shallow to moderately deep apedal (structureless) to structured soils in higher lying and midslope landscape positions. The soils in this land type often exhibit lime accumulation in the matrix and rocky outcrops occur throughout. Lastly, the Fb72 land type consists of very shallow apedal (structureless) to structured soils in higher lying and midslope landscape positions with numerous rock outcrops.

The dominant land use of the site is extensive grazing (99% of the site), with the secondary land use being irrigated agriculture (with associated infrastructure). The irrigation area covers approximately 26 ha and forms approximately 1% of the total surface area of the site (see Figure 5.4 below).

The agricultural potential of the bulk of site is low due to climatic constraints as well as the current land use. The site is therefore suited to extensive grazing with a long-term carrying capacity of approximately 6 ha per small stock unit. Where irrigation water is available, the agricultural potential increases drastically and crop production as pasture production becomes possible. The area on the site currently under irrigation is limited by the amount of water available for use at any one time or within a crop production unit (and therefore irrigation cycles). Most of the soils on the site can be used for irrigation but the limiting factor is the available water volume and long-term sustainable yield. The soils within the level terrain areas of the site are suitable for irrigation but the long-term sustainability will depend on rotation of irrigation fields, application of a leaching requirement as well as adequate irrigation scheduling. Due to the finer texture of the subsoils within the level terrain area the long-term viability of irrigated agriculture is limited through the limited potential of irrigation induced salt leaching.



**Figure 5.3:** Land types map of the site showing that the site is predominantly of the Ae138 land type

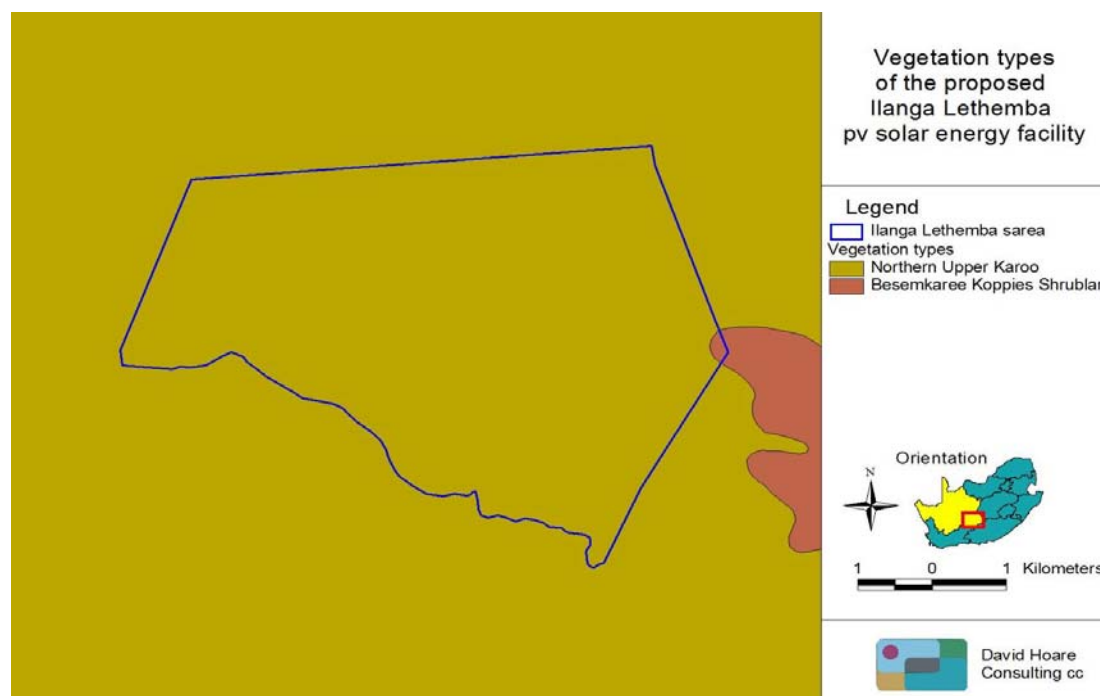


**Figure 5.4:** Land use map of the survey area

### 5.3.3 Ecological Profile

#### **Vegetation**

There are two major vegetation types that occur in the study area, namely Northern Upper Karoo and Besemkaree Koppies Shrubland. However, the majority of the site is predominantly of the Northern Upper Karoo type (refer to Figure 5.5 below).



**Figure 5.5:** Land cover/land use map of the study area

*Northern Upper Karoo:* occurs in the northern parts of the Upper Karoo Plateau, with its southern extent ending near De Aar. It is a scrubland dominated by dwarf karoo shrubs, grasses and some low trees, including *Acacia mellifera subsp. Detinens*. There are five known endemics in this vegetation, namely the succulent shrubs, *Lithops hookeri* and *Stomatium pluridens*, the low shrubs, *Atriplex spongiosa* and *Galenia exigua* and the herb, *Manulea deserticola*. At a national scale this vegetation type has been transformed (only a small amount, approximately 4%) and none is conserved and is therefore considered to be a Least Threatened vegetation type.

*Besemkaree Koppies Shrubland:* occurs on the slopes of koppies, buttes and tafelbergs of the extensive Eastern Upper Karoo from Richmond and Middelburg to the Orange River. It is a two-layered karroid shrubland. The lower (closed canopy) layer is dominated by dwarf small-leaved shrubs and, especially in precipitation-rich years, also by abundant grasses. The upper (loose canopy) layer is dominated by tall shrubs, namely *Rhus erosa*, *Rhus burchellii*, *Rhusciliata*,



*Euclea crispa* subsp. *ovata*, *Diospyros austro-africana* and *Olea europea* subsp. *africana*. This vegetation type is considered to be Least Threatened with about 3% transformed and 5% conserved of a target of 28%.



**Figure 5.6:** View of the general vegetation on site

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

The purpose of listing Red List plant and animal species is to provide information on the potential occurrence of species of special concern in the study site that may be affected by the proposed infrastructure. Species appearing on these lists can then be assessed in terms of their habitat requirements in order to determine whether any of them have a likelihood of occurring in habitats that may be affected by the proposed infrastructure.

Lists were compiled specifically for any species of conservation concern previously recorded in the area and any other species with potential conservation value. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute for the quarter degree squares within which the study area is situated. The list can be found in Appendix 1 of the Ecology Specialist Report (refer to Appendix E). Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed. There is one species on this list, *Protea subvestita*, which is listed as Vulnerable. This species occurs along the southern and eastern Great Escarpment of the country in montane habitats, particularly highland grassland and fynbos. The record from the

adjacent grid is considered to be incorrect and it is considered highly unlikely that this species occurs anywhere near to the site. There are, therefore, no plant species of conservation concern that are considered likely to occur on the site.

### **Red List animal species of the study area**

All Red List vertebrates (mammals, birds, reptiles, amphibians) that could occur in the study area are listed in Appendix 2 of the Ecology Specialist Report (refer to Appendix E). Those vertebrate species with a geographical distribution that includes the study area, and habitat preference that includes habitats available in the study site include the following:

- » There is one mammal species of low conservation concern that could occur in available habitats in the study area - Geoffroy's Horseshoe Bat. This is a species classified nationally as near threatened (NT), but globally as Least Concern. This is a cave-dwelling species and, based on aerial imagery and a site-visit, it was determined that there are no caves, rock crevices or other suitable roosting habitats on site.
- » There are three threatened bird species (all VU) and three Near Threatened bird species that have a medium to high probability of utilising available habitats in the study area, either for foraging or breeding. The species most likely to use parts of the site for breeding is Ludwig's Bustard. The Martial Eagle, Lesser Kestrel, Blue Korhaan, Secretarybird and Lanner Falcon may also use the site or parts of the site for foraging.
- » The Giant Bullfrog is the only amphibian species with a distribution that includes the study area and which could occur on site. This species is classified as Least Concern globally and Near threatened in South Africa. It is, however, protected under the National Environmental Management: Biodiversity Act and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit. No highly suitable habitat for this species occurs on site. In addition, during the site visit and interview conducted with the landowner, the landowner indicated that he has no memory of ever seeing bullfrogs on site or nearby.
- » One reptile species of conservation concern has a distribution that includes the study area - the Karoo Padloper. This species occurs widely in the southern parts of the Nama Karoo, including Britstown to the west of De Aar. It occurs in rocky or stony areas, often occurring on ridges or plateaus, which do not occur on site. Important habitat is horizontal rock crevices, which may be found to the east of the site, but not on the site itself. It is therefore considered unlikely that this species would be found on site.

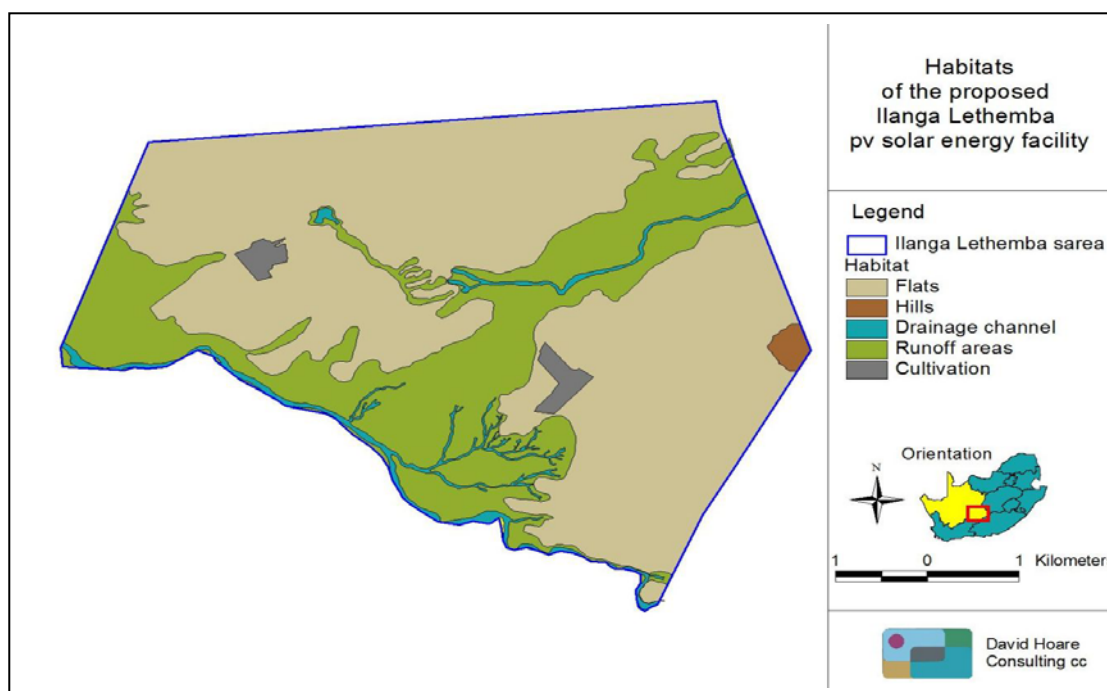
Therefore, the threatened species of concern for the site is the Ludwig's Bustard.

### **Protected trees**

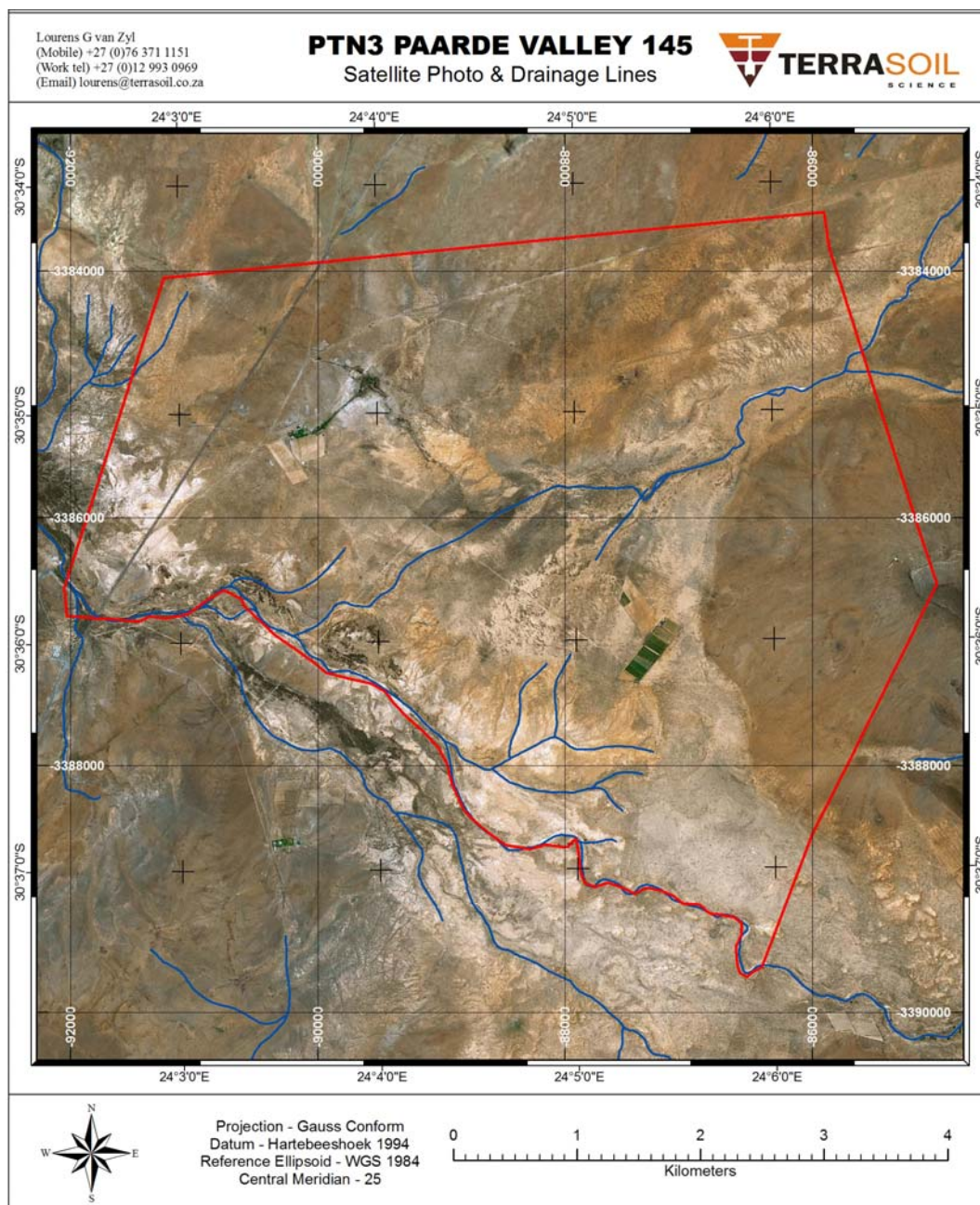
Tree species protected under the National Forest Act are listed in Appendix 3 of the Ecology Specialist Report (refer to Appendix E). The only one that has a geographical distribution that includes the study area is *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi). *Boscia albitrunca* occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. It has been determined that this species does not occur anywhere on site.

### **Wetlands**

Potential factors that may lead to parts of the study area having elevated ecological sensitivity are the presence of drainage lines on site (see Figure 5.7 and 5.8 below). There are various drainage lines draining the study area, all non-perennial. The main river is the Brak River that runs along the southern boundary of the study area and the other drainage line enters the northern part of the site, running southwards before dissipating on site. Drainage lines (wetlands) represent particularly vital natural corridors as they function both as wildlife habitat, providing resources needed for survival, reproduction and movement, and as biological corridors, providing for movement between habitat patches. Wetlands (including drainage lines) are protected under national legislation (the National Water Act). Any impacts on these areas would require a permit from the National Department of Water Affairs.



**Figure 5.7:** Habitats and land cover of the site proposed for the facility



**Figure 5.8:** Topographical map of the site indicating drainage features

#### 5.4. Social Characteristics of the Study Area and Surrounds

##### 5.4.1 Economic Profile

De Aar is at the centre of the economy of the Municipality. Its railway junction links Gauteng with Cape Town, Port Elizabeth and the Port at Coega, and Namibia. De Aar also has the largest abattoir in the Southern Hemisphere and the surrounding sheep farms are also major suppliers of wool for both the local and international market.



As part of the Emthanjeni Local Municipality Integrated Development Plan (2010), the Municipality identified a number of industrial and manufacturing projects that form part of their strategy for the economic development of the Local municipality. As part of this process, De Aar was identified as a Renewable Energy hub for the Municipality.

#### **5.4.2 Demographic Profile**

The Pixley ka Seme District's total population was estimated at 166 849 people, with the Emthanjeni Local Municipality accounting for ~23% (38 228) of that figure (Community Survey, 2007). The average population growth between 2001 and 2010 was estimated at 0.60% (Emthanjeni IDP, 2010). In 2001, approximately 92% of the population in the Emthanjeni Local Municipality lived in the three major urban centres of De Aar, Britstown and Hanover. Given the size of the Municipality and the relatively small total population size, the population density within the Municipality generally is low at 3.4 people per km<sup>2</sup>. However, the population density in the three urban nodes of De Aar, Brits town and Hanover can be expected to be significantly higher than that of the surrounding rural areas.

Unemployment within the Municipality is estimated at 23.1% of the total labour force, which is below the Northern Cape average of ~27% while 43.5% of the population is not economically active. The latter are made up of made up of scholars/students, homemakers/housewives, pensioners, the medically unfit, seasonal workers not currently employed, and those who choose not to work. The Municipal IDP and supporting documents do not provide any detail regarding the relative size of the each of the economic sector's contribution to employment in the Local Municipality.

### **5.5. Heritage and Palaeontology Profile**

#### **5.5.1. Possible engraving occurrences on dolerite koppies or exposures**

Where dolerite koppies occur there is a possibility that rock engravings might be found. Such koppies occur as a major feature in the area surrounding the study site, but are relatively minimal within the specific study area examined, where dolerite exposures occur as part of a major hill overlooking the proposed development site from the east and as low-topography outcrops on a few slight rises across the site. However, during the site visit it was noted that none of these engravings occur on site.

### **5.5.2. Occurrences of Stone Age artefacts:**

The study site exhibits a wealth of stone artefacts spread across its plains and probably below present sand surfaces where these mantle older surfaces. However, no definite Acheulean (Earlier Stone Age) artefacts were found. Stone Age industries present certainly include Middle and Later Stone Age assemblages (referred to as MSA and LSA). Only the following sites may be directly/indirectly impacted by the proposed development:

- » Hill with Stone Age (including LSA) traces and stone circle feature as well as the rich spread of artefacts on the plain immediately to the south of it (30.60044° S, 24.10566° E).
- » Later Stone Age site and other heritage traces as well as potential peat sequence at the spring (30.58073° S, 24.06585° E).
- » Rich surface spread of mainly Pleistocene age artefacts (30.59695° S, 24.09501° E).

The observed heritage resources over the bulk of the area surveyed were found to be mainly of lower significance (see Appendix G for Heritage Impact Study).

### **5.5.3 Colonial era heritage**

A farm graveyard with headstones dating back to the earlier nineteenth century and representing the first appearances of Trekboers in this landscape is well maintained to the south west of the farm homestead. This graveyard will not be impacted by the development footprint of the proposed development.

Also outside of the project footprint is a stockpost *skerm* (shelter) in the shadow of the koppie at the east end of the property. Pieces of ostrich eggshell, metal and glass were found in the vicinity. On the small hill identified above for its LSA remains there is a small stone circle which may be of LSA date (similar structures are known at many sites in the Upper Karoo); but it may have been a farm worker's *skerm*, while the possibility exists that it relates to the Anglo-Boer War. Further research would be needed on site and using other sources to resolve the identification of this structure.

### **5.5.4 Palaeontology Profile**

The proposed developmental site is underlain by rocks of the Tierberg Formation of the Ecca Group of the Karoo Supergroup. This largely argillaceous Formation comprises mainly green mudrocks. The Tierberg Formation in turn is overlain by Quaternary alluvial deposits which cover large areas of the property.

As the entire area is covered by rocks and sediments of sedimentary origin there is the potential that fossils could be present in the area. The Tierberg Formation is, however, not known to be very rich in fossils having yielded only odd plant fragments and isolated fish scales and bones. These rocks were deposited in a prodelta environment. The potential of fossils being present in the Quaternary alluvial deposits is also very limited.

## ASSESSMENT OF POTENTIAL IMPACTS:

## CHAPTER 6

This chapter serves to determine the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) associated with the development of the proposed Ilanga Lethemba PV Solar Energy Facility. This assessment is done for all the phases of the project's development and for all the facility's components which will comprise:

- » An array of **photovoltaic panels** with a generating capacity of up to **300 MW**, which will be developed in phases. The following phases are currently proposed:
  - \* Phase 1: 75 MW over an area of approximately 220 ha
  - \* Phase 2: 75 MW over an area of approximately 210 ha
  - \* Phase 3: 75 MW over an area of approximately 195 ha
  - \* Phase 4: 75 MW over an area of approximately 155 ha
- » **Support structures** to mount the photovoltaic panels. The angle of the panels will be tilted at 25° from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2.8 m from ground level.
- » An on-site **substation** (within an area of 100m x 100m) and new short overhead **power lines** between each phase and the on-site substation. Four (4) new overhead **22kV** power lines connecting the four proposed phases to the proposed on-site substation will be required.
- » A **short power line** (few meters) from the on-site substation to turn into the existing Hydra MTS-Behrshoek 132kV power line that traverses the site, therefore connecting directly into the Eskom electricity network<sup>10</sup>.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between project components, to be laid underground where practical.
- » **Access roads** with a width of less than 5 m within the site (for the purposes of construction and limited maintenance during operation). The southern road (existing) will be approximately 6 394 m in length, while the western road parallel to the R48 will be approximately 1 025 m in length.
- » Temporary **laydown** and **storage areas** in an area less than 1 hectare close to an existing house to be used as the site office

The development of the Ilanga Lethemba PV Solar Energy Facility will comprise the following phases:

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<sup>10</sup> A power line to turn in to the existing Hydra MTS-Behrshoek 132kV power line that traverses the site is the preferred connection alternative. In order to evacuate the power from the subsequent phases of the project, a new power line to connect directly to the Hydra Substation may be required. This would be the subject of a separate application for authorisation (as is not considered further in this EIA).

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.
- » *Operation* – will include operation of the facility and the generation of electricity.
- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately within this chapter.

### 6.1. Areas of Sensitivity

The broader study site of 2 778 ha in extent (i.e. the farm portion in its entirety) was evaluated within the scoping study (Savannah Environmental, June 2011). No environmental fatal flaws were identified to be associated with the site. However, from the preliminary sensitivity analysis undertaken, potentially sensitive areas within the broader site were identified. In order to reduce the potential for on-site environmental impacts, it was stated that these areas should be avoided as far as reasonably possible through the micro-siting of the components of the proposed facility. These potentially sensitive areas identified through the scoping study include:

- » *Non-perennial streams/ drainage lines within the site* - the site is in an arid area and although there are no permanent wetlands on site, there are a number of non-perennial streams / drainage lines that occur on the site<sup>11</sup>.
- » *Ecologically sensitive areas (terrestrial) that occur on the site* - ecologically sensitive areas that could support the occurrence of the following species:
  - \* Karoo Padloper (listed as Vulnerable), three threatened bird species, Ludwig's Bustard, Martial Eagle and Lesser Kestrel (all classified as Vulnerable) of which one species may use the site for breeding purposes (Ludwig's Bustard) and three near threatened bird species that may be found on site (Secretarybird, Lanner Falcon and Blue Korhaan).
  - \* Possibly the Giant Bullfrog.
  - \* Protected trees species *Boscia albitrunca* (Shepard's Tree / Witgatboom / !Xhi.)
- » *Agricultural potential of current irrigation areas* - areas of irrigated agriculture were identified as having a potentially high agricultural potential.

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<sup>11</sup> According to the National Water Act, these are classified as wetlands or water resources.

These and other environmental issues have been assessed during the EIA Phase. The sensitivity map produced from the Scoping Phase of the EIA process has been updated to include areas of high sensitivity confirmed during the EIA studies and field surveys, as well as the preliminary layout of the proposed facility (refer to Figure 6.1). This map indicates how the design of the proposed facility has taken identified sensitive areas into consideration.



## 6.2. Issues raised as part of the Public Participation Process

The opportunity to comment on the proposed project has been provided through the EIA process. This has included the use of stakeholder letters, a Background Information Document (BID), newspaper advertisements, site notices, and public and focus group meetings held in both the Scoping and EIA Phases. Comments raised to date in the process have included the following:

- » *Social* - employment opportunities, visual and aesthetics and socio-economic impacts,
- » *Biophysical* – impacts on avifauna, and protected trees
- » *EIA process* – public participation (I&AP registration)

## 6.3. Methodology for the assessment of Potentially Significant Impacts

A broader site of 2 778 ha (i.e. portion 3 of Farm Paarde Valley 145) was identified by the project developer for the purpose of establishing the proposed Ilanga Lethemba PV Solar facility. However, the developmental footprint will cover an extent of approximately 787 ha, which has been sited considering the identified environmental sensitivities and technical preferences (refer to Figure 6.1). This portion is likely to suffer disturbance, particularly during the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The assessment of potential issues has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The revised Comments and Response Report included within Appendix D lists these issues and the responses given by the EAP during the Scoping Phase.

In order to assess the potential impacts associated with the proposed facility, it was necessary to quantify the extent of the permanently and temporarily affected areas (i.e. both area and linear infrastructure). This includes the area required for the photovoltaic panels and associated infrastructure, as well as the linear infrastructure (i.e. road, power lines) (please see table below).

Permanent Component	Approximate extent (in ha)
PV panels including associated infrastructure	786
Substation	1
Admin and security	To utilise existing building
<b>TOTAL (ha)</b>	(of a total area of 787 ha of 2778 ha) <b>≈ 28% of site</b>



## 6.4. Assessment of the Potential Impacts associated with the Construction and Operation Phases

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed solar energy facility on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.3.4). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

### 6.3.1 Potential Impacts on Ecology

Solar energy facilities require relatively large areas of land for placement of infrastructure. The major expected negative impact will be due to loss of habitat which may have direct or indirect impacts on individual organisms.

Potential impacts and the relative significance of the impacts are summarised below (refer to Appendix E for more details):

- » Impacts on indigenous natural vegetation – assessed to be of **low** to **medium** significance.
- » Impacts on threatened plants - no populations of threatened plants were found on site. The potential impact on threatened plants is therefore not evaluated further in the tables that follow.
- » Impacts on protected tree species - no populations of protected trees were found on site. The potential impact on protected trees is therefore not evaluated further in the tables that follow.
- » Impacts on threatened animals - assessed to be of **low** significance.
- » Impacts on drainage areas/watercourses - assessed to be of **low** significance.
- » Establishment/spread of declared weeds and alien invader plants - assessed to be of **low** significance.

The overall impacts of the proposed project on ecology have been assessed as being of **low or medium** significance.

**Nature: Loss of habitat within indigenous natural vegetation types**

The vegetation types on site are Northern Upper Karoo and Besemkaree Koppies Shrubland, which are classified as Least Threatened. Terrestrial vegetation on site is therefore not considered to be of high conservation value. The construction of the PV panels will affect a moderate proportion of the natural vegetation on site while construction of the power line and access roads potentially affects a very small proportion of the natural vegetation. The vegetation in this area is in moderately poor condition due to long-term overgrazing.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1)	local (1)
<b>Duration</b>	Medium (2) - permanent (5)	Medium (2) - permanent (5)
<b>Magnitude</b>	Minor (3) - Low (4)	Small (1) - low (3)
<b>Probability</b>	Probable (3) - definite (5)	Probable (3) - definite (5)
<b>Significance</b>	<b>Low (18) - medium (50)</b>	<b>Low (15) - medium (45)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	Only to a small extent	

**Mitigation:**

- » Avoid unnecessary impacts on natural vegetation surrounding the PV solar plant , powerline servitude and access roads
- » Service roads must be properly maintained to avoid erosion impacts.

**Cumulative impacts:**

Soil erosion, and alien invasions may lead to additional loss of habitat that will exacerbate the impact of loss of habitat within indigenous natural vegetation types. Although other PV solar plants and wind energy facilities are proposed in the De Aar vicinity, the overall cumulative impact on vegetation is considered to be small in comparison to the extent of affected vegetation types. No cumulative impacts are anticipated with regard to the access roads as the main access road is already existing and the new proposed access road is to be constructed on already degraded land.

**Residual Impacts:**

Some loss of this vegetation type will definitely occur.

**Nature: Impacts on individuals of threatened animal species (Riverine Habitat)**

There is one threatened bird species that could occur in available habitats in the proposed study area. This is Ludwig's Bustard, listed as Vulnerable (VU). This species is seldom found very close to human habitation. The site is a few kilometres from De Aar and there is a risk of it occurring on site.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	local (1) - Local and surroundings (2)	local (1) - Local and surroundings (2)
<b>Duration</b>	Short term (1) - permanent (5)	Short term (1) - permanent (5)

<b>Magnitude</b>	small (3)	small (2)
<b>Probability</b>	Improbable (2) - probable (3)	probable (3)
<b>Significance</b>	<b>Low (10) - low (27)</b>	<b>Low (8) - low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Not reversible	Not reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b>		
» Avoid impacts on natural habitats outside the footprint of the proposed infrastructure. Place flappers/bird diverters on power lines to make them more visible to flying birds to minimise the risk of collision.		
<b>Cumulative impacts:</b>		
Impacts that cause loss of habitat (e.g. soil erosion, alien invasions, damage to watercourses) may exacerbate this impact.		
<b>Residual Impacts:</b>		
Unlikely to be residual impacts.		

**Nature: Damage to wetland areas resulting in hydrological impacts**

There are a number of dry stream beds and drainage areas on site, of which some are traversed by the servitude/s of the proposed 22kV power line/s. According to the National Water Act, these are classified as wetlands or water resources. Construction may lead to some direct or indirect loss of or damage to these affected areas or changes to the catchment of these areas. The impact will occur at the site of the proposed power line/s.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local and surroundings (2)	Local and surroundings (2)
<b>Duration</b>	Long-term (4)	Long-term (4)
<b>Magnitude</b>	Moderate (6)	Small (2)
<b>Probability</b>	Probable (3)	Improbable (3)
<b>Significance</b>	<b>medium (36)</b>	<b>low (24)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Reversible with effective rehabilitation	Reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	
<b>Mitigation:</b>		
» Place tower structures a minimum of 50 m from watercourses.		
» Service roads in the servitude must be properly maintained to avoid erosion impacts.		

» If not, there is a legal obligation to apply for a Water Use Licence for any wetlands that may be affected, since they are classified in the National Water Act as a water resource.

**Cumulative impacts:**

Soil erosion, alien invasions, may all lead to additional impacts on watercourse habitats that will exacerbate this impact.

**Residual Impacts:**

None.

**Nature: Establishment and spread of declared weeds and alien invader plants**

Potential weeds with a distribution centred on arid regions of the country include *Salsola kali*, *Atriplex lindleyi*, *Opuntia ficus-indica*, *Opuntia imbricata*, *Prosopis glandulosa*, *Prosopis velutina*, *Atriplex numularia*, and *Nicotiana glauca*. The shrub, *Prosopis glandulosa*, is potentially the most problematic. This species invades riverbeds, riverbanks and drainage lines in semi-arid and arid regions and has been recorded near to the site. There is therefore the potential for alien plants to spread or invade following disturbance on site.

	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Site & surroundings (2)	Site & surroundings (2)
<b>Duration</b>	long-term (4)	long-term (4)
<b>Magnitude</b>	small (3)	small (2)
<b>Probability</b>	probable (4)	improbable (2)
<b>Significance</b>	<b>medium (36)</b>	<b>low (16)</b>
<b>Status (positive or negative)</b>	negative	negative
<b>Reversibility</b>	Reversible	Reversible
<b>Irreplaceable loss of resources?</b>	Yes	Yes
<b>Can impacts be mitigated?</b>	To some degree	

**Mitigation:**

- » keep disturbance of indigenous vegetation to a minimum
- » rehabilitate disturbed areas as quickly as possible
- » do not translocate soil stockpiles from areas with alien plants
- » control any alien plants immediately to avoid establishment of a soil seed bank that would take decades to remove
- » establish an on-going monitoring programme to detect and quantify any aliens that may become established

**Cumulative impacts:**

Soil erosion, habitat loss, damage to wetlands may all lead to additional impacts that will exacerbate this impact.

**Residual Impacts:**

Will probably be very low if control measures are effectively applied

### **Implications for Project Implementation**

- » The development footprints will not impact on any ecological “no go” habitats or areas.
- » The drainage line that crosses the site from north to south will be crossed by two of the new proposed 22kV powerlines. The suggested mitigation measure to reduce this potential impact would be to ensure that the power line towers are placed a minimum of 50 m from the drainage lines.
- » Wetlands (including drainage lines) are protected under national legislation (National Water Act). Any impacts on these areas would require a permit from the relevant National Department of Water Affairs.

### **6.3.2 Potential Impacts on Soils and Agricultural Potential**

The most important direct impact is soil degradation including erosion from the area of construction activity. The most important indirect impact is the increased potential for dust pollution near the site because of wind erosion of exposed and loosened soil.

In terms of agricultural potential, the potential significance was rated as having a predominately low significance. The agricultural potential of the bulk of site is low due to climatic constraints as well as the current land use. In addition, the significance of the impacts is of low significance as the proposed development will take place outside of the sensitive areas (i.e. irrigated agricultural fields).

### **Impact tables summarising the significance of impacts on soils and agricultural potential (with and without mitigation)**

<b>Nature: Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles</b>		
This activity entails the operation of vehicles on site and their associated impacts in terms of spillages of lubricants and petroleum products.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Site (1)	Site (1)
<b>Duration</b>	Short-term (2)	Short-term (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>Low (20)</b>	<b>Low (10)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	No	No
<b>Irreplaceable loss of resources?</b>	Yes,	
<b>Can impacts be</b>	Yes	

<b>mitigated?</b>		
<b>Mitigation:</b>		
» Maintain vehicles, prevent and address spillages.		
<b>Cumulative Impacts:</b>		
» The cumulative impact of this activity will be small if managed.		
<b>Residual Impacts:</b>		
» None		

<b>Nature: Impact of dust generation on site</b>		
This activity entails the operation of vehicles on site and their associated dust generation.		
	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Extent</b>	Local (2)	Site (2)
<b>Duration</b>	Short-term (2)	Short-term (2)
<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Highly probable (4)	Improbable (2)
<b>Significance</b>	<b>Low (24)</b>	<b>Low (12)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	No	No
<b>Irreplaceable loss of resources?</b>	Yes	
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
» Avoid unnecessary compaction of soils by vehicles and other construction activities.		
<b>Cumulative Impacts:</b>		
» The cumulative impact of this activity will be small.		
<b>Residual Impacts:</b>		
» None		

<b><i>Nature of Impact: Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.</i></b>		
	Without mitigation	With mitigation
<b><i>Extent</i></b>	Low (1) – Site	Low (1) – Site
<b><i>Duration</i></b>	Permanent (5)	Permanent (5)
<b><i>Magnitude</i></b>	Low (2)	Low (2)
<b><i>Probability</i></b>	Highly probable (4)	Highly probable (4)
<b><i>Significance*</i></b>	<b>32 (Low)</b>	<b>32 (Low)</b>
<b><i>Status (positive or negative)</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	Medium	Medium
<b><i>Irreplaceable loss of resources?</i></b>	No	No
<b><i>Can impacts be mitigated?</i></b>	No	No
<b><i>Mitigation:</i></b> The loss of agricultural land is a long-term loss. If infrastructure results in the loss of agricultural land, there is no mitigation measure that can be put in place to combat this loss.		
<b><i>Cumulative impacts:</i></b> Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.		
<b><i>Residual Impacts:</i></b> None, as the agricultural potential is very low.		

### ***Implications for Project Implementation***

- » The proposed development of a photovoltaic facility on the site, outside of the current irrigation areas, will not have large impacts due to the low agricultural potential of the site.
- » Any potential impacts on current irrigated agricultural fields should be avoided.

### 6.3.3 Assessment of Potential Impacts on Heritage Sites

There is a rich distribution of heritage traces found on site.

- » Stone Age occurrences (mostly of the Pleistocene/early Holocene period) show use of abundant locally available raw material,
- » a few Late Stone Age sites are tightly focused on features of the landscape including a low hill and the spring; and
- » colonial traces refer to Trekboer inhabitation (graves) and farm worker activity (*skaapwagter skerms*).
- » the area in the vicinity of the spring located on site may be able to yield important palaeoenvironmental evidence.

The more significant of these heritage resources fall outside of the main areas of solar energy facility construction impact but the management plan will provide for their preservation. The provision of parameters for such a plan would, with selective sampling as proposed, be the main task of the recommended mitigation.

***Nature: Disturbance of surfaces and/or sub-surfaces containing artefacts resulting in the destruction, damage, excavation, alteration, removal or collection from its original position, of any archaeological material or object***

Some construction activities might result in the disturbance of surfaces and/or sub-surfaces containing artefacts (causes) resulting in the destruction, damage, excavation, alteration, removal or collection from its original position (consequences), of any archaeological material or object (what affected).

	<b><i>Without mitigation</i></b>	<b><i>With mitigation</i></b>
<b><i>Extent</i></b>	Regional (3)	Local (1)
<b><i>Duration</i></b>	Permanent (5)	Permanent – for material remaining on site after mitigation – mitigation would result in a sample of the material being preserved in a transformed state, removed from context, as museum collection (5)
<b><i>Magnitude</i></b>	Very high (10)	Moderate (6)
<b><i>Probability</i></b>	Highly probable (4)	Improbable (2)
<b><i>Significance</i></b>	<b>High (72)</b>	<b>Low (24)</b>
<b><i>Status (positive or negative)</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	No	No
<b><i>Irreplaceable loss of resources?</i></b>	Yes, with regional impact given the relative scarcity of sites of this nature in the surrounding landscape.	Resources would still be lost but representative samples will have been recovered and possible no-go areas demarcated.



<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<ul style="list-style-type: none"> <li>» Delineate no-go areas for the proposed development.</li> <li>» Salvage and investigative sampling/excavation of identified sites.</li> </ul>		
<b>Cumulative Impacts:</b>		
<ul style="list-style-type: none"> <li>» Where any archaeological contexts occur the impacts are once-off permanent destructive events. Infrastructure development may lead to spatially extended impacts in the vicinity, hence the need to demarcate areas for zero impact.</li> </ul>		
<b>Residual Impacts:</b>		
<ul style="list-style-type: none"> <li>» Depleted archaeological record.</li> </ul>		

### **Implications for Project Implementation**

- » Apart from some particular occurrences, from an archaeological perspective, the observed heritage resources over the bulk of the area surveyed were found to be mainly of lower significance.
- » Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner so that an investigation and evaluation of the finds can be made.
- » Permits will be required for the removal/sampling of heritage artefacts that will potentially be affected by the proposed development.

#### **6.3.4 Assessment of Potential Visual Impacts**

The study area for the visual assessment encompassed a geographical area of about 1200km<sup>2</sup> and included a minimum 16km buffer zone from the proposed development area. It included the town of De Aar as well as sections of the N10, the R48 and the R388.

Specific issues related to the potential visual impact include:

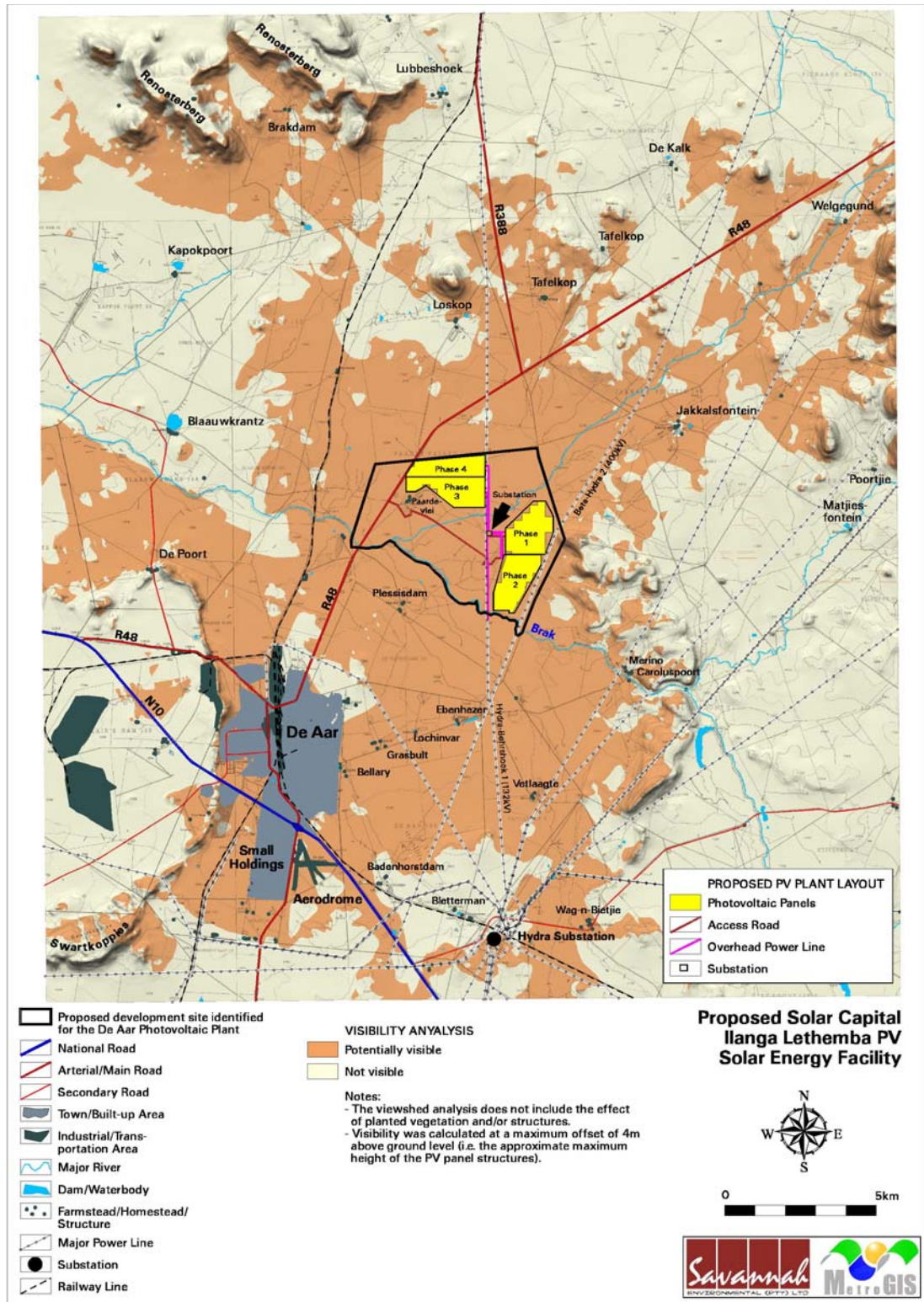
- » The visibility of the facility to, and potential visual impact on, observers travelling along national and arterial roads (i.e. the N10, the R48 and the R388) as well as secondary roads in close proximity to the proposed facility and within the region.
- » The visibility of the facility to, and potential visual impact on, commuters and tourists travelling by rail in close proximity to the proposed Solar Energy Facility and within the region.
- » The visibility of the facility to, and potential visual impact on residents of small-holdings, farms and homesteads in close proximity to the proposed facility and within the region.
- » The visibility of the facility to, and potential visual impact on residents of urban areas (i.e. De Aar) within the region.

- » The potential visual impact of the facility on the visual character of the landscape and sense of place of the region.
- » The potential visual impact of the facility on tourist access routes (i.e. N10) within the region.
- » The potential visual impact of ancillary infrastructure (i.e. substation, overhead power line, internal access roads and workshop) on observers in close proximity to the proposed facility.
- » The potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the proposed facility.
- » Potential visual impacts associated with the construction phase on observers in close proximity to the proposed facility.
- » Potential cumulative visual impacts of the proposed facility, specifically in context of the existing industrial infrastructure within the study area.
- » Potential residual visual impacts after the decommissioning of the facility.
- » The potential to mitigate visual impacts and inform the design process.

The anticipated impacts are not considered a fatal flaw from a visual perspective, considering the low incidence of visual receptors in the region and the relatively contained area of potential visual exposure.

***Potential visual impact assessment –visual impact index***

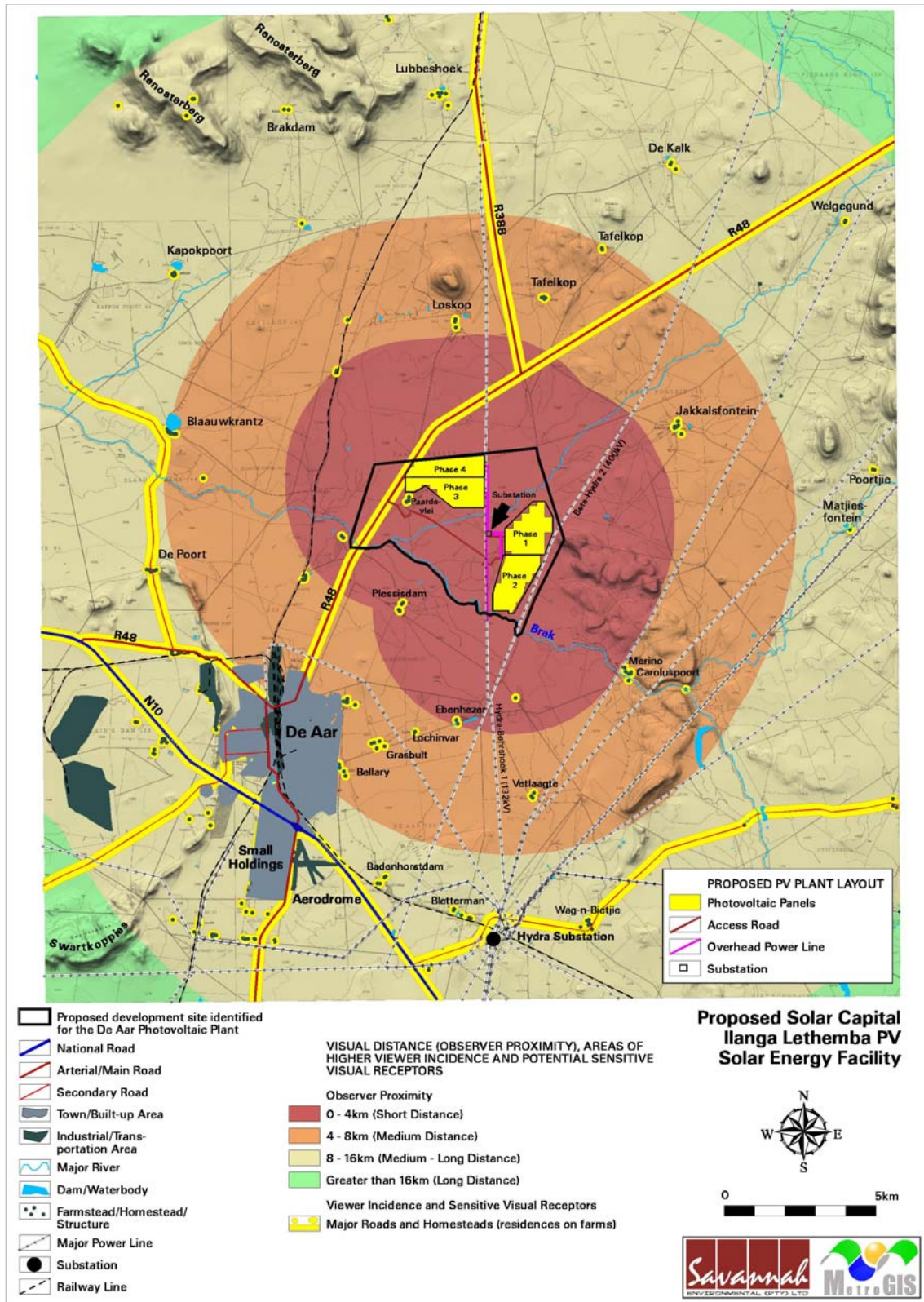
The results of analyses including visibility analysis / exposure (Figure 6.3); observer proximity to the facility (refer to Figure 6.4); viewer incidence / viewer perception; and visual absorption capacity (VAC) are merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact (refer to Figure 6.5).



**Figure 6.3:** Potential visual exposure of the Ilanga Lethemba PV Solar Energy Facility

*The potential visual exposure as illustrated is a theoretical representation of where visual receptors would be able to see the facility from. This does not take into consideration local factors such as vegetation, orientation of structures and views, and localised topographical features.*



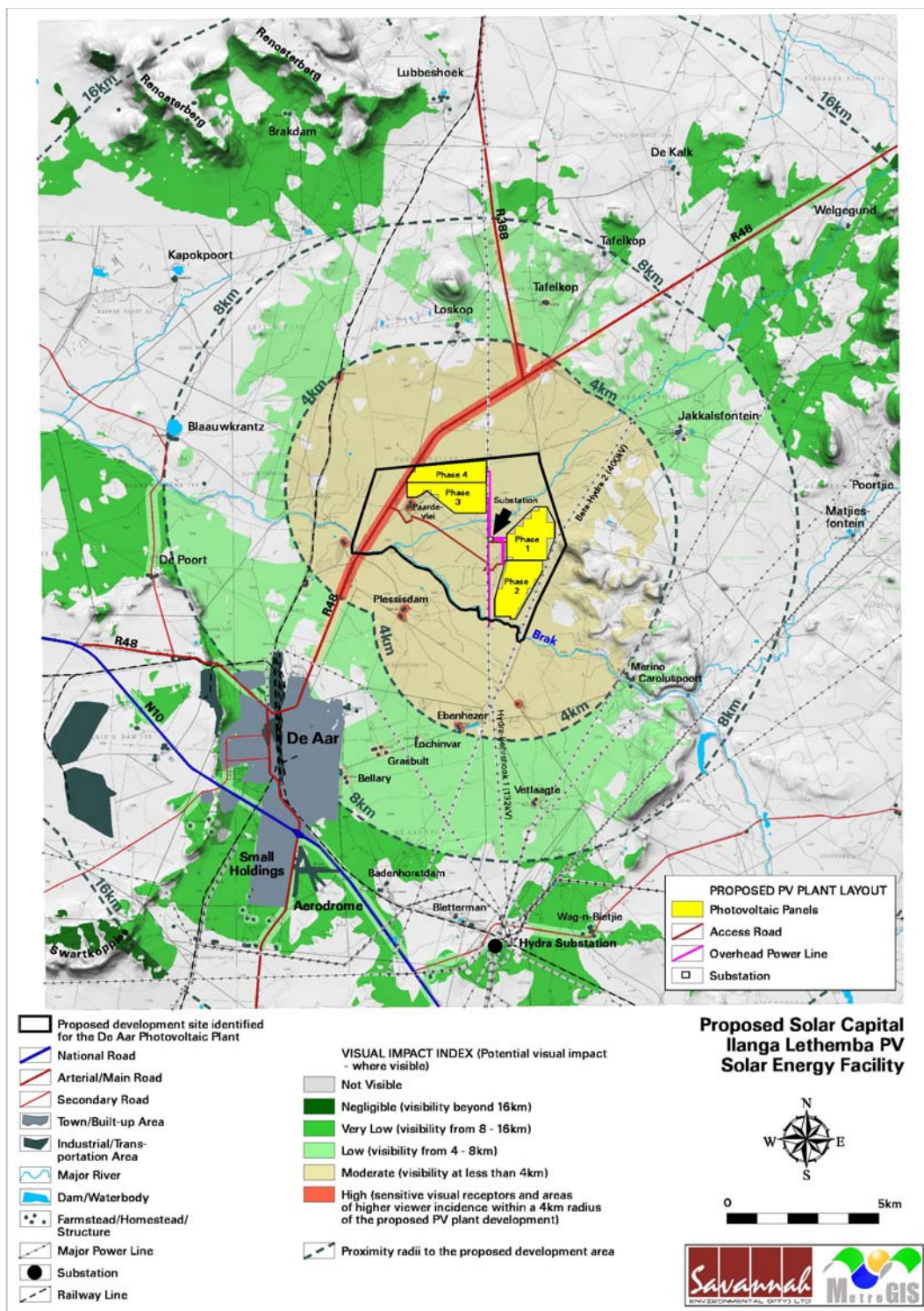


**Figure 6.4:** Observer Proximity, Areas of High Viewer Incidence and Potential Sensitive Visual Receptors.

### **Results of the Visual Assessment**

- » **Within 4km** from the facility, sensitive visual receptors may experience potentially **high** visual impact. These receptors are users of the R48, a short stretch of the R388 in the north and a number of homesteads / settlements, including *Paardevlei* (on the site), *Plessisdam* and *Ebenezer*.
  
- » **Between 4 km – 8 km**, the extent of potential visual impact decreases. Short stretches of the R48 in the south west and north east, as well as stretches of the R388 in the north are likely to be exposed to potentially moderate visual impact. In addition, a number of homesteads / settlements may be exposed to moderate visual impact. These include the following *Loskop*, *Tafelkop*, *Jakkalsfontein*, *Merino*, *Carouluspoort*, *Vetlaagte*, *Lochinvar*, *Grasbult* and *Bellary*. The north eastern parts of De Aar lie within this zone, but potential visual impact is expected to be low, where this occurs at all. This is due to the high VAC within the urban area.
  
- » **Beyond 8km**, the magnitude of visual impact is mostly reduced to **very low**. Visually exposed areas are patchy and interrupted, and lie mainly to the north, north east, west and south of the study area. Some stretches of the N10, short stretches of the R48 (west and south), a secondary road in the west and a limited number of homesteads and settlements (including the smallholdings south of De Aar) may experience potentially low visual impact. The western and southern parts of De Aar fall within this zone, but potential visual impact is expected to be very low due to the high Visual Absorption Capacity (VAC).





**Figure 6.5:** Visual impact index of the proposed Ilanga Lethemba PV Solar Energy Facility

*It should be noted that the visual impact index does not take into account visual clutter and structures that obstruct long distance views within built-up areas. For this reason it can be assumed that the solar energy facility would have a higher visual prominence from the outskirts of built up areas than from within these areas.*

**Impact tables summarising the significance of visual impacts (with and without mitigation)**

<b>Nature of Impact: Potential visual impact on users of main roads in close proximity to the proposed Solar Energy Facility</b>		
Visual impacts on users of the R48 and the R388 within a radius of 4km of the proposed facility are expected to be of high significance, both before and after mitigation.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	High <b>(8)</b>	High <b>(8)</b>
<b>Probability</b>	High <b>(4)</b>	High <b>(4)</b>
<b>Significance</b>	<b>High (64)</b>	<b>High (64)</b>
<b>Status (positive, neutral or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated</b>	Yes	
<b>Mitigation:</b>		
<u>Planning:</u>		
» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary. This includes the eastern side of the R48 where this road traverses the site. This measure will give some distance between the facility footprint and the visual receptors.		
» Retain and maintain natural vegetation in all areas outside of the development footprint.		
<b>Cumulative impacts:</b>		
The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).		
<b>Residual impacts:</b>		
The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

***Nature of Impact: Potential visual impact on commuters and tourists travelling by rail in close proximity to the proposed Solar Energy Facility***

Commuters and tourists travelling by rail, and especially those travelling by luxury coach, may be impacted upon within a radius of 4km of the proposed facility. Visual impacts are expected to be of low significance, before and after mitigation.

The visual context of the site in close proximity to De Aar is of relevance, and as such will reduce the probability of this impact occurring.

	<b><i>No mitigation</i></b>	<b><i>Mitigation considered</i></b>
<b><i>Extent</i></b>	Local <b>(4)</b>	Local <b>(4)</b>
<b><i>Duration</i></b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b><i>Magnitude</i></b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b><i>Probability</i></b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b><i>Significance</i></b>	<b>Low (28)</b>	<b>Low (28)</b>
<b><i>Status (positive, neutral or negative)</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b><i>Irreplaceable loss of resources?</i></b>	No	No
<b><i>Can impacts be mitigated</i></b>	Yes	

***Mitigation:***

***Planning:***

- » Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.

***Cumulative impacts:***

The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).

***Residual impacts:***

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

***Nature of Impact: Potential visual impact on residents of smallholdings, homesteads and settlements in close proximity to the proposed Solar Energy Facility.***

The visual impact on residents of smallholdings, homesteads and settlements within a radius of 4km of the proposed facility are expected to be of moderate significance, both before and after mitigation. The very limited number of visual receptors (i.e. the very few homesteads and settlements present within this radius) will reduce the probability of this impact occurring.



	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	High <b>(8)</b>	High <b>(8)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Moderate (32)</b>	<b>Moderate (32)</b>
<b>Status (positive, neutral or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated</b>	Yes	
<b>Mitigation:</b>		
<u>Planning:</u>		
<ul style="list-style-type: none"> <li>» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.</li> <li>» Retain and maintain natural vegetation in all areas outside of the development footprint.</li> </ul>		
<b>Cumulative impacts:</b>		
<p>The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).</p>		
<b>Residual impacts:</b>		
<p>The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.</p>		

***Nature of Impact: Potential visual impact on sensitive visual receptors (users of roads and residents of smallholdings, farms and homesteads) within the region.***

The visual impact users of main roads (i.e. the N10, the R48 and the R388), secondary roads and residents of homesteads and settlements within the region beyond the 4km radius, is expected to be of moderate significance.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Regional <b>(3)</b>	Regional <b>(3)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Probable <b>(3)</b>	Probable <b>(3)</b>
<b>Significance</b>	<b>Moderate (39)</b>	<b>Moderate (39)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be</b>	Yes	

<b>mitigated?</b>	
<b>Mitigation:</b>	
<u>Planning:</u>	
<ul style="list-style-type: none"> <li>» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.</li> <li>» Retain and maintain natural vegetation in all areas outside of the development footprint..</li> </ul>	
<b>Cumulative impacts:</b>	
The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).	
<b>Residual impacts:</b>	
The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.	

<b>Nature of Impact: Potential visual impact on residents of built up and urban centres within the region</b>		
The visual impact on residents of De Aar is expected to be of low significance. The Visual Absorption Capacity of this urban area reduces the probability of this impact occurring.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Regional <b>(3)</b>	Regional <b>(3)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Low <b>(4)</b>	Low <b>(4)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Low (22)</b>	<b>Low (22)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<b>Mitigation:</b>		
<u>Planning:</u>		
<ul style="list-style-type: none"> <li>» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.</li> <li>» Retain and maintain natural vegetation in all areas outside of the development footprint.</li> </ul>		
<b>Cumulative impacts:</b>		
The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).		

**Residual impacts:**

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

**Nature of Impact: Potential visual impact of the access roads and ancillary infrastructure on observers in close proximity to the proposed Solar Energy Facility**

The construction of the on-site substation, the access roads, the workshops and the storage areas could represent a visual impact. Although no dedicated viewshed has been generated for the above infrastructure, it will all be located within the proposed Solar Energy Facility footprint, and will thus lie within that of the primary infrastructure.

The anticipated visual impact resulting from this infrastructure is likely to be of low significance. The presence of the PV panels (i.e. the primary impact) will result in some absorption of this impact, thus reducing the probability of the impact occurring.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Low (28)</b>	<b>Low (28)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	

**Mitigation:**

Planning:

- » Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
- » Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- » Rehabilitation of all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary buildings.

Operation:

- » Maintenance of roads to avoid erosion and suppress dust.

Decommissioning:

- » Removal of infrastructure and roads not required for post decommissioning use and rehabilitation of the footprint areas.

<p><b>Cumulative impacts:</b></p> <p>The construction of the ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra Substation).</p>
<p><b>Residual impacts:</b></p> <p>The visual impact will be removed after decommissioning, provided the ancillary infrastructure is removed. Failing this, the visual impact will remain.</p>

<p><b>Nature of Impact: Potential visual impact of the power line on observers in close proximity to the proposed Solar Energy Facility</b></p>		
<p>The construction of the overhead power line could represent a visual impact. No dedicated viewshed has been generated for the 22 kV power line infrastructure, but it will be located within the proposed Solar Energy Facility footprint, and will thus lie within that of the primary infrastructure. The anticipated visual impact resulting from the on-site overhead power line is likely to be of moderate significance both before and after mitigation.</p>		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	High <b>(8)</b>	High <b>(8)</b>
<b>Probability</b>	Probable <b>(3)</b>	Probable <b>(3)</b>
<b>Significance</b>	<b>Medium (48)</b>	<b>Medium (48)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	
<p><b>Mitigation:</b></p> <p><u>Planning:</u></p> <ul style="list-style-type: none"> <li>» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.</li> <li>» Retain and maintain natural vegetation in all areas outside of the development footprint.</li> </ul> <p><u>Construction:</u></p> <ul style="list-style-type: none"> <li>» Rehabilitation of all construction areas and servitudes.</li> <li>» Ensure that vegetation is not cleared unnecessarily to make way for the power line and servitude.</li> </ul> <p><u>Operation:</u></p> <ul style="list-style-type: none"> <li>» Maintenance of servitudes to avoid erosion and suppress dust.</li> </ul> <p><u>Decommissioning:</u></p> <ul style="list-style-type: none"> <li>» Removal of infrastructure not required for post decommissioning use and rehabilitation of the footprint areas.</li> </ul>		

**Cumulative impacts:**

The construction of the on-site power line will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the Hydra substation).

**Residual impacts:**

The visual impact will be removed after decommissioning, provided the power line is removed. Failing this, the visual impact will remain.

**Nature of Impact: Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility**

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 significance for visual receptors in close/the immediate proximity. Another potential lighting impact is that known as sky glow. 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 amount of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow.

It should be noted that the urban area of De Aar, which lies some 6km away, and is an existing source of light within the region, and as such will reduce the probability of this impact occurring somewhat. This anticipated impact is likely to be of moderate significance, and may be mitigated to be of low significance.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Medium (42)</b>	<b>Low (28)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	

**Mitigation:**

Planning:

» Pro-active design, planning and specification of lighting of the facility by a lighting engineer. The correct specification and placement of lighting and light fixtures for the Solar Energy Facility and the ancillary infrastructure will go far to contain rather than spread the light.

**Cumulative impacts:**

The existing urban centre of De Aar generates lighting impact at night, so the impact of the Solar Energy Facility will contribute to a regional increase in lighting impact.

**Residual impacts:**

None. The visual impact will be removed after decommissioning.

**Nature of Impact: Potential visual impact of construction on observers in close proximity to the proposed Solar Energy Facility**

During the construction period, there will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and land owners in the area. Dust from construction work could also result in potential visual impact.

This anticipated impact is likely to be of **moderate** significance, and may be mitigated to **low**.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	Local <b>(4)</b>	Local <b>(4)</b>
<b>Duration</b>	Very short term <b>(1)</b>	Very short term <b>(1)</b>
<b>Magnitude</b>	Moderate <b>(6)</b>	Moderate <b>(6)</b>
<b>Probability</b>	Probable <b>(3)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Medium (33)</b>	<b>Low (22)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	

**Mitigation:**

Planning:

- » Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- » Proper planning and management of the construction site.
- » Ensure that vegetation is not cleared unnecessarily during the construction period.
- » Rehabilitation of construction areas

**Cumulative impacts:**

None.

**Residual impacts:**

None.

***Nature of Impact: Potential visual impact of the proposed facility on the visual character of the landscape and the sense of place of the region***

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc) play a significant role.

The anticipated visual impact of the facility on the visual character of the landscape, and by implication, on the sense of place, is expected to be of low significance due to the proximity of the proposed facility to De Aar, the Hydra Substation and the numerous power lines.

	<b><i>No mitigation</i></b>	<b><i>Mitigation considered</i></b>
<b><i>Extent</i></b>	Regional <b>(3)</b>	Regional <b>(3)</b>
<b><i>Duration</i></b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b><i>Magnitude</i></b>	Low <b>(4)</b>	Low <b>(4)</b>
<b><i>Probability</i></b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b><i>Significance</i></b>	<b>Low (22)</b>	<b>Low (22)</b>
<b><i>Status (positive or negative)</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b><i>Irreplaceable loss of resources?</i></b>	No	No
<b><i>Can impacts be mitigated?</i></b>	Yes	Yes

***Mitigation:***

***Planning:***

- » Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.

***Cumulative impacts:***

The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the hydra substation).

***Residual impacts:***

The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.

***Nature of Impact: Potential visual impact of the proposed facility on tourist access routes (the N10) within the region***

The anticipated visual impact of the facility on the N10, which is a recognised national tourist access route is expected to be of low significance, both before and after mitigation.

	<b><i>No mitigation</i></b>	<b><i>Mitigation considered</i></b>

<b>Extent</b>	Regional <b>(3)</b>	Regional <b>(3)</b>
<b>Duration</b>	Long term <b>(4)</b>	Long term <b>(4)</b>
<b>Magnitude</b>	Low <b>(4)</b>	Low <b>(4)</b>
<b>Probability</b>	Improbable <b>(2)</b>	Improbable <b>(2)</b>
<b>Significance</b>	<b>Low (22)</b>	<b>Low (22)</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Reversibility</b>	Recoverable <b>(3)</b>	Recoverable <b>(3)</b>
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impacts be mitigated?</b>	Yes	Yes
<b>Mitigation:</b>		
<u>Planning:</u>		
<ul style="list-style-type: none"> <li>» Retain a buffer (approximately 100m wide) of intact natural vegetation along the perimeter of the development area and/or along the site boundary.</li> <li>» Retain and maintain natural vegetation in all areas outside of the development footprint..</li> </ul>		
<b>Cumulative impacts:</b>		
<p>The construction of the Solar Energy Facility and ancillary infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the significant electricity related infrastructure within the region (i.e. the power lines and the hydra substation).</p>		
<b>Residual impacts:</b>		
<p>The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.</p>		



### ***Implications for Project Implementation***

- » The anticipated visual impacts (i.e. post mitigation impacts) range from high to low, but are not considered to be fatal flaws from a visual perspective. The main considerations in this regard are the relatively low occurrence of potential visual receptors, the proximity to the urban centre of De Aar and the visual context of existing industrial and electrical type infrastructure within the study area.
- » The construction phase of the facility should be sensitive to potential observers in the vicinity of the construction site. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass
- » A buffer of approximately 100 m in width of intact natural vegetation should be left along the perimeter of the development area and/or along the site boundary.

### ***6.3.5 Assessment of Potential Social Impacts***

The construction phase of the first phase of the Ilanga Lethemba PV Solar Energy Facility is anticipated to last for 12 months. The following positive impacts are expected for both the construction and operational phases:

- » Creation of employment and business opportunities and opportunity for skills development and on-site training

Potential negative impacts will include:

- » Impacts associated with the presence of construction workers on site
- » Influx of job seekers to the area;
- » Loss of farm labour to the construction phase;
- » Increased risk of stock theft, poaching and damage to farm infrastructure associated with presence of construction workers on the site
- » Increased risk of veld fires associated with construction-related activities
- » Threat to safety and security of farmers associated with the presence of construction workers on site
- » Impact of heavy vehicles, including damage to roads, safety, noise and dust
- » Potential loss of grazing land associated with construction-related activities

***Impact tables summarising the significance of social impacts during the construction and operational phases (with and without mitigation)***

***Nature: Creation of employment and business opportunities during the construction phase***

Based on information provided by the proponent it is anticipated that approximately 80% of the employment opportunities will be available to low-skilled workers (construction labourers, security staff etc.), 10% to semi-skilled (drivers, equipment operators etc.) and 10% to skilled personnel (engineers, land surveyors, project managers etc.). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are therefore likely to be available to members from the local Historically Disadvantaged (HD) community who reside in the local towns of De Aar, Britstown and Hanover.

	<b><i>Without Mitigation</i></b>	<b><i>With Enhancement</i></b>
<b><i>Extent</i></b>	Local – Regional (2)	Local – Regional (3)
<b><i>Duration</i></b>	Very Short Term (1)	Very Short Term (1)
<b><i>Magnitude</i></b>	Low (4)	Low (4)
<b><i>Probability</i></b>	Highly probable (4)	Highly probable (4)
<b><i>Significance</i></b>	<b>Low (28)</b>	<b>Medium (32)</b>
<b><i>Status</i></b>	Positive	Positive
<b><i>Reversibility</i></b>	N/A	N/A
<b><i>Irreplaceable loss of resources?</i></b>	N/A	N/A
<b><i>Can impact be enhanced?</i></b>	Yes	

***Enhancement :***

*Employment*

- » Where reasonable and practical, Solar Capital should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- » Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria;
- » Before the construction phase commences, Solar Capital should meet with representatives from the Emthanjeni Local Municipality to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase.
- » The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that Solar Capital intends following for the construction phase of the project.
- » Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

*Business*

- » Solar Capital should seek to develop a database of local companies, specifically BEE

companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;

- » Where possible, Solar Capital should assist local BEE companies to complete and submit the required tender forms and associated information.
- » The Emthanjeni Local Municipality, in conjunction with the local Chamber of Commerce and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project

**Cumulative impacts:** Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.

**Residual impacts:** Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.

***Nature: Creation of employment and business opportunities associated with the operational phase***

Based on information provided by Solar Capital the proposed development will create ~ 375 employment opportunities for over a 25-30 year period. Of this total approximately 80% will be low skilled, 10% medium-skilled and 10% high skilled positions. The proposed facility will therefore create potential employment opportunities in the Northern Cape Province and the Emthanjeni Municipality.

	<b><i>Without Mitigation</i></b>	<b><i>With Enhancement</i></b>
<b><i>Extent</i></b>	Local and Regional (2)	Local and Regional (4)
<b><i>Duration</i></b>	Long term (4)	Long term (4)
<b><i>Magnitude</i></b>	Low (4)	Moderate (6)
<b><i>Probability</i></b>	Probable (3)	Definite (5)
<b><i>Significance</i></b>	<b>Medium (30)</b>	<b>High (70)</b>
<b><i>Status</i></b>	Positive	Positive
<b><i>Reversibility</i></b>	N/A	
<b><i>Irreplaceable loss of resources?</i></b>	No	
<b><i>Can impact be enhanced?</i></b>	Yes	

**Enhancement:**  
 The enhancement measures listed above, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase. In addition:

- » Solar Capital should implement a training and skills development programme for locals

during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project;

Solar Capital, in consultation with the Emthanjeni LM, should investigate the opportunities for establishing a Community Trust. The Community Trust should be linked to funding and supporting projects and initiatives identified in the Emthanjeni developmental plan.

**Cumulative impacts:** Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area

**Residual impacts:** See cumulative impacts

***Nature: Potential impacts on family structures and social networks associated with the presence of construction workers***

There are a relatively small number of farmsteads that will be affected. However, there are a number of potentially vulnerable farming activities, such as livestock farming. In addition, the presence of construction workers also poses a potential risk to family structures and social networks in the area. The most vulnerable communities include the communities in De Aar, Britstown and Hanover.

	<b><i>Without Mitigation</i></b>	<b><i>With Mitigation</i></b>
<b><i>Extent</i></b>	Local (3)	Local (2)
<b><i>Duration</i></b>	Very Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STD's etc. (5)	Very Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STD's etc. (5)
<b><i>Magnitude</i></b>	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STD's etc. (10)
<b><i>Probability</i></b>	Probable (3)	Probable (3)
<b><i>Significance</i></b>	<b>Low (24)</b> for the community as a whole Moderate-High ( <b>57</b> ) for specific individuals who may be affected by STD's etc.	Low ( <b>21</b> ) for the community as a whole Moderate-High ( <b>51</b> ) for specific individuals who may be affected by STD's etc.
<b><i>Status</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b><i>Irreplaceable loss of resources?</i></b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for	

	their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<p><b>Mitigation:</b></p> <ul style="list-style-type: none"> <li>» Where possible, Solar Capital should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories.</li> <li>» Solar Capital should consider the establishment of a Monitoring Forum (MF) for the construction phase which should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, farmers, and the contractor;</li> <li>» Solar Capital and the contractor should, in consultation with representatives from the MF, develop a Code of Conduct for the construction phase.</li> <li>» Solar Capital and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;</li> <li>» The movement of construction workers on and off the site should be closely managed and monitored by the contractors;</li> <li>» The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 12 month construction phase. It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. This will make it possible to manage the potential impacts effectively</li> </ul>		
<p><b>Cumulative impacts:</b> Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.</p>		
<p><b>Residual impacts:</b> See cumulative impacts.</p>		

<p><b>Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers</b></p>		
<p>Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community</p>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)
<b>Magnitude</b>	Low (4) for the community as a whole Very High (10) for specific	Minor (2) for community as a whole Very High (10) for specific individuals who may be affected by

	individuals who may be affected by STD's etc.	STD's etc.
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Medium (36)</b> for the community as a whole <b>Medium (54)</b> for specific individuals who may be affected by STD's etc.	<b>Low (18)</b> for the community as a whole <b>Medium (51)</b> for specific individuals who may be affected by STD's etc.
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b> It is almost impossible to stop people from coming to the area in search of a job. However, as indicated above, Solar Capital should ensure that the employment criteria favour local residents in the area. In addition Solar Capital should: <ul style="list-style-type: none"> <li>» In consultation with the Emthanjeni Local Municipality, investigate the option of establishing a Local Community Forum to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The Forum should also include the other proponents of solar energy projects in the area;</li> <li>» Implement a policy that no employment will be available at the gate. This should be linked to the establishment of labour offices and the use of experienced local labour brokers.</li> </ul>		
<b>Cumulative impacts:</b> Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.		
<b>Residual impacts:</b> See cumulative impacts.		

**Nature: Potential impacts on family structures, social networks and community services associated with the influx of job seekers during operational phase**

While the proposed development on its own is unlikely to result in an influx of job seekers during the operational phase, the proposed establishment of a number of solar energy projects in the vicinity of De Aar is likely to attract job seekers to the area.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (3)	Local (2)
<b>Duration</b>	Permanent (5)	Permanent (5)

<b>Magnitude</b>	Low (4) for the community as a whole Very High (10) for specific individuals who may be affected by STD's etc.	Minor for community as a whole (2) Very High (10) for specific individuals who may be affected by STD's etc.
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	Low (24) for the community as a whole Medium -High (54) for specific individuals who may be affected by STD's etc.	Low (27) for the community as a whole Medium-High (51) for specific individuals who may be affected by STD's etc.
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	No in case of HIV and AIDS	No in case of HIV and AIDS
<b>Irreplaceable loss of resources?</b>	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	

**Mitigation:**

It is almost impossible to stop people from coming to the area in search of a job. However, as indicated above, Solar Capital should ensure that the employment criteria favour local residents in the area. In addition Solar Capital should:

- » Solar Capital, in consultation with the Emthanjeni Local Municipality, should investigate the option of establishing a Local Community Forum to monitor and identify potential problems that may arise due to the influx of job seekers to the area. The Forum should also include the other proponents of solar energy projects in the area;
- » Implement a policy that no employment will be available at the gate. This should be linked to the establishment of labour offices and the use of experienced local labour brokers

**Cumulative impacts:** Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.

**Residual impacts:** See cumulative impacts.

**Nature: Potential impact on local farmers associated with loss of farm labour to the construction phase**

Experience from other projects indicates that the loss of farm workers is an issue of concern.

In most instances local farmers are unlikely to be in a position to compete with the salaries offered by the solar energy companies during the construction phase. As a result farm labourers may be tempted to resign from their current positions on farms. The loss of skilled and experienced farm labour would have a negative impact on local farmers.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and Regional (3)	Local and Regional (3)
<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Low (27)</b>	<b>Low (27)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, if farm workers return of are replaced	Yes, if farm workers return of are replaced
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b>		
<p>While Solar Capital could liaise with local farmers in the area and undertake not to employ farm worker were possible, it is not possible to prevent farm workers from applying for work in other sectors. There are therefore no recommended mitigation measures. Also it is assumed that farm labour can be replaced. The impacts would therefore be temporary.</p> <p>Farm workers who apply for construction related work should also be informed that the nature of the work is temporary. In addition they should be informed of the potential negative consequences of their actions, which include the potential loss of their permanent farm job</p>		
<b>Cumulative impacts:</b> Impacts on farm operations due to loss of experienced farm labour		
<b>Residual impacts:</b> See cumulative impacts.		

**Nature: Potential impact on local farmers associated with loss of farm labour to the operational phase**

Experience from other projects indicates that the loss of farm workers is an issue of concern. In most instances local farmers are unlikely to be in a position to compete with the salaries offered by the solar energy companies during the construction phase. As a result farm labourers may be tempted to resign from their current positions on farms. The loss of skilled and experienced farm labour would have a negative impact on local farmers.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local and Regional (3)	Local and Regional (3)



<b>Duration</b>	Short term (2)	Short term (2)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Low (27)</b>	<b>Low (27)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, if farm workers return or are replaced	Yes, if farm workers return or are replaced
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes, to some degree. However, the risk cannot be eliminated	
<b>Mitigation:</b> While Solar Capital could liaise with local farmers in the area and undertake not to employ farm workers where possible, it is not possible to prevent farm workers from applying for work in other sectors. There are therefore no recommended mitigation measures. Also it is assumed that farm labour can be replaced. The impacts would therefore be temporary		
<b>Cumulative impacts:</b> Impacts on farm operations due to loss of experienced farm labour		
<b>Residual impacts:</b> See cumulative impacts.		

**Nature: Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site**

The presence of construction workers on the site increases the potential risk of stock theft and poaching. The movement of construction workers on and off the site also poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock and game losses may also result from gates being left open and/or fences being damaged.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4)	Local (2)
<b>Duration</b>	Very Short Term (1)	Very Short Term (1)
<b>Magnitude</b>	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Medium (33)</b>	<b>Low (21)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes (compensation paid for stock losses etc.)	Yes (compensation paid for stock losses etc.)

<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	Yes
<p><b>Mitigation:</b>                  The mitigation measures that can be considered to address the potential impact on livestock, game, and farm infrastructure include:</p> <ul style="list-style-type: none"> <li>» Solar Capital should enter into an agreement with the affected landowners whereby the company will compensate for damages to farm property and disruptions to farming activities. This includes losses associated with stock theft and damage to property etc.;</li> <li>» Solar Capital should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between Solar Capital, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);</li> <li>» The EMP must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;</li> <li>» Contractors appointed by Solar Capital should ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.</li> <li>» Contractors appointed by Solar Capital should ensure that construction workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;</li> <li>» The housing of construction workers on the site should be limited to security personnel</li> </ul>		
<p><b>Cumulative impacts:</b> No, provided losses are compensated for</p>		
<p><b>Residual impacts:</b> See cumulative impacts.</p>		

**Nature:** *Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires*

The presence of construction workers and construction-related activities on the site poses an increased risk of veld fires that in turn pose a threat to the livestock, wildlife, and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)
<b>Duration</b>	Very Short Term (1)	Very Short Term (1)
<b>Magnitude</b>	Moderate-High (8) due to reliance	Low-Moderate (6)

	on livestock for maintaining livelihoods	
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Medium (39)</b>	<b>Low (27)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, compensation paid for stock and crop losses etc.	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<p><b>Mitigation:</b>                  Solar Capital should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated veld fires. In addition, the potential increased risk of veld fires can be effectively mitigated. The detailed mitigation measures are outlined in the EMP for the construction and operation phases. The aspects that should be covered include:</p> <ul style="list-style-type: none"> <li>» Contractor to ensure that open fires on the site for cooking or heating are not allowed except in designated areas;</li> <li>» Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include clearing working areas and avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months;</li> <li>» Contractor to provide adequate fire fighting equipment on-site;</li> <li>» Contractor to provide fire-fighting training to selected construction staff;</li> <li>» As per the conditions of the Code of Good Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire fighting costs borne by farmers and local authorities.</li> </ul>		
<p><b>Cumulative impacts:</b> None, provided losses are compensated for.</p>		
<p><b>Residual impacts:</b> See cumulative impacts.</p>		

**Nature: Potential noise, dust and safety impacts associated with movement of construction related traffic to and from the site**

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area, specifically the local farmers that use the R48 to access their farms. Information provided by Solar Capital indicates that ~ 1000 trips to the site via the R48 will be required during the construction phase. The initial plan is to transport equipment and components via road from Port Elizabeth.

<p>The findings of the SIA indicate that the current road use frequency in the area and specifically along the R48 is low. The social impacts associated with the movement of construction related traffic along this road are therefore likely to be low. In addition, the option of raiiling material from Port Elizabeth to De Aar should be investigated. This would reduce the potential impact on other road users along the N10.</p>		
	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Very Short Term (1)	Very Short Term (1)
<b>Magnitude</b>	Low (4)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Low (21)</b>	<b>Low (12)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	No	No
<b>Can impact be mitigated?</b>	Yes	
<p><b>Mitigation:</b></p> <p>Solar Capital should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated with damage to local internal farm roads that are affected by the site. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:</p> <ul style="list-style-type: none"> <li>» The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;</li> <li>» Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;</li> <li>» All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.</li> <li>» In addition, it is recommended that Solar Capital investigate the option of using rail to transport materials and equipment from Port Elizabeth to De Aar</li> </ul>		
<p><b>Cumulative impacts:</b> If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.</p>		
<p><b>Residual impacts:</b> See cumulative impacts</p>		

***Nature: Impact on farmland due to construction related activities***

The activities associated with the construction phase have the potential to result in the loss of land available for grazing. However, the farm owner, Mr Jaco du Plessis, indicated that the proposed project would not have a significant impact on his farming operations as the area identified for the proposed PVSEF is not heavily utilised. In addition, only one landowner is affected and he (Mr Jaco du Plessis) has entered into a 25 year renewable lease agreement with Solar Capital. The loss of productive farmland has therefore been offset by the income from the lease agreement.

	<b><i>Without Mitigation</i></b>	<b><i>With Mitigation</i></b>
<b><i>Extent</i></b>	Local (3)	Local (1)
<b><i>Duration</i></b>	Long term-permanent (5)	Short term (1)
<b><i>Magnitude</i></b>	Moderate (4), due to importance of farming in terms of local livelihoods	Minor (2)
<b><i>Probability</i></b>	Definite (5)	Highly Probable (4)
<b><i>Significance</i></b>	<b><i>High (60)</i></b>	<b><i>Low (16)</i></b>
<b><i>Status</i></b>	Negative	Negative
<b><i>Reversibility</i></b>	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
<b><i>Irreplaceable loss of resources?</i></b>	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
<b><i>Can impact be mitigated?</i></b>	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided

**Mitigation:**

The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The aspects that should be covered include:

- The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA (Savannah Environmental);
- The implementation of the Rehabilitation Programme should be monitored by the ECO.

**Cumulative impacts:** Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.

**Residual impacts:** See cumulative impacts.

<b>Nature: Promotion of clean, renewable energy</b>		
	<b>Without Mitigation</b>	<b>With Mitigation</b> <i>(The provision of renewable energy infrastructure is in itself a mitigation measure)</i>
<b>Extent</b>	Local, Regional and National (4)	Local, Regional and National (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Low (4)	Low (4)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	Medium (48)	High (48)
<b>Status</b>	Positive	Positive
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	Yes, impact of climate change on ecosystems	
<b>Can impact be enhanced?</b>	Yes	
<p><b>Enhancement:</b>                      The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project Solar Capital should:</p> <ul style="list-style-type: none"> <li>» Use the project to promote and increase the contribution of renewable energy to the national energy supply;</li> <li>» Maximise the public's exposure to the project via an extensive communication and advertising programme;</li> <li>» Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project;</li> <li>» Investigate the opportunities for establishing a Community Trust. The revenue for the trust should be derived from the income generated from the sale of energy from the plant. The Community Trust should be linked to funding and supporting projects and initiatives identified in the Emthanjeni IDP.</li> </ul>		
<p><b>Cumulative impacts:</b> Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.</p>		
<p><b>Residual impacts:</b> See cumulative impacts</p>		

**Nature: Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place.**

The anticipated visual impact of the facility on the visual character of the landscape, and by implication, on the sense of place, is expected to be of low significance, both before and after mitigation. The overall findings of the VIA indicate that the anticipated visual impacts associated with the proposed development are not considered to be fatal flaws from a visual perspective, are not considered to be fatal flaws from a visual perspective. The main considerations in this regard are the relatively low occurrence of potential visual receptors, the proximity to the urban centre of De Aar and the visual context of existing industrial and electrical type infrastructure within the study area.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (4)	Local (4)
<b>Duration</b>	Long term (4)	Long term (4)
<b>Magnitude</b>	Moderate (6)	Moderate (6)
<b>Probability</b>	Highly Probable (4)	Highly Probable (4)
<b>Significance</b>	<b>Medium (56)</b>	<b>Medium (56)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes, solar facility can be removed.	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	
<b>Enhancement:</b> » The recommendations contained in the VIA should be implemented.		
<b>Cumulative impacts:</b> Potential impact on current rural sense of place.		
<b>Residual impacts:</b> See cumulative impacts		

**Nature: Potential impact of the facility on local tourism**

Caution must be taken to ensure that the development of large renewable energy projects, such as the proposed solar energy facility, do not affect the tourism potential of the Province. However, based on the findings of the site visit, the proposed facility is not likely to impact on the tourism sector in the area or the Province. The significance of this issue is therefore rated as low negative. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive

	<b>Without Mitigation</b>	<b>With Enhancement / Mitigation</b>
<b>Extent</b>	Local (2)	Local (3)
<b>Duration</b>	Long term (4)	Long term (4)

<b>Magnitude</b>	Low (2)	Low (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Low (24) (Applies to both – and +)</b>	<b>Low (27) (Applies to both – and +)</b>
<b>Status</b>	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be enhanced?</b>	Yes	

**Enhancement:**

In terms of mitigating the visual impacts, it is virtually impossible to hide the facility. The impact on the sense of place of the area cannot therefore be effectively mitigated. In terms of efforts to enhance the proposed benefits to tourism:

- » Solar Capital should liaise with representatives from the Emthanjeni LM and local tourism representatives to raise awareness of the proposed facility;
- » Solar Capital should investigate the option of establishing a renewable energy interpretation centre at entrance to the site. The centre should include a viewing area where passing visitors can stop and view the site;
- » In order to maximise the benefits of the interpretation centre to the broader community, it is recommended that the information on the project and solar energy be presented in the three main languages of the Northern Cape Province, namely Afrikaans, English and Setswana.

**Cumulative impacts:** Potential negative and or positive impact on tourism in the Emthanjeni Local Municipality Area.

**Residual impacts:** See cumulative impacts

**Impact tables summarising the significance of social impacts during the construction and operational phases of the powerline (with and without mitigation)**

**Nature: Potential visual impact and impact on sense of place associated with power lines**

The findings of the VIA indicate that the visual impact associated with the new power line is rated to be of moderate significance after mitigation. The findings of the SIA indicate that the social impacts associated with the power lines will be low.

	<b>Without Mitigation</b>	<b>With Mitigation</b>
<b>Extent</b>	Local (2)	Local (1)
<b>Duration</b>	Long term (4)	Long term (4)



<b>Magnitude</b>	Minor (2)	Minor (2)
<b>Probability</b>	Probable (3)	Probable (3)
<b>Significance</b>	<b>Low (24)</b>	<b>Low (21)</b>
<b>Status</b>	Negative	Negative
<b>Reversibility</b>	Yes	
<b>Irreplaceable loss of resources?</b>	No	
<b>Can impact be mitigated?</b>	Yes	
<b>Enhancement:</b>		
» The recommendations contained in the visual Impact assessment should be implemented. The measures listed above to address the potential impacts associated with the construction phase also apply to the construction of the power line.		
<b>Cumulative impacts:</b> Limited visual and impact on sense of place		
<b>Residual impacts:</b> See cumulative impacts		

### ***Implications for Project Implementation***

- » The findings of the SIA undertaken for the proposed Ilanga Lethemba PV Solar Energy Facility indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project.
- » The proposed development also supports the Emthanjeni Local Municipality policy of developing the area as a Renewable Energy Hub and represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.
- » The visual impacts associated with facility will impact on the areas rural sense of place and landscape character. This impact will be for the entire operational lifespan (approximately 25-30 years) of the facility.
- » The potential for cumulative impacts also exists due to the large number of applications for solar energy facilities in the area. However, these impacts are not considered to represent a fatal flaw.

### **6.5. Summary of All Impacts**

As a summary of the potential impacts identified and assessed through the EIA process, the following table provides a summary of the impact rating.

<b>Nature</b>	<b>Without mitigation</b>	<b>With mitigation</b>
<b>Impacts on Ecology</b>		
Loss of habitat within indigenous natural vegetation types	Low - Medium	Low - Medium
Impacts on individuals of threatened animal species (Riverine Habitat)	Low	Low
Damage to wetland areas resulting in hydrological impacts	Medium	Low
Establishment and spread of declared weeds and alien invader plants	Medium	Low
<b>Impacts on soils and agricultural potential</b>		
Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles.	Low	Low
Impact of dust generation on site	Low	Low
Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.	Low	Low
<b>Potential Heritage Impacts</b>		
Disturbance of surfaces and/or sub-surfaces containing artefacts resulting in the destruction, damage, excavation, alteration, removal or collection from its original position, of any archaeological material or object.	High	Low
<b>Potential Visual Impacts</b>		
Potential visual impact on users of main roads in close proximity to the proposed Solar Energy Facility	High	High
Potential visual impact on commuters and tourists travelling by rail in close proximity to the proposed Solar Energy Facility	Low	Low
Potential visual impact on residents of smallholdings, homesteads and settlements in close proximity to the proposed Solar Energy Facility.	Medium	Medium
Potential visual impact on sensitive visual receptors (users of roads and residents of smallholdings, farms and homesteads) within the region	Medium	Medium
Potential visual impact on residents of built up and urban centres within the region	Low	Low
Potential visual impact of the access roads and ancillary infrastructure on observers in close proximity to the proposed Solar Energy Facility	Low	Low

<b>Nature</b>	<b>Without mitigation</b>	<b>With mitigation</b>
Potential visual impact of the power line on observers in close proximity to the proposed Solar Energy Facility	Medium	Medium
Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility	Medium	Low
Potential visual impact of construction on observers in close proximity to the proposed Solar Energy Facility	Medium	Low
Potential visual impact of the proposed facility on the visual character of the landscape and the sense of place of the region	Low	Low
Potential visual impact of the proposed facility on tourist access routes (the N10) within the region	Low	Low
<b>Potential Social Impacts</b>		
Creation of employment and business opportunities during the construction phase	Low (positive)	Medium (positive)
Creation of employment and business opportunities associated with the operational phase	Medium (positive)	High (positive)
Potential impacts on family structures and social networks associated with the presence of construction workers	Low	Low
Potential impacts on family structures, social networks and community services associated with the influx of job seekers	Medium	Medium
Potential impacts on family structures, social networks and community services associated with the influx of job seekers during operational phase	Low	Minor
Potential impact on local farmers associated with loss of farm labour to the construction phase	Low	Low
Potential impact on local farmers associated with loss of farm labour to the operational phase	Low	Low
Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site	Medium	Low
Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires	Medium	Low
Potential noise, dust and safety impacts	Low	Low

<i>Nature</i>	<i>Without mitigation</i>	<i>With mitigation</i>
associated with movement of construction related traffic to and from the site		
Impact on farmland due to construction related activities	High	Low
Promotion of clean, renewable energy	Medium (positive)	High (positive)
Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place	Medium	Medium
Potential impact of the facility on local tourism	Low	Low
Potential visual impact and impact on sense of place associated with power lines	Low	Low

### 6.6. Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area<sup>12</sup>. Based on information available at the time of undertaking the EIA, it appears that there are other proposed renewable energy projects, in particular PV facilities, in the immediate vicinity and region. These include, inter alia, the facility proposed by Mulilo Power (Pty) Ltd on Farm 145/2 located northwest of the town of De Aar; the facility proposed by Inca Energy on the Remainder of Portion 1 of the Farm Vetlaagte No. 4 and Remainder of Portion 2 (Portion of Portion 1) of the farm De Aar No. 180, and the facility proposed by ACED on farms Carolus Poort 3 (Portion 3), Carolus Poort (Portion 4), Wagt en bittje 5 (remaining extent of Portion 5), Riet Fountain 6 (Portion 1), and Wagt en bittje Annex C137.

These proposed developments, in addition to the already existing significant electricity related infrastructure within the region (i.e. the Hydra Substation and the 132 kV power lines radiating from it), will increase the cumulative visual impact of industrial type infrastructure within the region. On the other hand, the proposed Ilanga Lethemba PV Solar Energy facility also has the potential to result in significant positive cumulative impacts, specifically with regards to the establishment of De Aar as a renewable solar energy hub. The reduction in rail traffic in South Africa over the last 10-15 years has had a significant negative socio-economic impact on the economy of De Aar and its inhabitants. The proposed establishment of a number of solar energy facilities in the vicinity of De Aar will create a number of socio-economic opportunities for the town, which, in turn, will result in a positive social benefit.

<sup>12</sup> Definition as provided by DEA in the EIA Regulations.

Cumulative effects have been considered within the detailed specialist studies, where applicable (refer to Appendices E – J).

## CONCLUSIONS AND RECOMMENDATIONS

## CHAPTER 7

Solar Capital (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility as well as associated infrastructure on a site located approximately 7 km northeast of De Aar, in the Northern Cape Province. The study area is situated within the jurisdiction of the Emthanjeni Local Municipality. The facility will be referred to as the **Ilanga Lethemba PV Solar Energy Facility** and will have a generating capacity of up to **300 MW** which will be developed in phases over an area of approximately 787 ha in extent. An area of 2 778 ha in extent (entire farm portion) was identified for investigation at the start of the process; however the available layout indicates that an area of 787 ha would be potentially impacted on.

The construction and commissioning of the facility is proposed to be implemented in **four phases**. It is envisaged that **75 MW** will be installed in a **first phase** and the remaining three phases will be developed at **75 MW** each (refer to Figure 7.1). The following infrastructure is proposed:

- » An array of **photovoltaic panels** with a generating capacity of up to **300 MW**, which will be developed in phases.
- » **Support structures** to mount the photovoltaic panels.
- » An on-site **substation**.
- » Four (4) new overhead **22kV** power lines connecting the four proposed phases to the proposed on-site substation.
- » A **short power line** (less than 300 m) from the on-site substation to turn into the existing Hydra MTS-Behrshoek 132kV power line that traverses the site<sup>13</sup>.
- » **Invertors** and **cabling** between project components.
- » **Access roads**. (to use one existing track and construct one new one)
- » Temporary **laydown** and **storage areas**.

The EIA for the proposed facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). The EIA Phase aimed to achieve the following:

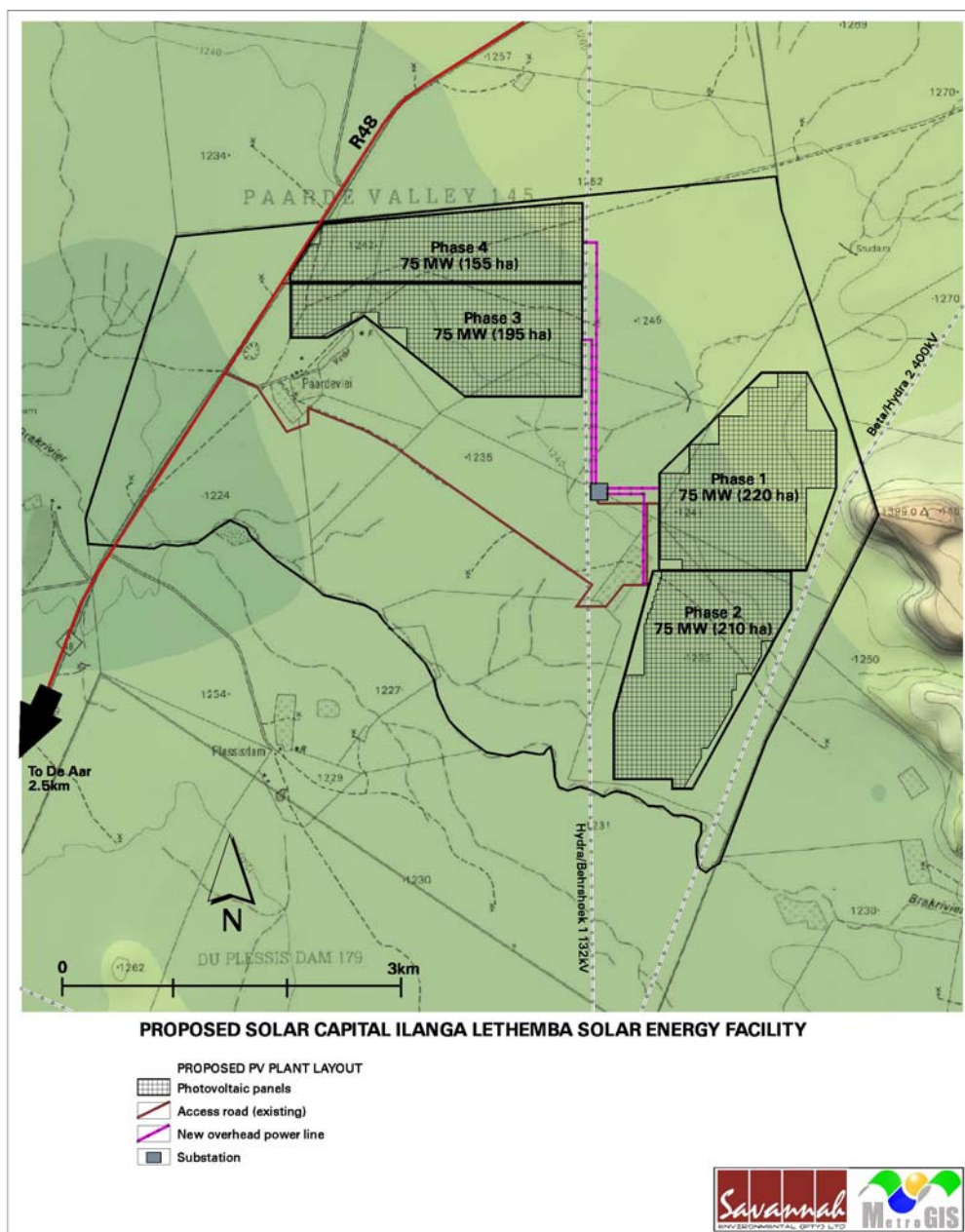
- » Provide an overall assessment of the social and biophysical environments affected by the proposed project.
- » Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the proposed facility.

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<sup>13</sup> A power line to turn in to the existing Hydra MTS-Behrshoek 132kV power line that traverses the site is the preferred connection alternative. In order to evacuate the power from the subsequent phases of the project, a new power line to connect directly to the Hydra Substation may be required. This would be the subject of a separate application for authorisation (and is not considered further in this EIA).

- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public participation process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The conclusions and recommendations of this EIA are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area.



**Figure 7.1:** Layout of the proposed Ilanga Lethemba PV Solar Energy Facility

## 7.1. Evaluation of the Proposed Project

The preceding chapters of this report together with the specialist studies contained within Appendices E -J provide a detailed assessment of the potential impacts that may result from the proposed project. This chapter concludes the EIA Report by providing a summary of the conclusions of the assessment of the proposed site for the solar energy facility. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

In summary, the most significant environmental impacts associated with the proposed project, as identified through the EIA, therefore include:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on social environment.

### **7.1.1. Local Site-specific Impacts**

The construction of the facility will lead to permanent disturbance of an area of approximately 787 ha in extent. Permanently affected areas include the area for the PV panels and associated infrastructure, as well as the internal power line routes and the access roads. From the specialist investigations undertaken for the proposed solar energy facility development site, limited 'no go' areas and areas of high sensitivity were identified (refer to the sensitivity map - Figure 6.1). These potentially sensitive/no-go areas include:

- » Areas of heritage/cultural significance (with an approximate buffer of 30 m)
- » Drainage lines (with an approximate buffer of 50 m)

These are considered further below:

- » Areas of heritage/cultural significance (with an approximate buffer of 30 m)

From a heritage/cultural and palaeontological point of view the site was found to have a wealth of archaeological and heritage artefacts. However, most of the observed heritage resources over the bulk of the area surveyed were found to be of low significance. Only the following sites may be directly/indirectly impacted by the proposed development, and are important for consideration:

- \* Hill with Stone Age (including LSA) traces and stone circle feature as well as the rich spread of artefacts on the plain immediately to the south of it



(30.60044° S, 24.10566° E). This area must be delineated as a 'no-go' or exclusion area with a buffer of 30 m.

- \* Later Stone Age site and other heritage traces as well as potential peat sequence at the spring (30.58073° S, 24.06585° E). This area must be delineated as a 'no go' or exclusion area with a buffer of 30 m.
- \* Rich surface spread of mainly Pleistocene age artefacts (30.59695° S, 24.09501° E). This area must be sampled and documented for preservation at the McGregor Museum in Kimberley. It is not considered an exclusion area.

- » Drainage lines (with an approximate buffer of 50 m)

There are two major vegetation types that occur in the study area, namely Northern Upper Karoo and Besemkaree Koppies Shrubland. However, the majority of the site is predominantly of the Northern Upper Karoo type. These vegetation types are both classified as Least Threatened. Potential factors that may lead to parts of the study area having elevated ecological sensitivity are the presence of dry watercourses/drainage lines on site and the potential presence of one animal species of conservation concern. The drainage line will potentially be impacted by the proposed power line and access roads, and not the areas to be occupied by the PV panels. However, the powerline can span the drainage line and would easily be outside the recommended 50 m buffer.

In order to minimise potential impacts during construction on these no-go areas and potentially sensitive areas within the site, the following recommendations have been made:

- » Delineate all heritage sensitive/exclusion areas as identified with a buffer of approximately 30 m. These areas must be excluded from the development footprint.
- » Apply for permits from SAHRA and/or the PHRA for the removal and/or sampling of heritage resources.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Where drainage lines are required to be crossed by access roads, the relevant permits (or water use licences) must be applied for from the DWA.
- » Ensure that power line towers are constructed at least 50 m from the drainage lines (i.e. span the watercourses).

### ***7.1.2 Impacts on the Social Environment***

The land surrounding the proposed facility is primarily undeveloped farmland that is very sparsely populated. The closest farm homesteads or residences to the

proposed solar energy facility site are *Paardevlei* (on the site), *Plessisdam* and *Ebenezer* within 4 km to the site. The following homesteads are located between the 4 km to 8 km from the site; *Loskop*, *Tafelkop*, *Jakkalsfontein*, *Merino*, *Carouluspoort*, *Vetlaagte*, *Lochinvar*, *Grasbult* and *Bellary*.

Impacts on the social environment are expected during both the construction phase and the operational phase of the solar energy facility. Impacts are expected at both a local and regional scale. Impacts on the social environment as a result of the construction of the solar energy facility can be mitigated to impacts of low significance or can be enhanced to be of positive significance to the region.

No construction crew camp will be established on the site, and construction workers will be housed in the town of De Aar or other available/existing accommodation. Construction activities on the site will be restricted to daylight hours, and the construction phase is anticipated to extend for a minimum 12-month period. Negative impacts during construction relate mainly to impacts due to presence of construction workers and visual impact imposed by the facility on the local environment. There will be a positive impact due to employment creation, which is a much needed relief by the town of De Aar (which has very high unemployment levels). The positive impact due to employment creation will be lower than during operation as there will be a limited number of staff required compared to the construction phase. The potential negative impacts of the proposed development are offset by the potential positive impacts.

## 7.2. Overall Conclusion (Impact Statement)

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a 10-year cumulative target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. This amounts to approximately 4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

The key documents that provide guidance regarding planning in the area include the:

- » Pixley ka Seme District Municipality Integrated Development Plan 2009-2012.
- » Emthanjeni Local Municipality Integrated Development Plan 2010.
- » Northern Cape Provincial Growth and Development Strategy (2004-2014);

The viability of establishing a solar plant on a site near De Aar has been established by Solar Capital. The positive implications of establishing a solar energy facility on the identified site include:

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.
- » The facility has a novel and futuristic design that invokes a curiosity factor not generally present with other conventional power generating facilities. The advantage being that the solar facility can become an attraction or a landmark within the region that people would actually want to come and see. It could become a major tourist attraction in its own right and could complement the existing tourism attractions in the area, thereby resulting in promoting a positive image of the area with resultant positive impact on the local tourism industry, economy, and environment.
- » The project is anticipated to have positive social and health related impacts through the "greener" technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.
- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within Appendix K.

With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable**.

### 7.3. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the developmental impacts of the proposed Ilanga Lethemba Solar Energy Facility can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

The following conditions would be required to be included within an authorisation issued for the project:

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices E to J should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix K of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.
- » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
- » Delineate all heritage sensitive/exclusion areas as identified with a buffer of approximately 30 m. These areas must be excluded from the development footprint.
- » Apply for permits from SAHRA and/or the PHRA for the removal and/or sampling of heritage resources.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Where drainage lines are required to be crossed by access roads, the relevant permits (or water use licences) must be applied for from the DWA.

- » Ensure that power line towers are constructed at least 50 m from the drainage lines (i.e. span the watercourses).
- » Alien invasive plants should be controlled on site.
- » A permit is required for the removal of some of the archaeological artefacts that occur on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

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## CHAPTER 8

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