# ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
# DRAFT SCOPING REPORT

# PROPOSED LETHABO PV SOLAR ENERGY FACILITY NEAR SASOLBURG, FREE STATE PROVINCE

## DEA REF NO.: 14/12/16/3/3/2/753

**DRAFT SCOPING REPORT**

**FOR PUBLIC REVIEW**

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## *PROJECT DETAILS*

| | | |
|---|---|---|
| **DEA Reference No.** | : | 14/12/16/3/3/2/753 |
| **Title** | : | Environmental Impact Assessment Process<br>Draft Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Sasolburg, Free State Province |
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| **Client** | : | Eskom Holding SOC (state owned company) Ltd |
| **Report Status** | : | Draft Scoping Report for Public Review |
| **Review Period** | : | 18 March 20152015 – 21 April 2014 |

**When used as a reference this report should be cited as:** Savannah Environmental (2015) Draft Scoping Report: Proposed Lethabo PV Solar Energy Facility near Sasolburg, Free State Province.

## PURPOSE OF THE SCOPING REPORT

**Eskom Holding SOC (state owned company) Ltd** is proposing to establish a 75MW photovoltaic solar energy facility and associated infrastructure on a site within the Lethabo coal fired power station boundary, approximately 25 km north-east of Sasolburg in the Free State Province and appointed Savannah Environmental, as independent environmental consultants, to undertake the requisite Environmental Impact Assessment (EIA) Process. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

Scoping is an important part of the EIA process, as it helps to ensure that the impact assessment is appropriately focussed. The main objectives of the Scoping process are:

» To engage with stakeholders at an early stage of the development so that they may contribute their views with regards to the proposed project;
» To identify potential issues and impacts associated with the proposed development;
» To define the scope of the Environmental Impact Assessment (EIA);
» To define the methodology that is required for the EIA; and
» To describe the plan of study for the EIA.

In terms of NEMA, the Scoping Report is submitted to the competent authority (i.e. the National Department of Environmental Affairs (DEA)) as part of the decision-making process with regard to the proposed solar energy project. The Scoping Report is also intended to provide sufficient background information to other Organs of State, non-statutory bodies, the general public, organisations and local communities in order to obtain their commentary and input on the proposed development. The Scoping Phase of the EIA process identifies and describes potential issues associated with the proposed project, and defines the extent of the studies required within the EIA Phase of the process. The EIA Phase will assess those identified potential environmental impacts and benefits associated with all phases of the project including design, construction, operation and decommissioning, and will recommend appropriate mitigation measures for potentially significant environmental impacts.

This Draft Scoping Report represents the findings of the Scoping Phase of the EIA process and contains the following sections:

» **Chapter 1** provides background to the proposed solar energy facility and the environmental impact assessment process.
» **Chapter 2** describes the components of the proposed project.

- **Chapter 3** outlines the process which was followed during the Scoping Phase of the EIA process.
- **Chapter 4** describes the existing biophysical and socio-economic environment affected by the proposed project.
- **Chapter 5** provides a desktop assessment of the potential environmental and social impacts associated with the development of the proposed project.
- **Chapter 6** presents the conclusions of the scoping evaluation.
- **Chapter 7** describes the Plan of Study for EIA.
- **Chapter 8** provides references used in the compilation of this Scoping Report.

## *DEA & LEGAL REQUIREMENTS*

As outlined in the acceptance of the application dated November 2015, Savannah Environmental has compiled a table (refer to Table 1 below) which outline the requirements and where in the draft scoping report the requirements have been addressed for ease of reference.

***Table 1: Information requested by DEA***

| No. | Information | Provided |
|---|---|---|
| 1 | Please be advised that in terms of the EIA Regulations and NEMA the investigation of alternatives is mandatory. Alternatives must therefore be identified, investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option). | Section 2.3 |
| 2 | A detailed and complete EMPr must be submitted with the EIR. This EMPr must not provide recommendations but must indicate actual remediation activities which will be binding on the applicant. Without this EMPr the documents will be regarded as not meeting the requirements and will be returned to the applicant for correction. | An EMPr will be drafted and will form part of the Final EIA report |
| 3 | The applicant/EAP is required to inform this Department in writing upon submission of any draft report, of the contact details of the relevant State Departments (that administer laws relating to a matter affecting the environment) to whom copies of the draft report were submitted for comment. Upon receipt of this confirmation, this Department will in accordance with Section 240(2) & (3) of the National Environmental Management Act, 1998 (Act 107 of 1998) inform the relevant State Departments of the commencement date of the 40 day commenting period, or 60 days in the case of the Department of Water Affairs for waste management activities which also require a licence in terms of the National Water Act, 1998 (Act 36 of 1998). | In terms of the NEMA Amendments Law Act, Section 24O of NEMA has been amended such that Organs of State must comment within 30days of receipts of the request. Also Organs of States should now submit their comments to the EAP and no longer directly to DEA (except for final reports) |

***Table 2: Legal requirements in terms of the EIA regulations***

| NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS | CROSS REFERENCE IN THIS SCOPING REPORT |
|---|---|
| (a) details of—<br>(i) the EAP who prepared the report; and<br>(ii) the expertise of the EAP to carry out scoping procedures | Chapter 1 |
| (b) a description of the proposed activity | Chapter 2 |
| (c) a description of any feasible and reasonable alternatives that have been identified | Chapter 2 |
| (d) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is—<br>(i) a linear activity, a description of the route of the activity; or<br>(ii) an ocean-based activity, the coordinates where the activity is to be undertaken | Chapter 2 |
| (e) a description of the environment that may be affected by the activity and the manner in which activity may be affected by the environment | Chapter 4 |
| (f) an identification of all legislation and guidelines that have been considered in the preparation of the scoping report | Chapter 3 |
| (g) a description of environmental issues and potential impacts, including cumulative impacts, that have been identified | Chapter 5 |
| (h) details of the public participation process conducted in terms of regulation 27(a), including— | |
| (i) the steps that were taken to notify potentially interested and affected parties of the application | Chapter 3 |
| (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given | Appendix C |
| (iii) a list of all persons or organisations that were identified and registered in terms of regulation 55 as interested and affected parties in relation to the application | Appendix C |
| (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues | Appendix C |
| (i) a description of the need and desirability of the proposed activity | Chapter 2 |

| NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS | CROSS REFERENCE IN THIS SCOPING REPORT |
|---|---|
| (j) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity | Chapter 2 |
| (k) copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties | Appendix C |
| (l) copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants | Appendix C |
| (m) any responses by the EAP to those representations and comments and views; | Appendix C |
| (n) a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include— | Chapter 7 |
| (i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken | |
| (ii) an indication of the stages at which the competent authority will be consulted | |
| (iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and | |
| (iv) particulars of the public participation process that will be conducted during the environmental impact assessment process | |
| (o) any specific information required by the competent authority | Refer to Page i for information requested by DEA |
| (p) any other matters required in terms of sections 24(4)(a) and (b) of the Act. | Refer to Page i for information requested by DEA |
| (2) In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application. | Chapter 3 |
| (3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation (1)(c), exist. | Chapter 2 |

## INVITATION TO COMMENT ON THE DRAFT SCOPING REPORT

This **Draft Scoping Report** has been made available for public review at the following places, which lie in the vicinity of the proposed project area from **18 March 2015 – 21 April 2015**

» Sasolburg Public Library
» Vereeniging Library

The report is also available for download on:

» www.savannahsa.com

| Please submit your comments to |
|---|
| **Gabriele** of **Savannah Environmental**<br>PO Box 148, Sunninghill, 2157<br>Tel: 011 656 3237<br>Fax: 086 684 0547<br>Email: gabriele@savannahsa.com |
| The due date for comments on the Draft Scoping Report is **21 April 2015** |

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

# *EXECUTIVE SUMMARY*

## Background

**Eskom Holding SOC Ltd** is proposing to establish a 75MW photovoltaic solar energy facility and associated infrastructure on a site within the Lethabo coal fired power station boundary, approximately 25 km north-east of Sasolburg in the Free State Province.

Based on a pre-feasibility analysis and site identification process undertaken by Eskom Holding, a favourable area has been identified for consideration and evaluation through an environmental impact assessment process. The study area is situated in the jurisdiction of Fezile Dabi District Municipality and Metsimaholo Local Municipality.

The **Lethabo PV Solar Energy Facility** is proposed to accommodate several arrays of photovoltaic (PV) panels and associated infrastructure. From a local perspective, the site is preferred due to suitable topography, grid connection access, and by virtue of the extent of the site.

An EIA process and public participation process is being undertaken for the proposed project. The nature and extent of this facility, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this final Scoping Report.

## Project Location

The project is on Farm 1814 located approximately 25 km north-east of Sasolburg in the Free State Province the Lethabo Power Station.

## Project Components

The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a net generating capacity of up to 75MW. A development footprint of approximately 112 ha will be required in order to accommodate the following infrastructure:

- Solar panels (fixed/tracking technology) with an export capacity of up to 75MW.
- Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
- Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- An on-site substation or switching station.
- A power line to facilitate the connection of the solar energy facility from the on-site substation to Lethabo power

station or nearest grid connection within the Lethabo power station.
» Internal access roads.
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

The overarching objective for the solar energy facility is to maximise electricity production through **exposure to the solar resource**, while minimising infrastructure, operational and maintenance costs, as well as **social and environmental impacts**. In order to meet these objectives local level environmental and planning issues will be assessed in the EIA process through site-specific studies in order to delineate areas of sensitivity within the broader site; this will serve to inform the design of the facility.

**Evaluation of the Proposed Project**

The main issues identified through this scoping study associated with the proposed solar energy facility are summarised in Table 3.

As is evident from Table 3, the majority of potential impacts identified to be associated with the construction of the Lethabo Solar Energy project are anticipated to be localised and restricted to the proposed site itself (apart from social impacts – job creation which could have more of a regional positive impact), while operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa). However, areas of potential environmental sensitivity were identified through the scoping phase. These include depressions and wetlands such as dams and pans. These are shown in Figure 1.

The potentially sensitive areas/environmental features/issues that have been identified for further study include:

**Avifauna –** Due to the presence of existing habitat degradation and disturbance associated with the mining and energy generation activities in the study area, it is anticipated that the proposed Lethabo Solar Photovoltaic Facility can be constructed at either of the identified sites with acceptable levels of impact on the resident avifauna. Potential impacts that were identified relating to the PV plant itself are: bird collisions with PV panels; loss of habitat; disturbance; and the nesting of birds on plant infrastructure, of which habitat destruction is likely to be the most significant. Potential impacts of associated infrastructure include the following: collision of large terrestrial birds with overhead power lines; electrocution of birds on pylons; nesting of birds on pylons; habitat destruction and disturbance. Certain levels of habitat destruction and disturbance may also result from the construction of internal access roads, additional on-site substations and operations buildings

**Ecologically sensitive areas on the site -** Although most of the study area appears to have been previously disturbed, the actual state of the ecosystem will have to be studied in detail during the peak growing season, before a definite assessment statement can be made as to the ecological impact of the proposed development. The largest concerns currently identified are:

» All wetland areas on and adjacent to the study area will have to be delineated to determine suitable buffer areas between them and the proposed development
» The ecological state of the vegetation of the study area needs to be assessed in detail to correctly identify its conservation status
» All indigenous and alien invasives, weeds and potential invasives within the development area will have to be cleared prior to development and controlled after construction until decommissioning
» An ongoing monitoring program will be necessary to control and/or eradicate newly emerging invasives
» Newly cleared soils will have to be revegetated and stabilised as soon as construction has been completed

**Heritage and palaeontology -** This desktop study has not identified any paleontological reason to prejudice the progression of the Lethabo Solar Energy Facility within either the preferred project location or the identified alternative location, subject to the recommended damage mitigation procedures being enacted.

This scoping study revealed that a range of heritage sites occur in the larger region and similar sites can be expected within the study area. Every site is relevant to the Heritage Landscape, but it is anticipated that no site in the study area could have conservation value. The following conclusions are applicable to the following sites:

» Archaeological sites: All sites could be mitigated either in the form of conservation of the sites with in the development or by a Phase 2 study where the sites will be recorded and sampled before the client can apply for a destruction permit for these sites prior to development.
» Historical finds and Cultural landscape: Several structures occur within the study area and could possibly be older than 60 years and protected by heritage legislation. This assumption will however need to be verified in the field.
» Burials and cemeteries: Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved within a development. These sites can however be relocated if avoidance is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave sites must be

confirmed during the field survey and the public consultation process.

**Soils & agricultural potential –** The area investigated is comprised of mainly moderately deep to deep soils, with a small percentage of shallow soils. As such, the area can be considered as at least moderate to high potential for agricultural purposes, taking into consideration the annual rainfall.

**Social impacts:** The most important potential social benefits associated with the construction and operations of the project refer to the job opportunities and possible socio-economic spin-offs created. New economic activities such as this project having the potential to assist with the developmental challenges that much of province is faced with, providing employment and skills development to local community and contributing to the social, economic and institutional development of the local area. The benefit of employment opportunities and disposable income in the local project area has the opportunity to improve levels of health, education and service delivery with the exposure to such opportunities. Additional employment and associated indirect economic benefits will maintain and improve the quality of life of these communities. The main negative impacts are associated with the influx of in-migrants and intrusion impacts associated with the construction phase and the visual impact of the facility and associated infrastructure while in operation, with possible subsequent negative social consequences and/or impacts

**Visual / Social Receptors:** The brief assessment undertaken for the scoping stage indicates that because the project is proposed against the backdrop of the Lethabo Power Station which includes associated infrastructure such as internal buildings, HV overhead power lines, coal stockpiles, a PFA tip and above ground conveyors, visual impacts of the proposed solar array are generally unlikely to be significant. In terms of possible landscape degradation, the landscape does not appear to have any specific protection although the Vaal River corridor has obvious local importance as do the residential areas and recreational areas indicated on mapping. Rural areas to the east and the road corridors that pass through them also have some importance in their own right and as approach corridors to the Vaal Dam. In terms of visual intrusion or obstruction impacting on visual receptors, the initial investigation indicates that generally these impacts are not likely to be significant. Due to the above listed implications Alternative 1 is favoured from the perspective of landscape change as development of this site is likely to be less visible than development of Alternatives 2 and 3. However, neither none of the alternatives is are likely to result in significant landscape change and neither or are is likely to have significant impact on the more

important natural areas around the Vaal River / Agricultural Areas approaching the Vaal Dam or Urban Areas

**Cumulative effects:** Cumulative impacts of this new development to the larger area is likely to have low or no influence on the nature of the areas due to heavy industrial and large mining areas located next to the project site. Existing industrial structures are likely to provide significant screening particularly from middle distance and distance views. From a distance small scale development may also be viewed against a backdrop of larger industry which is also likely to make it less obvious.

**Evaluation of the Potential Issues with Associated Infrastructure - Invertors, and Internal Access Roads**

In order to connect the Lethabo PV Solar Energy Facility to the power grid, the Eskom intends on building on-site substation and power line for which will connect into the existing substation located on the site.

Potential issues identified to be associated with a proposed overhead power line, substation, access roads and invertors include impacts on flora, fauna and ecological processes, impacts on avifauna as a result of collisions and electrocutions, potential impacts on heritage sites and visual impacts. The potential impacts associated with the power line, substation, access roads and inverters will be considered in detail within the EIA phase. Recommendations regarding preferred locations for this infrastructure and appropriate mitigation measures (if required) will be made.

At this stage, there are no fatal flaws associated with the associated infrastructure of the Lethabo PV Solar Energy Facility site on Farm 1814. Further investigation is required to confirm this. It is recommended that the proposed site can be considered in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

**Table 3:** Summary of the potential impacts associated the Lethabo PV Solar Energy Facility development.

| Construction / Decommissioning Impacts | Extent |
|---|---|
| Habitat Loss | L |
| Disturbance and Displacement | L |
| Disturbance or loss of indigenous natural vegetation | L |
| Disturbance or loss of threatened / protected plants | L |
| Loss of habitat for threatened and /or protected vertebrates | L |
| Impacts on wetlands | L |
| Establishment and spread of declared weeds and alien invader plants. | L |
| Disturbance or loss of indigenous natural vegetation | L |
| Disturbance or loss of threatened / protected plants | L |
| Loss of habitat for threatened and /or protected vertebrates | L |
| Impacts on wetlands | L |
| Establishment and spread of declared weeds and alien invader plants. | L |
| Potential impacts on heritage resources | L |
| Potential movement, damage, or destruction of fossil material | L |
| Loss of agricultural land use | L |
| Soil erosion | L |
| Degradation of vegetation | L |
| Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard; | L-R |
| It is anticipated that the more skilled positions could be filled by individuals from South Africa; | L-R |
| An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed | L |
| Visual impact of construction traffic, deliveries, laydown areas, accommodation, offices. | L |
| Impact on surface water resources (riparian systems) | L |

| **Operational Impacts** | Extent |
|---|---|
| Mortality as a direct collisions with solar panels | L |
| Collisions with power line infrastructure | L |
| Disturbance and Displacement | L |
| Disturbance or loss of indigenous natural vegetation due to shading | L |
| Altered runoff patterns due to rainfall interception by PV panels and compacted areas | L |
| Loss of agricultural land use | L |
| Soil erosion | L |
| Contribution of clean energy | N |
| Employment opportunities | L-R |
| General landscape degradation or changes to landscape character | L |
| Change to the views of visual receptors. | L |
| Impact on surface water resources (riparian systems) | L |

L **Local** R **Regional** N **National** I **International**

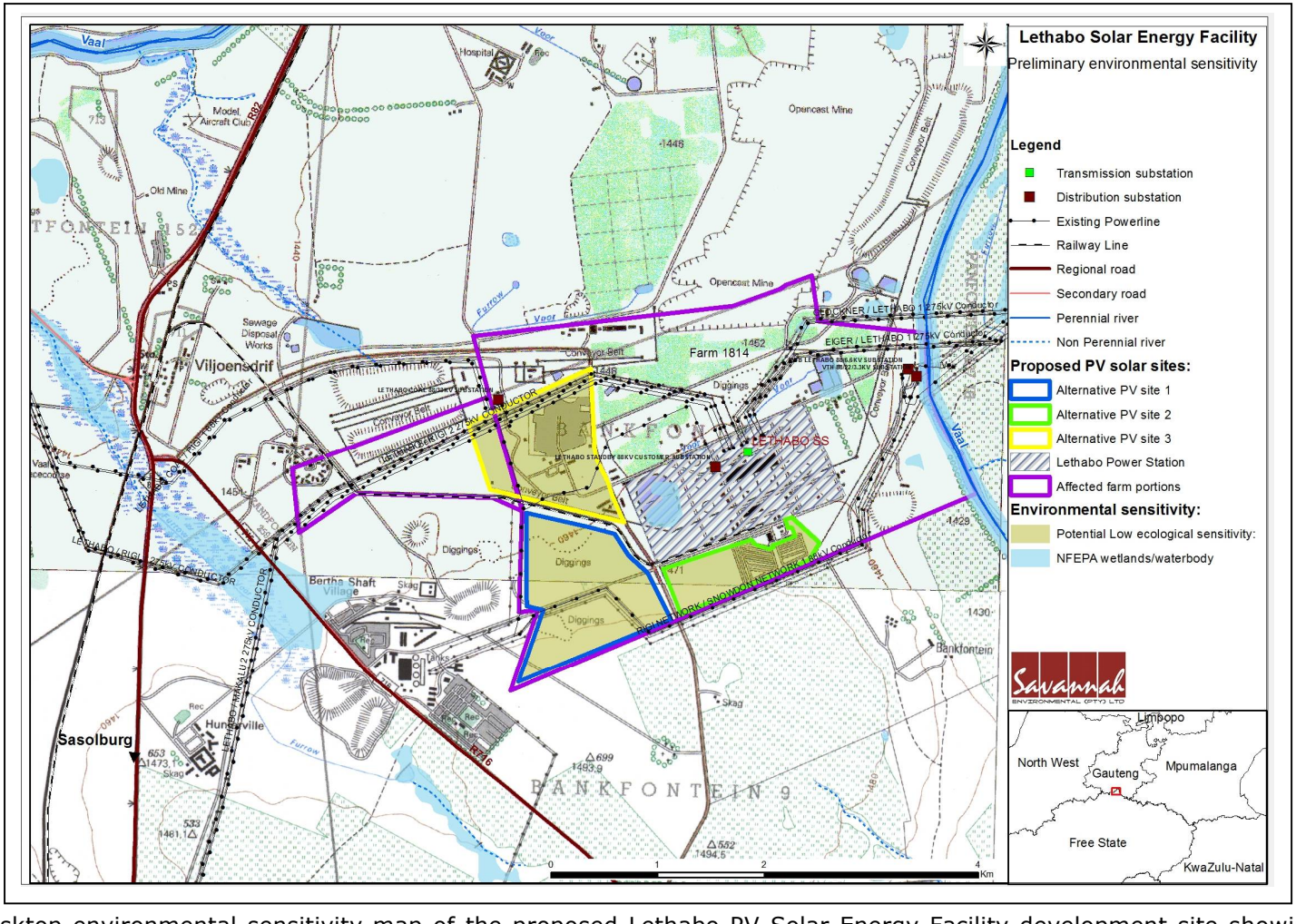


**Figure 1**: Desktop environmental sensitivity map of the proposed Lethabo PV Solar Energy Facility development site showing that the site is of potentially low ecological sensitivity

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# *DEFINITIONS AND TERMINOLOGY*

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

**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.

**Article 3.1 (*sensu* Ramsar Convention on Wetlands):** "Contracting Parties "shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory"".(Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)

**Calcrete:** A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.

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

**Demand-side Management Programme (DSM):** A joint initiative between the DME, the National Electricity Regulator (NER) and Eskom which aims to provide lower cost alternatives to generation system expansion by focusing on the usage of electricity. Consumers are incentivised to use electricity more efficiently and at times of the day outside of Eskom's peak periods.

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

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

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

**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 on-going maintenance after implementation.

**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.

**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 (LSA):** 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 (MSA):** An early period in human history characterised by the development of early human forms into modern humans capable of abstract though process and cognition 300 000 – 40 000 years ago.

**Midden:** A pile of debris or dump (shellfish, stone artefacts and bone fragments) left by people after they have occupied a place.

**Miocene:** A geological time period (of 23 million - 5 million years ago).

**National Integrated Resource Plan (NIRP):** 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.

**Natural properties of an ecosystem (*sensu* Convention on Wetlands):** Defined in Handbook 1 as the "…physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)

**Palaeontological:** Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

**Pleistocene:** A geological time period (of 3 million – 20 000 years ago).

**Pliocene:** A geological time period (of 5 million – 3 million years ago).

**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).

**Self-consumption**: The possibility for any kind of electricity consumer to connect a photovoltaic system, with a capacity corresponding to his/her consumption, to his/her own system or to the grid, for his/her own or for on-site consumption, while receiving value for the non-consumed electricity which is fed into to the grid.

**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.

**Sustainable Utilisation (*sensu* Convention on Wetlands):** Defined in Handbook 1 as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer http://www.ramsar.org/).

**Structure (historic):** Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

## *ABBREVIATIONS AND ACRONYMS*

| | |
|---|---|
| BID | Background Information Document |
| CBOs | Community Based Organisations |
| CDM | Clean Development Mechanism |
| $CO_2$ | Carbon dioxide |
| DEA | National Department of Environmental Affairs |
| DMR | Department of Mineral Resources |
| DOT | Department of Transport |
| DWA | Department of Water Affairs |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| GIS | Geographical Information Systems |
| GG | Government Gazette |
| GN | Government Notice |
| GWh | Giga Watt Hour |
| I&AP | Interested and Affected Party |
| IDP | Integrated Development Plan |
| IEP | Integrated Energy Planning |
| $km^2$ | Square kilometres |
| kV | Kilovolt |
| $m^2$ | 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 |
| NHRA | National Heritage Resources Act (Act No 25 of 1999) |
| NGOs | Non-Governmental Organisations |
| NIRP | National Integrated Resource Planning |
| NWA | National Water Act (Act No 36 of 1998) |
| SAHRA | South African Heritage Resources Agency |
| SANRAL | South African National Roads Agency Limited |
| SDF | Spatial Development Framework |
| SIA | Social Impact Assessment |
| ZVI | Zone of visual influence |

# INTRODUCTION CHAPTER 1

**Eskom Holding SOC (state owned company) Ltd** is proposing to establish a 75MW photovoltaic solar energy facility and associated infrastructure on a site within the Lethabo coal fired power station boundary, approximately 25 km north-east of Sasolburg in the Free State Province (Refer to Figure 1.1). This project is to be known as the Lethabo Photovoltaic (PV) Solar Energy Facility. Based on a pre-feasibility analysis and site identification process undertaken by Eskom Holdings SOC Ltd (hereafter to be referred to as Eskom), a favourable area has been identified for consideration and evaluation through an Environmental Impact Assessment (EIA).

The solar enrgy facility is proposed to accommodate several arrays of tracking or static **photovoltaic (PV) panels** and associated infrastructure over the proposed site. From a regional perspective, the greater area is considered favourable for the development of commercial solar electricity generating facility by virtue of the **climatic conditions** (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the site, and the availability of a direct **grid connection** (i.e. point of connection to the National grid). In addition, the project will contribute towards Eskom's target for the reduction of reducing its self-consumption at its sites by introducing a PV Programme at various Eskom-owned properties across the country.

The nature and extent of this facility, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Scoping Report.

## 1.1. Background to the project

The Lethabo Solar Energy Facility is proposed on Farm 1814, in the jurisdiction of Fezile Dabi District Municipality and Metsimaholo Local Municipality within the Free State Province. Three alternative sites of~165 ha in extent will be assessed for the Lethabo PV Solar Energy Facility, both the proposed alternative 1 and 3 will generation 75MW, alternative 2 to generate 35MW. The sites are situated within the broader power station property on Eskom owned land. These sites were confirmed by Eskom as being potentially suitable for solar energy generation through an internal site selection and feasibility study (refer to Chapter 2). The proposed development site has a number of power lines connecting into the Lethabo Power Station. Access to the site is provided directly from the R716 that runs parallel to the western boundary of the proposed site.

The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a net generating capacity of up to 75 MW. The broader site is proposed to accommodate the following infrastructure:

» Solar panels (fixed/tracking technology) with an export capacity of up to 75MW.
» Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
» Central inverter/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
» An on-site substation or switching station.
» A power line to facilitate the connection of the solar energy facility from the on-site substation to Lethabo power station or nearest grid access point
» Internal access roads.
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

The overarching objective for the Lethabo Solar Energy Facility is to maximise electricity production through exposure to the solar resource, while minimising infrastructure, operational and maintenance costs, as well as social and environmental impacts. Furthermore, the project will contribute towards Eskom's target to reduce self-consumption at their various owned or utilised sites by installing 150MWp at their various power stations, offices and substations. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme. In order to assess the environmental feasibility of the proposed project, local level environmental and planning issues will be assessed through the EIA through site-specific studies in order to delineate areas of sensitivity within the broader site. This will serve to inform the design of the facility.

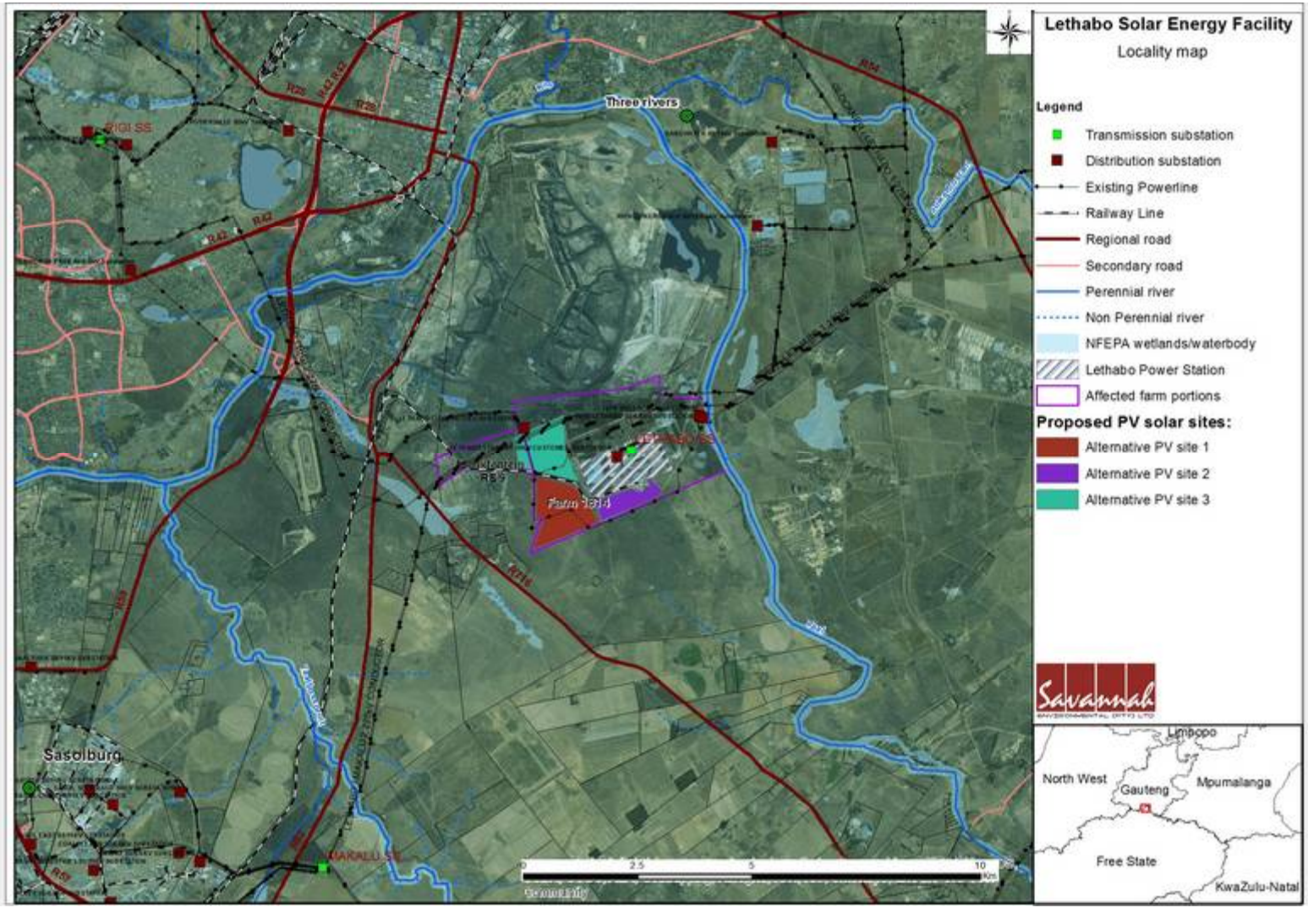


**Figure 1.1:** Locality map for the proposed alternative sites for the Lethabo Solar Energy Facility, indicating the proximity to grid connection infrastructure

## 1.2. Requirement for an Environmental Impact Assessment Process

The Lethabo PV Solar Energy Facility 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 the projects.

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 that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project, the National Department of Environmental Affairs (DEA) is the competent authority and the Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA) will act as a commenting authority. The application has been registered with the Department of Environmental Affairs under the DEA reference number **14/12/16/3/3/2/753**[1]. It must be noted that a precautionary approach has been taken in determining the list of relevant Listed Activities such that all possible activities relevant to the project have been included in the application. This application may be refined during the course of the EIA process and listed activities may be removed or added as applicable depending on the findings of the EIA process.

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the 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. Savannah Environmental (Pty) Ltd was appointed as the independent Environmental Assessment Practitioner (EAP) to conduct the EIA process for the proposed projects.

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

## 1.3 Details of the Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA Phases

[1] [1] This EIA application was accepted by the DEA under the EIA Regulations of GNR543; GNR544; GNR545; and GNR546 as amended in December 2010 (Appendix B).

Savannah Environmental was contracted by Eskom as an independent Environmental Assessment Practitioner (EAP) to undertake both Scoping and EIA processes for the proposed project. Neither Savannah Environmental nor any of the specialist sub-consultants on this project are subsidiaries of, or are affiliated to Eskom. 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 consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

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

» *Sheila Muniongo* - the principle author of this report holds an Honours Bachelor degree in Environmental Management and 4 years' experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management programmes, and mapping through ArcGIS for variety of environmental projects. She is currently involved in several EIAs for renewable energy projects EIAs across the country.
» *Jo-Anne Thomas*, the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 16 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 and power line projects across the country.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed the following specialist consultants to conduct specialist impact assessments:

» Avifauna – Megan Diamond (Feathers Environmental Services)
» Ecology – Marianne Strohbach (Savannah Environmental)

» Wetlands – Robert Taylor (Limosella Consulting)
» Soils and Agricultural Potential – Garry Paterson (ARC-Institute for Soil, Climate and Water)
» Heritage – Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC (HCAC))
» Palaeontological Assessment– Barry Millstead (BM Geological Services)
» Visual – John Marshall (Afzelia Environmental Consultants and Environmental Planning and Design)
» Social – Candice Hunter (Savannah Environmental) and Anton Pelser (external reviewer)

Refer to **Appendix A** for the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

# SCOPE OF THE PROPOSED PROJECT CHAPTER 2

This chapter provides a description of the Lethabo PV project near Sasolburg, Free State Province. The project scope includes the planning and design, construction, operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also describes the feasible alternatives identified for investigation within the EIA process.

## 2.1 Description of the Associated Infrastructure

The proposed Lethabo Solar Energy Project will require various support infrastructures, located within the perimeter of the facility. The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a generating capacity of up to 75 MW (depending on the alternative site selected) and includes the following associated infrastructure:

- Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
- Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- An on-site substation or switching station.
- A power line to facilitate the connection of the solar energy facility from the onsite substation to Lethabo power station or nearest grid access point
- Internal access roads. The length of transmission line connecting to the Lethabo power station is estimated around between 800 – 1000 m. The connection point will be either at HV yard within power station or at station board. However, the project is going to apply for grid connection through grid access unit, which identifies the alternative grid connection point. The project in later phase will know the exact connection point for alternative options, which will be notified upon the finalisation.
- Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

A summary of the details and dimensions of the infrastructure is shown in Table 2.1.

**Table 2.1:** Dimensions of typical structures required for the PV Facility

| Component | Description/ Dimensions |
|---|---|
| Location of the site | Farm 1814 |
| Municipal Jurisdiction | The property is located within jurisdiction of Fezile Dabi District Municipality and Metsimaholo Local Municipality. |

| Component | Description/ Dimensions |
|---|---|
| Electricity Generating capacity | » Alternative site 1 – 75MW<br>» Alternative site 2 – 35MW<br>» Alternative site 3– 75MW |
| Extent of the proposed development footprint | » Alternative site 1– 112ha<br>» Alternative site 2– 52ha<br>» Alternative site 3 – 130ha |
| Centre Point for each alternative proposed | » Alternative site 1: Longitude: 27°57'25.49"E Latitude: 26°44'23.61"S<br>» Alternative site 2: Longitude: 27°58'26.27"E Latitude: 26°44'59.40"S<br>» Alternative site 3: Longitude: 27° 57.657'E Latitude: 26° 45.084'S S |
| Extent of broader site | » Alternative 1 site – approximately 112 ha, located west of the power station<br>» Alternative site 2– – approximately 52ha, located south-east of the power station<br>» Alternative site 3 – 130ha, west of the power station |
| Site access | The main access to the site will be obtained via the R715 that runs parallel to the site. Internal access roads of up to 5m wide will also be required. |
| Proposed technology and Height of installed panels from ground level | Static - up to 3.5 m<br>Tracking – single/double axis up to 6 m |
| Number of Panels | Dependant on module to be used. This will be confirmed before construction. Typically it would be:<br>Alternative site 1 and 3 –<br>» Approximately 300,000 PV modules (Polycrystalline technology)<br>» Approximately 714,000 PV modules (Thin Film technology)<br>Alternative site 2:<br>» Approximately 140,000 PV modules (Polycrystalline technology)<br>» Approximately 333,300 PV modules (Thin Film technology) |
| Panel Dimensions | 1,640 x 990 mm (Polycrystalline technology)<br>1,200 x 600 mm (Thin Film technology) |
| Panel direction | North facing |
| Number of inverters | Dependant on inverter to be used. This will be confirmed before construction. Typically it would be:<br>» Alternative site 1 and 3 – 150 |

| Component | Description/ Dimensions |
|---|---|
| | » Alternative site 2– 70 |
| Main transformer / on-site substation capacity and size | All three alternatives –<br>» Step-up up to 6.6/11 kV (for connection at station board)<br>» Step-up up to 88/132 kV (for connection at HV yard) on site substation size approximately 50m x 50m |
| Associated buildings (size) | Approximately 150 $m^2$ |
| New overhead power line | Servitude width – depending upon the overhead voltage level (between 9 m to 15.5 m : measured from the centre line of the power line)<br>Length: approximately 800 - 1000 m<br>Height of towers – maximum height of 12 to 25 m |
| Services required | » Sewage and Refuse material disposal - all sewage and refuse material generated during the establishment of the proposed site will be collected by a contractor to be disposed of at a licensed waste disposal site<br>» Water and electricity – water will be obtained from the municipality. Electricity will be generated from generators for any electrical work on site or electricity will be obtained from an Eskom auxiliary supply, depending on the feasibility during construction. |

## 2.2 Photovoltaic (PV) Solar Energy Facility and the Generation of Electricity

Solar energy facilities, such as those using PV technology use the energy from the sun to generate electricity through a process known as the Photoelectric Effect (Figure 2.1). A PV cell or solar cell is the semiconductor device that converts sunlight into electricity. These cells are interconnected to form panels which, in turn, are combined with associated structural and electrical equipment to create what are called arrays – the actual solar generation systems which connect to the energy grid. As sunlight hits the solar panel, photons can be reflected, absorbed, or pass through the panel. When photons are absorbed, they have the energy to knock electrons loose, which flow in one direction within the panel and exit through connecting wires as solar electricity.

There are several types of semiconductor technologies currently in use for PV solar panels. Two however, have become the most widely adopted: crystalline silicon and thin film.

[2]**Polycrystalline Silicon Solar Cells**

The first solar panels based on polycrystalline silicon, which also is known as polysilicon (p-Si) and multi-crystalline silicon (mc-Si), were introduced to the market in 1981. Unlike monocrystalline-based solar panels, polycrystalline solar panels do not require the Czochralski process. Raw silicon is melted and poured into a square mold, which is cooled and cut into perfectly square wafers.

*Advantages*

» The process used to make polycrystalline silicon is simpler and cost less. The amount of waste silicon is less compared to monocrystalline.
» Polycrystalline solar panels tend to have slightly lower heat tolerance than monocrystalline solar panels. This technically means that they perform slightly worse than monocrystalline solar panels in high temperatures. Heat can affect the performance of solar panels and shorten their lifespans. However, this effect is minor, and most homeowners do not need to take it into account.

*Disadvantages*

» The efficiency of polycrystalline-based solar panels is typically 13-16%. Because of lower silicon purity, polycrystalline solar panels are not quite as efficient as monocrystalline solar panels.
» Lower space-efficiency. You generally need to cover a larger surface to output the same electrical power as you would with a solar panel made of monocrystalline silicon. However, this does not mean every monocrystalline solar panel perform better than those based on polycrystalline silicon.
» Monocrystalline and thin-film solar panels tend to be more aesthetically pleasing since they have a more uniform look compared to the speckled blue color of polycrystalline silicon.

**Thin-Film Solar Cells (TFSC)**

Depositing one or several thin layers of photovoltaic material onto a substrate is the basic gist of how thin-film solar cells are manufactured. They are also known as thin-film photovoltaic cells (TFPV). Depending on the technology, thin-film module prototypes have reached efficiencies between 7–13% and production modules operate at about 9%. Future module efficiencies are expected to climb close to the about 10–16%. The market for thin-film PV grew at a 60% annual rate from 2002 to 2007. In 2011, close to 5% of U.S. photovoltaic module shipments to the residential sector were based on thin-film.

*Advantages*

[2] http://energyinformative.org/best-solar-panel-monocrystalline-polycrystalline-thin-film/

» Mass-production is simple. This makes them and potentially cheaper to manufacture than crystalline-based solar cells.
» Their homogenous appearance makes them look more appealing.
» Can be made flexible, which opens up many new potential applications.
» High temperatures and shading have less impact on solar panel performance.
» In situations where space is not an issue, thin-film solar panels can make sense.

*Disadvantages*

» Thin-film solar panels are in general not very useful for in most residential situations. They are cheap, but they also require a lot of space. SunPower`s monocrystalline solar panels produce up to four times the amount of electricity as thin-film solar panels for the same amount of space.[3]
» Low space-efficiency also means that the costs of PV-equipment (e.g. support structures and cables) will increase.
» Thin-film solar panels tend to degrade faster than mono- and polycrystalline solar panels, which is why they typically come with a shorter warranty.

This project proposes using either of the above PV technology

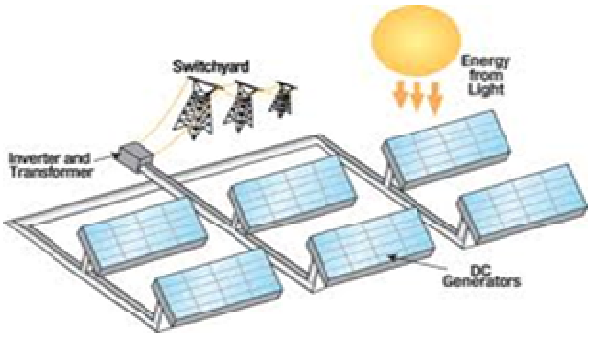


**Figure 2.1:** Schematic diagram of a PV plant (Sourced from: http://www.solar-green-wind.com/archives/tag/solar-cells)

A solar energy facility typically comprises the following components:

The **Photovoltaic Panels**

Solar photovoltaic (PV) panels consist primarily of glass and various semiconductor materials and in a typical solar PV project, will be arranged in rows to form solar arrays, as shown in Figure 2.2 and Figure 2.3. The PV panels are designed to operate continuously for more than 25 years with minimal maintenance required.

**Figure 2.2:** Picture of a PV Modules (75 MW plant in Kalkbutt South-Africa Source: SMA)

**Figure 2.3:** Picture of the installation of a typical PV array (75 MW plant in Kalkbutt South-Africa Source: PennEnergy)

The **Inverter**

The photovoltaic effect produces electricity in direct current (DC). Therefore an inverter (refer to Figure 2.4) must be used to invert it to alternating current (AC) for transmission in the national grid. The inverters convert the DC electric input into AC electric output, and then a transformer steps up the voltage to required transmission voltage level (6.6/11/84/132 kV) for on-site transmission of the power. The inverter and transformer are housed within the power conversion station (PCS) (refer to Figure 2.5). The PV combining switchgear (PVCS), which are dispersed among the arrays, collects the power from the arrays for transmission to the project's substation.


**Figure 2.4:** Image of a typical inverter

**Figure 2.5:** Image of a typical power conversion station

The **Support Structure**

The photovoltaic (PV) modules will be mounted to steel support structures. These can either be mounted at a fixed tilt angle, optimised to receive the maximum amount of solar radiation and dependent on the latitude of the proposed facility, or on a tracking mechanism where at a maximum tilt angle of 45 to 45 degrees. The lowest part of the panel can be 30-50cm from the ground (refer to Figure 2.6).

**Figure 2.6:** The support structures elevate the PV panels and allow for single axis tracking of the sun for increased efficiency (Source: SAPVIA)

## 2.3 Project Alternatives

In accordance with the requirements of the EIA Regulations[3], project alternatives have been considered within the Scoping process. These are detailed below.

### *2.3.1 Site Alternatives*

Three technically and economically feasible alternative sites have been identified by Eskom for investigation in the EIA process for the establishment of the proposed Lethabo PV project. This is based on an investigation/screening process that was undertaken by Eskom to assess the potential for installing PV facilities at Eskom power stations in Gauteng, Free-State, Mpumalanga and KwaZulu-Natal regions. This study provided an indication of the potential capacity, land availability, environmental constraints and electrical connection options for each of the power stations including Arnot, Duvha, Kendal, Kriel, Lethabo, Majuba, Matimba, Tutuka, Camden, Komati and Ingula. The sites within the Arnot, Duvha, Lethabo, Majuba and Tutuka power stations were selected as the first sites for consideration within EIA processes.

The following factors have been considered in determining a preferred site for PV solar development including:

» Land availability and environmental constraints ie ecological sensitive areas; and
» Technical feasibility – taking into account all electrical considerations including point of connection and electrical infrastructure available

At screening it was concluded by Eskom that the Lethabo power station has land available for a large PV facility. The land profile of the site is predominantly flat with little vegetation and trees and a minimal number of power lines running through some of the preferred site. The point of electrical connection is situated in close proximity to the land area and there are no foreseen risks from an environmental perspective at a high level. The Lethabo PV site is outside the immediate power station fence but it is still located within the broader power station property on Eskom owned property. Additionally, there was support offered from the power station personnel in accepting to install PV at the power station as well as providing the required information. With a pilot PV project being already installed at the power station as a showcase for COP17, there is a great support structure available and the personnel at Lethabo already have experience in understanding PV and the operations and maintenance behind it.

[3] GNR543 27(e) calls for the applicant to identify feasible and reasonable alternatives for the proposed activity.

Based on the above considerations, Eskom considers the proposed site as a highly preferred site for the development of a PV Solar Energy Facility

### *2.3.2 Layout and Design Alternatives*

The Scoping Phase aims to identify potential environmentally sensitive areas on the site which should be avoided by the proposed development as far as possible. These areas will need to be considered in greater detail during the EIA Phase through site-specific specialist studies. The information from these studies will be used to inform layout alternatives for the proposed development site and inform recommendations regarding a preferred alternative. Specific design alternatives will include *inter alia* the layout and mounting of the PV panels, and alternative routes for the power line corridors and access roads. The aim of this planning process is to avoid environmentally sensitive areas as far as possible and inform the final design of the facility.

### *2.3.3 Technology Alternatives*

Few technology options are available for PV facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail on the site, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability. Solar PV was determined as the most suitable option for the proposed site as large volumes of water are not required for power generation purposes compared to concentrated solar power technology (CSP). PV is also preferred when compared to CSP technology because of the lower visual profile. Two solar energy technology alternatives are being considered for the proposed project and include:

» Fixed Mounted PV systems (static/fixed-tilt panels);
» Tracking PV systems (with solar panels that rotate around a defined axis to follow the sun's movement);

The primary differences between technologies available which affect the potential for environmental impacts relate to the extent of the facility, or land-take (disturbance or loss of habitat), as well as the height of the facility (visual impacts). The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance. The impacts associated with the operation and decommissioning of the facility will be the same irrespective of the technology chosen. The technology to be used will be confirmed and assessed during the EIA Phase.

**Fixed Mounted PV System**

In a fixed mounted PV system (fixed-tilt), PV panels are installed at a pre-determined angle from which they will not move during the lifetime of the plant's operation. The limitations imposed on this system due to its static placement are offset by the fact that the PV panels are able to absorb incident radiation reflected from surrounding objects. In addition, the misalignment of the angle of PV panels has been shown to only marginally affect the efficiency of energy collection. There are further advantages which are gained from fixed mounted systems, including:

» The maintenance and installation costs of a fixed mounted PV system are lower than that of a tracking system, which is mechanically more complex given that PV mountings include moving parts.
» Fixed mounted PV systems are an established technology with a proven track record in terms of reliable functioning. In addition, replacement parts are able to be sourced more economically and with greater ease than with alternative systems.
» Fixed mounted systems are robustly designed and able to withstand greater exposure to winds than tracking systems.
» Fixed mounted PV systems occupy less space than the tracking systems.

**Tracking PV System**

Tracking PV Systems (single axis or dual axis trackers) are fixed to mountings which track the sun's movement. There are various tracking systems. A 'single axis tracker' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and more complex technology, which may include solar irradiation sensors to optimise the exposure of PV panels to sunlight. Tracking PV panels follow the suns rotational path all day, every day of the year giving it the best solar panel orientation and thereby enabling it to generate the maximum possible output power.

### *2.3.4 The 'Do-Nothing' Alternative*

The 'do-nothing' alternative is the option of not constructing the proposed Lethabo PV Solar Energy Facility. Should this alternative be selected, there would be no impacts on the site due to the construction and operation activities of a solar energy facility. This alternative will be assessed within the EIA Phase of the process.

## 2.4 Need and desirability of the proposed project

Internationally there is an increase in the deployment of renewable energy technologies for the generation of electricity due to concerns such as climate change and exploitation of non-renewable resources. Through the Integrated Resource Plan (IRP), the South African Government has set a target for renewable energy of 17 GWh renewable energy contributions to final energy consumption by 2030, to be produced mainly from biomass, wind, solar and small-scale hydro. Eskom has already successfully installed PV systems at offices and parking lots within Eskom-owned property to promote renewable energy awareness and to diversify their own energy mix. Furthermore, Eskom is looking at further reducing its self-consumption at its sites by introducing the PV Programme which aims to install up to 150 MWp at its various power stations, which includes the proposed Lethabo Photovoltaic Solar Energy Facility. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme.

The approved strategy for PV programme is to install 150 MWp of PV at various power stations; however, the program is exploring the possibility of maximizing the usage of available land at each power station. The capacity of 75 MW presented in this report represents the maximum estimated PV capacity at Lethabo.

As can be seen in the above paragraph, 75 MW for Lethabo is way above the capacity allocated for self-consumption (8 – 12 MW) at Lethano. The Program is also exploring to construct maximum available capacity if Eskom would be allowed to develop a project and connect into the national grid. Currently, Eskom is not allowed to feed into the national grid.

### *2.4.1 The Need for the Project at a National Scale*

The need for harnessing renewable energy resources (such as wind energy for electricity generation) is linked to increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources and the rising cost of fossil fuels. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010. This 17,8GW of power from renewable energy amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

Renewable energy technologies are among the supply-side options being considered by Eskom. The organisation has developed a renewable energy strategy which outlines a number of focus areas, including research and development of various technologies. Renewable energy sources which are being evaluated are wind, solar, wave, tidal, ocean current, biomass and hydro.

Through the South African Bulk Renewable Energy Generation (SABRE-Gen) programme, a vehicle was established to enable the evaluation of multi-MW, grid connected generation. The initiatives all follow the same functional structure, namely:

*a)* the identification of feasible options
*b)* an assessment of the financial and economic viability as well as resource potential in the country
*c)* the implementation of demonstration projects to conduct operational research
*d)* the provision of strategies for the uptake and sustainable deployment of the technologies where feasible.

### *2.4.2 The Need for the Project at a Provincial and Local Scale*

According to the DEA Draft Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (October 2012) the need and desirability of a development must be measured against the contents of the Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) for an area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF.

**Free State Provincial Growth and Development Strategy (FSPGDS) - Free State Vision 2030**

The draft Provincial Growth and Development Strategy (PGDS) – Free State Vision 2030 was released in May 2012. The PGDS is a critical instrument to shape and coordinate the allocation of national, provincial and local resources, and private sector investment to achieve sustainable development outcomes based on provincial development needs and priorities. The Free State Vision 2030 marks a break with the current five-year planning approach and is a reflective long-term strategic framework envisioned to create an environment to respond to the complexities that characterise the provincial development landscape. Underpinning the vision is the ability of government together with the people to map out the destiny of the province. The Free State 2030 targets include:

» Economic Restructuring, Growth and Employment Creation
» Education, Innovation and Skills Development
» Improved Quality of Life
» Sustainable Rural Development
» Build Social Cohesion

Solar energy, specifically the PV solar energy industry, provides the Free State with an opportunity to diversify its economy in a way that will assist in employment opportunities and contribute towards economic growth and development.

**Free State Provincial Spatial Development Framework (FSPSDF)**

The vision, the FSGDS and the FSPSDF collectively respond to the need for the province to describe and map its future destiny through long-term development planning, and to forge a common and shared development agenda across a wide spectrum of service delivery mechanisms. This relates to the interconnectedness between development imperatives and the capacity of the various forms of capital vested in the province and to ultimately bring about a better life for all. The PSDF is a spatial and strategic supplement to the Free State Provincial Growth and Development Strategy (FSPGDS, 2012) as it relates to the shaping and coordination of the allocation of national, provincial and local resources, and private sector investment to achieve sustainable development outcomes based on provincial development needs and priorities.

The Free State Vision 2030 envisages that, by 2030, the Free State shall have a resilient, thriving and competitive economy that is inclusive, with immense prospects for human development anchored on the principles of unity, dignity, diversity, equality and prosperity for all. Impelled by this vision, the Free State of 2030 will be characterised by an economy that encourages the development of new growth sectors with emphasis on the knowledge-based industries and the green economy (FSGDS). The transition towards a resilient, thriving and competitive economy will be pursued within the overarching framework of redistribution of economic resources, ownership and control of the provincial economy, and the creation of opportunities for the marginalised to play a central and meaningful role in the growth and development. The Free State Vision 2030 furthermore envisages that, by 2030, ownership and control patterns of the economy will be transformed, spatial under-development will be addressed, and basic services such as healthcare, education, electricity, water and sanitation will be equitably accessed by the people of the province. In the quest for inclusive economic growth and development, the environment will be protected for future generations. Lasting responses to climate changes will be part of the landscape of the development of the province. Provincial strategic growth and development pillars include:

- Pillar 1: Inclusive economic growth and sustainable growth job creation
- Pillar 2: Education, innovation and skills development
- Pillar 3: Improved quality of life
- Pillar 4: Sustainable rural development
- Pillar 5: Build social cohesion
- Pillar 6: Good Governance

The overarching goal of PSDF is to enable sustainability through sustainable development. In the Free State renewable energy is a key focus area of the Free State Development Corporation. The Free State has significant potential for the harvesting of solar energy. The Free State SDF emphasises the need for economic growth and renewable energy investment. Thus the proposed development is considered to be aligned to the economic and investment priorities of the Free State provincial government

**Fezile Dabi District Growth and Development Strategy (2004-2014)**

The Fezile Dabi District Growth and Development Strategy (FDDGDS) aims to provide a framework for sustainable growth and economic development for the District from 2004 to 2014. It seeks to achieve balanced development of economic sectors in accordance with the needs and potentials of the people. It is also aimed at targeted investments in the district with the aim of offering opportunities to the people in skills development, employment and the improved quality of life. The FDDGDS focuses on 6 thrusts considered to be the main economic drivers of the area. The preservation of the productive integrity of agricultural land is identified as of high importance in the Free State province. The SDF also identifies tourism as one of the major growth industries in the region. Minimizing visual impacts, protecting scenic areas and preserving the integrity of historic settlements are identified as important points to consider with regard to new developments in the area. The proposed development is located within an industrial area so the impacts on the agricultural industry, scenic areas and tourism will be minimal therefore the project falls in line with the FSDGDS.

**Fezile Dabi District Municipality Integrated Development Plan (2012-2017)**

Fezile Dabi District Municipality (FDDM) IDP outlines the municipalities plan for 2012-2017. The core mission of the municipality is to improve the lives of citizens and progressively meet their basic, social and economic needs, thereby restoring community confidence and trust in government. Of the 57 key performance areas, the following goals and objectives are of specific relevance to this study:

- To enhance human capacity and productivity within the municipality
- To maintain sound labour relations
- To create skills development opportunities for students & the unemployed in the district
- To create an environment that stimulates the local economic growth

The Proposed project is line with these objectives through providing opportunities to create skills development for the unemployed in the district and will contribute in creating an environment that stimulates local economic growth.

**Metsimaholo Local Municipality Integrated Development Plan (IDP) (2012/13-2016/17)**

The Metsimaholo Local Municipality (MLM) collected and based its strategy on the strategic areas identified by both National and Provincial Government. The five-year plan (2012/13 – 2016/17) is aligned to the local priorities reflected in election manifesto and is further based on the Medium Term Strategic Framework (MTSF) outcomes and the revised National Key Performance Indicators (NKPIs). Policies that the IDP follows that relates to the proposed development includes the New Growth Path which identifies five other priority areas as part of the programme to create jobs, through a series of partnerships between the State and the private sector. The one priority area in the New Growth path that is in line with the proposed development includes: "Green economy- expansions in construction and the production of technologies for solar, wind and biofuels are supported by the draft Energy on Integrated Resource Plan. Clean manufacturing and environmental services are projected to create 300 000 jobs over the next decade."

The MLM mission is "To promote the sustainable socio-economic development of our communities through effective, efficient and affordable service delivery and sound institutional and financial management." The MLM strategic priorities, key performance areas (KPAs), objectives and programmes include:

**Table 1:** Strategic priorities of the MLM

| Strategic Priority | KPA | Programmes |
|---|---|---|
| SP1: Build our local economy to create more employment, decent work and sustainable livelihoods | KPA1: Local Economic Development | P8-Local Economic Development<br>P9-Job Creation<br>P10-Sustainable livelihoods |
| SP2: Broaden access to and improve the quality of municipal services | KPA2: Basic service delivery and infrastructure development | P1-Water<br>P2-Sanitation<br>P3-Electricity<br>P4-Roads and storm water<br>P11-Waste management<br>P12-Community facilities |
| SP3: Build united, non-racial, integrated and safer communities | KPA3: Community development and social cohesion<br>KPA2: Basic service delivery and infrastructure development | P13-Clean communities<br>P14-Safe communities<br>P15-Healthy communities<br>P16-Arts and culture<br>P17-Disaster management<br>P5-Human settlements<br>P6-Spatial development<br>P7-Public transport |

| Strategic Priority | KPA | Programmes |
|---|---|---|
| SP4: Promote active community participation | KPA4: Good governance and community participation | P18-Participatory governance |
| SP5: Ensure more effective, accountable and clean local government that works together with national and provincial government | KPA4: Good governance and community participation<br>KPA5: Financial management and viability<br>KPA6: Municipal transformation and institutional development | P19-Corporate governance<br>P20-Intergovernmental Relations<br>P21-Customer care<br>P22-Revenue and cash flow management<br>P23-SCM and Expenditure management<br>P24-Budgeting and reporting<br>P25-Clean Audit<br>P26-Asset management<br>P27-Facilities management<br>P28-Human capital<br>P29-Institutional excellence |

The proposed solar energy facility development will advance the objectives of local economic development and job creation outlined in the strategic priorities of the MLM IDP.

**Metsimaholo Local Municipality Economic Development (LED) (2012)**

The purpose of the MLM Draft LED Strategy is to develop a framework for economic growth and development. Whilst the development of economic sectors and industries is the focal point, the objective is to ensure skills development, quality employment, SMME and co-operative development becomes part of the outcome during implementation. The economic outcomes of the strategy is not intended at measuring growth only, but the ability to respond to social needs like education, health, recreation and the general quality of life. The objectives of the MLM strategy include the following:

» To beneficiate the existing manufacturing industry and diversify the local economy (that is, the ability to develop value chain in any industry)
» To develop and position the Metsimaholo economy as the most performing economy in the Free State Province.
» To develop and position the Metsimaholo economy as a leading leisure destination in the Free State Province
» To develop and position the Metsimaholo economy as a leading retail destination in the Fezile Dabi District.

The intended impacts include the following:
» The development of highly skilled people in the local economy
» The increase in employment of local people in the local economy
» The development of SMMEs and Co-operatives in various sectors of the local economy

The development of the proposed solar energy facility will assist the MLM in attaining the objectives of local economic development that apply to all future planning actions in the MLM area that is relevant to the proposed development, such as increase employment opportunities, development of local human capital and diversifying the local economy.

**Metsimaholo Local Municipality Spatial Development Framework (SDF) (2012)**

The municipality attaches considerable importance to "green" issues within the SDF, including for example energy conservation, the protection of its blue corridors, the retention of the green wedges and other areas of open space and heritage significance.

Key strategic guiding issues of the SDF that are of specific relevance to the proposed development include:

» Sasolburg, Deneysville and Oranjeville are three of the major urban centres in the Municipality at various scales. These areas are also the major areas within which development opportunities exist and should be concentrated for higher density development.
» The development of these areas is therefore critical for job creation and new housing development. A number of other smaller areas located outside of these urban centres are also identified for new development or redevelopment.
» The development of these areas must be in line with the intention of providing job opportunities and minimising travelling for the poor to benefit from these opportunities.

The SDF identifies a number of priority areas which are regarded as relevant to the proposed development which include: sustainable and less energy intensive forms of development and economic diversification. The proposed development is located in close proximity to Sasolburg within an industrial area. The development also has the intention of providing job opportunities for the local community which is line with the SDF.

**Strategic Integrated Projects (SIPs)**

The Presidential Infrastructure Coordinating Committee (PICC) are integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered

through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration.

SIP 8 of the energy SIPs supports the development of the Solar Energy Facility which is as follows:

» *SIP 8: Green energy in support of the South African economy:* Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.

In fulfilment of SIP 8 (green energy) and to meet the targets set in the Integrated Resource Plan (IRP 2010), the proposed Lethabo Solar Energy Facility could potentially contribute towards SIP 8 by addition of clean energy to the grid (should the project be constructed) and the project will create significant socio-economic benefits at a local, regional and national scale.

**Financial Viability and Community Needs**

In terms of the energy yield predicted from the facility, Eskom considers the Eskom Lethabo project to be financially viable. The "need and desirability" of the local community as reflected in the IDP and SDF for the area is also considered in the EIA. In the South African context, developmental needs (community needs) are often determined through the above planning measures (IDP and SDF). Although the renewable energy sector is not explicitly identified as a sector or initiative in all current municipal policy and planning documents as outlined above, it could contribute positively to the needs of the local community, including development, social services, education and employment opportunities in this area, as identified in these planning documents. The Lethabo solar energy facility will create employment and business opportunities during the construction and operational phases, as well as the opportunity for skills development for the local community. In addition, indirect benefits and spend in the local area will benefit the local community.

**The Desirability for the Lethabo Solar Energy Facility Project**

The use of solar irradiation for electricity generation is essentially a non-consumptive use of a natural resource. A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies) as it meets all international requirements in this regard. The proposed site located on Farm 1814 was selected for the development of a solar energy facility based on its

suitable proximity in relation to the existing and available electricity grid, and minimum technical constraints from a construction, technical perspective and environmental suitability.

Additionally, Eskom has also successfully installed PV at offices and parking lots to promote renewable energy awareness and to diversify their own energy mix. Furthermore, Eskom is looking at further reducing their self-consumption at their various owned or utilised sites by introducing Eskom's Ilanga PV Project Portfolio which aims to install 150MWp at their various power stations, offices and substations. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme.

## 2.5 Proposed Activities during the Project Development Stages

In order to construct the solar energy 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 Design and Pre-Construction Phase*

**Conduct Surveys**

Prior to initiating construction, a number of surveys will be required including, but not limited to confirmation of the micro-siting footprint (i.e. the precise location of the PV panels, substation and the 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.

### *2.5.2 Construction Phase*

The construction the proposed project is expected to extend over a period of approximately 15-18 months and create at least 250-300 employment opportunities at peak. The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community, representing a significant positive social benefit in an area with limited employment opportunities. The construction phase will entail a series of activities including:

**Undertake Site Preparation**

Site preparation involves construction of new access roads and improvement of existing on-site construction access roads with compacted native soil, installation of drainage crossings, setup of construction staging areas, storm water management work, preparation of land areas for array installation, and other activities needed before installation of the solar arrays can begin. The work would involve trimming of vegetation, selected compacting and grading, and setup of modular offices and other construction facilities.

A relatively level and stable surface is required for the safe and effective installation of the PV arrays. Topographic, geotechnical, and hydrologic studies will be used to determine the necessary grading and compaction.

Trenching would occur within each array to accommodate the electrical cables. The trenches would be up to ~ 1.8m in width and 2m deep, for a total combined length of approximately 10 km. Minimal ground disturbance may occur within the trenched corridors to restore them after soil has been replaced in the trenches, so that the corridor can conform to the existing surface contours.

**Transport of Components and Construction Equipment to Site**

The components for the proposed facility will be transported to site 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)[4] by virtue of the dimensional limitations (i.e. size 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 the components required for the establishment of the on-site substation.

**Establishment of Access Roads to the Site**

The site can be accessed from the R716 regional road which lies west of the proposed site connecting Vereeniging to Deneysville. Within the site itself, access is already established and is used for the power station. These existing roads will be utilised for construction purposes (and later limited access for maintenance). Internal access roads between the project components will be required. Access track construction would normally comprise of compacted rock-fill with a layer of higher quality surfacing stone on top. The strength and durability properties of the rock strata at the proposed site are not known at this stage; this will need to be assessed via a geotechnical study to be conducted by the project proponent. Depending on the results of these studies, it may be possible in some areas, to

[4] A permit will be required for the transportation of these abnormal loads on public roads.

strip off the existing vegetation and ground surface and level the exposed formation to form an access track surface. The final layout of the access roads will be determined following the identification of site related sensitivities.

**Installation of PV Panels and Construct Substation & Inverters**

The PV panels will be arranged in arrays, the mounting structure will be preferably fixed onto the ground with the use of rammed or screw anchor foundations (see typical example Figure 2.7). . Where the soil conditions do not lend themselves to these technologies, concrete or chemical anchors will be deployed. This approach reduces installation time, will make the installation of the plant less invasive for the territory and facilitate the decommissioning at the end of its production cycle. The height of the PV panel structure will be up to 3.5m for fix mounted structures. In case of single/dual axis structures, the height of Panel Structure, can reach up to 6 meters.

**Figure 2.7:** Frame, structural details (Lesedi Solar PV Project, Kimberly, South Africa. Source: Power Technology.com)

Inverters will be installed to facilitate the connection between the solar energy facility and the Eskom electricity grid via the 11 kV (for connection at station board) or 132 kV (for connection at HV yard) power line. The position of the inverters within the footprint of the broader site will be informed by the final positioning of the PV components.

The construction of a substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

**Establishment of Ancillary Infrastructure**

Ancillary infrastructure will include; a workshop, laydown area and office. The laydown area will be a temporary structure. The establishment of these areas/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.

**Undertake Site Rehabilitation**

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. Upon completion of 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.

### *2.5.3 Operational Phase*

The solar energy facility is expected to be operational for a minimum of 20 years, with an opportunity for a lifetime of 50 years or more with equipment replacement and repowering. The project will operate continuously, 7 days a week, during daylight hours. While the project will be largely self-sufficient upon completion of construction, monitoring and periodic, as needed maintenance activities will be required.

An Operation and Maintenance plan will be compiled for the facility. Key elements of the Operation and Maintenance plan include monitoring and reporting the performance of the project, conducting preventative and corrective maintenance, receiving visitors, and maintaining security of the project.

The operational phase will create ~10 full-time employment positions. No large scale energy storage mechanisms for the facility which would allow for continued generation at night or on cloudy days are proposed. . An operational PV plant has no direct water requirement associated with the generation of electricity. Water is required primarily for the construction of the facility and well as for human consumption (sanitation) during

operation. In many instances, water is used to clean off dust or dirt that builds up on the panels. A volume of approximately 7000 $m^3$ per annum would be required during the operational phase. This will be acquired from the Lethabo Power Station adjacent to the proposed project.

### *2.5.4 Decommissioning Phase*

Depending on the continued economic viability of the facility following the initial 20 year operational period, the solar energy facility will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to extend the operational phase, existing components would either continue to operate or be dissembled and replaced with new, more efficient 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 Remove Existing Components**

When the project is ultimately decommissioned, the equipment to be removed will depend on the proposed land use for the site at that time. At this time, all above ground facilities that are not intended for future use at the site will be removed. Underground equipment (e.g. foundation, wiring) will either be removed, or cut off 1m below the ground surface, and the surface restored to the original contours. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and can be returned to the agricultural or other beneficial land-use.

**Future plans for the site and infrastructure after decommissioning**

At the end of the PV plant operational life time, will start a dismantling phase of all structures to re-establish the original condition of the site before the PV plant installation.

The following elements/materials will be removed from the site:

» Steel/aluminium mounting structure elements and concrete foundation (if any)
» PV modules, Inverter, transformers and all electrical equipment which were needed for the PV plant operation;
» Metal fence including:

- fence mounting structure
- concrete foundation (if any)
- Gates

» Inverters and O&M buildings including the concrete foundation
» Electrical wire

All equipment such as electrical equipment like PV modules, inverters, transformers and other electrical tools will be recycled. All elements which cannot be recycled like concrete mounting structures foundation (if any) and inverter cabin foundation will be dumped into authorized dump. Then, the restoration of the site to the original condition will be completed by removing all residual materials like concrete fragments etc. as well as removing all transporting means form the site. All these activities need to be carried out according to the local/national prescription related to the waste disposal regulation.

## APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 3

An Environmental Impact Assessment (EIA) process refers to that process (in line with the EIA Regulations) which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e. **Scoping Phase** and **EIA Phase**. The EIA process culminates in the submission of an EIA Report (including an Environmental Management Programme (EMPr)) to the competent authority for decision-making. The EIA process is illustrated below:

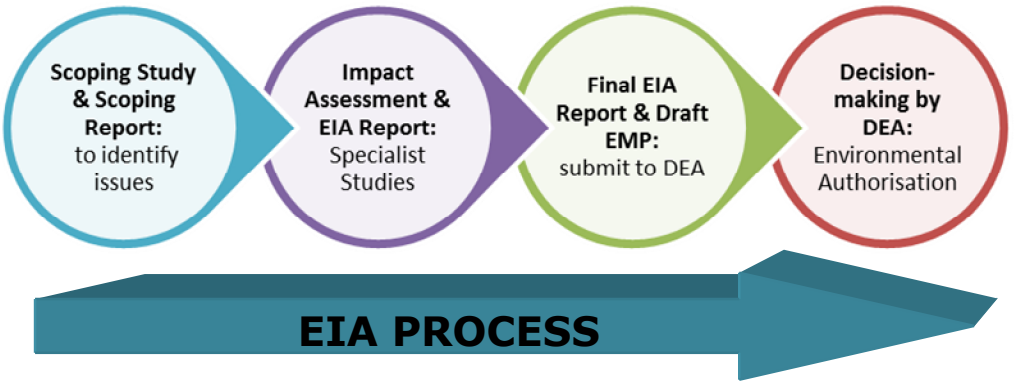


**Figure 3.1:** The Phases of an EIA Process

The Scoping Phase for the proposed Lethabo Solar Energy Facility has been undertaken in accordance with the EIA Regulations (GNR543), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This scoping process is aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders, relevant government authorities, and interested and affected parties (I&APs).

This chapter outlines the process which was followed during the Scoping Phase of the EIA process.

### 3.1. Objectives of the Scoping Phase

This Scoping Phase aimed to:

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

Within this context, the objectives of this Scoping Phase are to:

» Describe the scope and nature of the proposed activities.
» Describe the reasonable and feasible project-specific alternatives to be considered through the EIA process, including the "do nothing" option.
» Identify and evaluate key environmental issues/impacts associated with the proposed project, and through a process of broad-based consultation with stakeholders and desk-top specialist studies, identify those issues to be addressed in more detail in the Impact Assessment Phase of the EIA process, as well as potentially sensitive environmental features and areas which should be considered in the preliminary design phase.
» Conduct an open, participatory, and transparent public involvement process and facilitate the inclusion of stakeholders concerns regarding the proposed project into the decision-making process.

## 3.2. Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations (GNR543), in terms of NEMA. Key tasks undertaken within the scoping phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of an application form for authorisation to the competent authority (DEA) in terms of Regulation 12 and 26 of Government Notice No R543 of 2010.
» Undertaking a public involvement process throughout the Scoping process in accordance with Chapter 6 of Government Notice No R543 of 2010 in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Regulation 32 of Government Notice No R543 of 2010.
» Preparation of a Draft Scoping Report and Plan of Study for EIA in accordance with the requirements of the Regulation 28 Government Notice No R543 of 2010.

» 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 Government Notice No R543 of 2010).

These tasks are discussed in detail below.

### *3.2.1. Authority Consultation and Application for Authorisation in terms of GNR543 of 2010*

As Eskom is a State Owned Enterprise, the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within the Free State Province, the Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA) is the commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping Phase. This consultation has included the submission of an application for authorisation to DEA. Authorisation to continue with the Scoping Phase of the project was granted when this application was accepted by DEA, and allocated the reference number **14/12/16/3/3/2/753.**

A record of all authority correspondence undertaken prior to and within the Scoping Phase is included within **Appendix C**.

### *3.2.2. Public Participation*

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

» All relevant stakeholders and I&APs are identified and consulted with.
» Information containing all relevant facts in respect of the application is made available to stakeholders and I&APs.
» Participation by stakeholders and I&APs is facilitated in such a manner that they are all provided with a reasonable opportunity to comment on the application.
» Comments received from stakeholders and I&APs are recorded and considered in the EIA process, where appropriate.

The following sections detail the tasks which were undertaken as part of the public participation process.

#### i. Stakeholder identification

The first step in the public involvement process was to initiate the identification of relevant stakeholders and interested and affected parties (I&APs). This process was undertaken through existing contacts and databases, recording responses to site notices and newspaper advertisements, as well as through the process of networking. Stakeholder groups identified include:

- National government departments, including:
  - South African Heritage Resources Agency (SAHRA)
  - Department of Water and Sanitation (DWS)
  - Department of Agriculture, Forestry and Fisheries (DAFF)
  - National Department of Energy (DoE)
  - Department of Mineral Resources (DMR)
  - The South African Civil Aviation Authority (CAA)
- Provincial government departments including:
  - Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA)
  - Department of Police, Transport and Public Works
  - Provincial Department of Water Affairs
  - Free State Department of Agriculture
- Parastatals including:
  - South African National Roads Agency Limited (SANRAL)
- Local and District Municipalities having jurisdiction over the study area being the:
  - Metsimaholo Local Municipality
  - Fezile Dabi District Municipality
- Neighbouring landowners
- Other potentially affected parties and landowners
- Industry and business
- Community Based Organisations and
- Non-Governmental Organisations.

The process of identification of stakeholders and I&APs will be on-going throughout the EIA process.

### ii. Stakeholder Database

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to **Appendix C** for a listing of recorded parties). While I&APs have been encouraged to register their interest in the project from the start of the process, the identification and registration of I&APs will be on-going for the duration of the EIA process. The I&AP database will be updated throughout the EIA process, and will act as a record of the parties involved in the public involvement process.

### iii. Adverts and Notifications

In order to notify and inform the public of the proposed project and invite members of the public to register as interested and affected parties (I&APs), the project, and EIA process was advertised in the following newspapers:

- Sasolburg Ster (English: 13 January 2015)

» Vaal weekblad (seSotho & Afrikaans:14 January 2015)

A second advert was placed announcing the date and venue of the public meeting and the availability of the draft scoping report. This advert appeared in the following newspapers:

» Sasolburg Ster (17 March 2015)
» Vaal weekblad (18 March2015)

Site notices (in English and seSotho) were placed at visible points on the entrance of the Lethabo power station on 12 December 2014, in accordance with the requirements of the EIA Regulations. Further notices were placed at the Sasolburg Library and outside the Metsimaholo Local Municipality. In addition to the advertisements and site notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process. Copies of all the advertisements, site notices and written notifications are included within **Appendix C**.

### iv. Public Involvement and Consultation

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (refer to Appendix C). The BID was distributed to identified stakeholders and I&APs, additional copies were made available at public venues within the broader study area, and it was posted electronically on the Savannah Environmental website.

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study were identified and confirmed. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been provided, and will continue to be provided in order for I&APs to have their issues noted as follows:

» **Public meeting** in the study area (open meeting advertised in the local press)
» **Focus group meetings** (pre-arranged and stakeholders invited to attend)
» One-on-one **consultation meetings** (for example with directly affected or surrounding landowners)
» **Telephonic** consultation sessions
» Written, faxed or e-mail **correspondence**

Networking with I&APs will continue throughout the duration of the EIA process.

### v. Identification and Recording of Issues and Concerns

No comments have been received to date regarding the proposed project. All comments received from stakeholders and I&APs on the proposed project will be included in the Final Scoping Report. A Comments and Response Report will be compiled to include all comments received during the scoping phase of the process, including those received in the public review period of the draft Scoping Report.

### *3.2.3. Evaluation of Issues Identified through the Scoping Process*

Issues (both direct and indirect environmental impacts) associated with the proposed project identified within the scoping process have been evaluated through desk-top studies. In evaluating potential impacts, Savannah Environmental has been assisted by the following specialist consultants:

| Specialist | Area of Expertise | Appendix |
|---|---|---|
| Megan Diamond (Feathers Environmental Services) | Avifauna | Appendix D |
| Marianne Strohbach (Savannah Environmental) | Ecology | Appendix E |
| Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC (HCAC)) | Heritage and Archaeology | Appendix F |
| Barry Millstead (BM Geological Services) | Palaeontology | Appendix G |
| Candice Hunter (Savannah Environmental) and Anton Pelser (external reviewer) | Social | Appendix H |
| Garry Paterson (ARC-Institute for Soil, Climate and Water) | Soils and Agricultural Potential | Appendix I |
| John Marshall (Afzelia Environmental Consultants and Environmental Planning and Design) | Visual | Appendix J |
| Rob Taylor (Limosella Consulting) | Wetlands | Appendix K |

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

- *the nature,* which includes 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) or regional

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA.

Specialist Scoping Reports are contained within Appendices D – K.

### *3.2.4. Public Review of Draft Scoping Report and Public Meeting*

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from **18 March 2015 – 21 April 2015** at the following locations:

» Sasolburg Library
» Vereeniging Public Library
» www.savannahSA.com

In order to give I&APs an opportunity to raise any issues and concerns about the proposed development, a public meeting will be held as follows during the review period for the draft scoping report.

» Date: Thursday, 16 April 2015
» Time: 17:00 PM
» Venue: Vaal Power Village Community Haal, Vaal Power Village

Details of the availability of the draft scoping report for public review and public meeting were advertised in the following regional and local newspapers:

» Sasolburg Ster (English: 17 March 2015)
» Vaal weekblad (Afrikaans:18 March2015)

In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to Appendix C).

### *3.2.5. Final Scoping Report*

The final stage in the Scoping Phase will entail the capturing of responses from stakeholders and I&APs on the Draft Scoping Report in order to finalise this report. It is the final Scoping Report upon which the decision-making environmental Authorities provide comment, recommendations, and acceptance to undertake the EIA Phase of the process.

## 3.3 Regulatory and Legal Context

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

### *3.3.1 Requirement for an EIA*

The EIA Regulations were revised in December 2014 in terms of GNR 982 – 985. In terms of Sub-Regulations 53(2) and 53(3) of these Regulations) Transitional Arrangements):

" If a situation arises where an activity or activities, identified under the previous NEMA Notices, no longer requires environmental authorisation in terms of the current activities and competent authorities identified in terms of section 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), and where a decision on an application submitted under the previous NEMA regulations is still pending, the competent authority will consider such application to be withdrawn". And "where an application submitted in terms of the previous NEMA regulations, is pending in relation to an activity of which a component of the same activity was not identified under the previous NEMA notices, but is now identified in terms of section 24(2) of the Act, the competent authority must dispense of such application in terms of the previous NEMA regulations and may authorise the activity identified in terms of section 24(2) as if it was applied for, on condition that all impacts of the newly identified activity and requirements of these Regulations have also been considered and adequately assessed."

Therefore, similarly listed and additional activities relevant to the current application have been identified and are listed in the table below. They are no new listed activity as per the revised EIA Regulations of December 2014 in terms of GNR 982 – 985.

| Activity listed in GNR 544 – 546 | Activity listed in GNR 983 - 985 | Relevance to the project |
|---|---|---|
| **GN 544, activity 10**<br><br>The construction of facilities or infrastructure for the transmission and distribution of electricity –<br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV; | GN983, activity 11 (i)<br><br>The development of facilities or infrastructure for the transmission and distribution of electricity-<br>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts | An overheard power line and on-site substation will be constructed to connect the PV facility to the Eskom grid |
| **GN 544, activity 11**<br><br>The construction of:<br>**(xi)** infrastructure or structures covering 50 square metres or more | GN983, activity 12<br><br>The development of<br>(xii) infrastructure or structures with a physical footprint of 100 square metres or more; | The PV facility will include the construction of buildings (workshop area and site office) and infrastructures (underground cabling, panels) within 32 metres |

| Activity listed in GNR 544 – 546 | Activity listed in GNR 983 - 985 | Relevance to the project |
|---|---|---|
| Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse. | where such development occurs-<br>(a) within a watercourse, or<br>c) within 32m of a watercourse | of a watercourse. |
| **GN 544, activity 18**<br><br>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from<br>**(i)** a water course | GN983, activity 19<br><br>The infilling or depositing of any material of more than 5 cubic metres into, or the dredging,<br>excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5<br>cubic metres from-<br>(i) a watercourse | Construction of the PV facility may require the infilling or excavation and removal of soil of more than 5 cubic metres from a watercourse. |
| **GN 544, activity 22**<br><br>The construction of a road, outside urban areas,<br>Where no road reserve exists where the road is wider than 8 metres<br>(i) Where no road reserve exists where the road is wider than 8 m; | GN983, activity 24<br><br>The development of-<br>(ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres | The facility will require construction of new access roads. These may exceed 8 metres in width. |
| **GN 544, activity 29**<br><br>The expansion of facilities for the generation of electricity where:<br>(ii) regardless the increased output of the facility, the development footprint will be expanded by 1 hectare or more; | **GN 983, activity 36**<br><br>The expansion and related operation of facilities for the generation of electricity from a non-renewable resource where -<br>(ii) regardless the increased output of the facility, the development footprint will be<br>expanded by 1 hectare or more; | The development footprint of the current Lethabo power station will be expanded by 1 hectare or more with the construction of the PV facility. |
| **GN 544, activity 47**<br><br>The widening of a road by more than 6 metres,<br>(ii) Where no reserve | GN983, activity 56<br><br>The widening of a road by more than 6 metres, or the lengthening of a road by | The facility will require the widening/lengthening of existing access roads within the site. |

| Activity listed in GNR 544 – 546 | Activity listed in GNR 983 - 985 | Relevance to the project |
|---|---|---|
| exists, where the existing road is wider than 8 metres – | more than 1 kilometre-<br>(ii) where the existing reserve is wider than 13,5 meters | |
| **GN 545, activity 1**<br><br>The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more. | GN984, activity 1<br><br>The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more | The proposed facility will consists on of arrays of photovoltaic (PV) panels with an electricity output of 75MW. |
| **GN 545, activity 15**<br><br>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 | GN983, activity 28<br><br>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development:<br>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare | The development footprint of the solar energy facility would be in excess of 20ha. |
| **GN546 Item 14 (a) i:**<br>The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation<br>(a) In Free State:<br>i. All areas outside urban areas | GN 984, activity 15<br><br>The clearance of an area of 20 hectares or more of indigenous vegetation | The solar energy facility will be located outside urban areas and will require the clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation cover. |

### *3.3.2 Regulatory Hierarchy*

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, and is responsible for developing and approving the IRP (Integrated Resource Plan for Electricity).
- *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 solar 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 project, and charged with granting the relevant environmental authorisation.
- *The South African Heritage Resources Agency (SAHRA):* SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa's cultural heritage.
- *National Department of Agriculture, Forestry, and Fisheries (DAFF):* This Department is responsible for activities pertaining to subdivision and rezoning of agricultural land. The forestry section is responsible for the protection of tree species under the National Forests Act (Act No 84 of 1998).
- *South African National Roads Agency (SANRAL):* This Agency is responsible for the regulation and maintenance of all national routes.
- *National Department of Water Affairs (DWA):* This Department is responsible for water resource protection, water use licensing and permits.
- *South African Civil Aviation Authority (CAA):* This department is responsible for aircraft movements and radar, which are aspects that may have bearing on location and planning for renewable energy facilities.

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

- *Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA):* This Department is the commenting authority for the project.
- *Department of Police, Transport and Public Works:* This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- *Provincial Department of Water Affairs:* This Department is responsible for water resource protection, water use licensing and permits.
- *Free State Heritage Authority:* This body is responsible for commenting on heritage related issues in the Free State Province.
- *Free State Department of Agriculture:* This Department is responsible for all matters which affect agricultural land.
- *Free State Department of Mineral Resources (DMR):* Approval from this department may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act, approval from the Minister of Mineral Resources is

required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.

At **Local Level**, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Free State Province, both the local and district municipalities play a role. The local municipality is the Metsimaholo Local Municipality which forms part of the Fezile Dabi District Municipality. There are also numerous non-statutory bodies such as environmental non-governmental organisations (NGOs) and community based organisations (CBO) working groups that play a role in various aspects of planning and environmental monitoring that will have some influence on proposed solar energy development in the area.

### *3.3.3 Legislation and Guidelines that have informed the preparation of this Scoping Report*

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

- National Environmental Management Act (Act No. 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA (GNR R543 in Government Gazette 33306 of 18 June 2010)
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
  - Public Participation in the EIA Process (DEA, 2010)
  - Integrated Environmental Management Information Series (published by DEA)
- Metsimaholo Municipality Integrated Development Plan
- International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines.

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A listing of relevant legislation is provided in Table 3.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA phase.

**Table 3.1:** Initial review of relevant policies, legislation, guidelines, and standards applicable to the proposed Lethabo PV Solar Energy project EIA

| Legislation | Applicable Sections |
|---|---|
| ***National Legislation*** | |
| Constitution of the Republic of South Africa (Act No 108 of 1996) | » Bill of Rights (S2)<br>» Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well- |

| Legislation | Applicable Sections |
|---|---|
| | being<br>» Rights to freedom of movement and residence (S22)<br>» Property rights (S25)<br>» Access to information (S32)<br>» Right to just administrative action (S33) |
| National Environmental Management Act (Act No 107 of 1998) | » NEMA requires, inter alia, that:<br>* Development must be socially, environmentally, and economically sustainable.<br>* Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.<br>* A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions.<br>» EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.<br>» The Transitional Arrangements as contained in Chapter 8 of the 2014 EIA Regulations as promulgated on 8 December 2014 regarding pending applications with specific reference to Regulation 53(1) which reads as follows:<br>» 53. (1) An application submitted in terms of the previous NEMA regulations and which is pending when these Regulations take effect, including pending applications for auxiliary activities directly related to-<br>* prospecting or exploration of a mineral or petroleum resource; or<br>* extraction and primary processing of a mineral or petroleum resource,<br>must despite the repeal of those Regulations be dispensed with in terms of those previous NEMA regulations as if those previous NEMA regulations were not repealed.<br>» In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.<br>» In terms of GNR 543 of 18 June 2010, a Scoping EIA Process is required to be undertaken for the proposed project. |
| Environment Conservation Act (Act No 73 of 1989) | » National Noise Control Regulations (GN R154 dated 10 January 1992) |
| National Heritage Resources Act | » Stipulates assessment criteria and categories of |

| Legislation | Applicable Sections |
|---|---|
| (Act No 25 of 1999) | heritage resources according to their significance (S7)<br>» Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35)<br>» Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36)<br>» Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38)<br>» Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44) |
| National Environmental Management: Biodiversity Act (Act No 10 of 2004) | » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)<br>» A list of threatened and protected species has been published in terms of S56 (1) - Government Gazette 29657.<br>» Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).<br>» Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011).<br>» This Act also regulates alien and invader species. |
| National Environmental Management: Air Quality Act (Act No 39 of 2004) | » S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas"<br>» Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards<br>» The Act provides that an air quality officer may require any person to submit an atmospheric impact report if |

| Legislation | Applicable Sections |
|---|---|
| | there is reasonable suspicion that the person has failed to comply with the Act.<br>» Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan. |
| Conservation of Agricultural Resources Act (Act No 43 of 1983) | » Prohibition of the spreading of weeds (S5)<br>» Classification of categories of weeds & invader plants & restrictions in terms of where these species may occur - Regulation 15 of GN R1048 and Regulation 598 GN 37885 of NEM:BA (Act No. 10 of 2004)<br>» Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048 & Regulation 598 GN 37885 of NEM:BA (Act No. 10 of 2004) ). |
| National Water Act (Act No 36 of 1998) | » Under S21 of the Act, water uses 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.<br>» 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. |
| National Environmental Management: Waste Act (Act No 59 of 2008) | » The purpose of this Act is to reform the law regulating waste management in order to protect health and the environment by providing for the licensing and control of waste management activities.<br>» The Act provides listed activities requiring a waste license<br>» Standards for the storage and handling of waste have been published in terms of this Act |
| National Forests Act (Act No 84 of 1998) | » Protected trees: According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.<br>» Forests: The Act prohibits the destruction of indigenous trees in any natural forest without a licence. |
| National Veld and Forest Fire Act (Act 101 of 1998) | In terms of S13 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. |

| Legislation | Applicable Sections |
|---|---|
| | In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires. |
| Aviation Act (Act No 74 of 1962) | Obstacle limitations and marking outside aerodrome or heliport |
| **Provincial Legislation and Policy** | |
| Free State Provincial Spatial Development Framework (2013) | As a provincial policy framework, it sets the tone and pace for shared growth and development in the Province. It addresses the key social, economic, environmental and spatial imperatives in the Province. According to the FS (PSDF – 2013), the Free State renewable energy is a key focus area of the Free State Development Corporation, especially the solar energy sector. |
| The Nature Conservation Ordinance (NCO) 8 of 1969 and subsequent amendments | To provide for the conservation of fauna and flora and the hunting of animals causing damage and for matter incidental thereto |
| ***Guideline Documents, Policies and White Papers*** | |
| Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads | » Outlines the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits |
| Fezile Dabi District Municipality and Metsimaholo Local Municipality, Integrated Development Plan | » According to the Municipal Systems Act of 2000, all Municipalities have to undertake an Integrated Development Planning (IDP) process to produce Integrated Development Plans (IDPs). As the IDP is a legislative requirement it has a legal status and it supersedes all other plans that guide development at local government level. |
| The White Paper on the Energy Policy of the Republic of South Africa (December 1998) | » Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by this white Paper. |
| The White Paper on Renewable Energy (November 2003) | » This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. |

# DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 4

This section of the Draft Scoping Report provides a description of the environment that may be affected by the **Lethabo PV Solar Energy Facility**. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is 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 existing information available for the area, and aims to provide the context within which this EIA is being conducted.

The entire proposed project development area on the farm 1814 is described below. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within **Appendices D – K.**

## 4.1 Regional Setting: Location of the Study Area

The proposed Lethabo Solar Photovoltaic (PV) Facility is located between Sasolburg and Vereeniging, approximately 10 and 25 km from the major towns in the Vaal Triangle in the Free State. The site falls within the Metsimaholo Local Municipality which falls within the Fezile Dabi District Municipality. The identified sites fall within the Lethabo coal fired power station boundary (refer to Figure 4.1.). The site can be accessed directly from the R716.

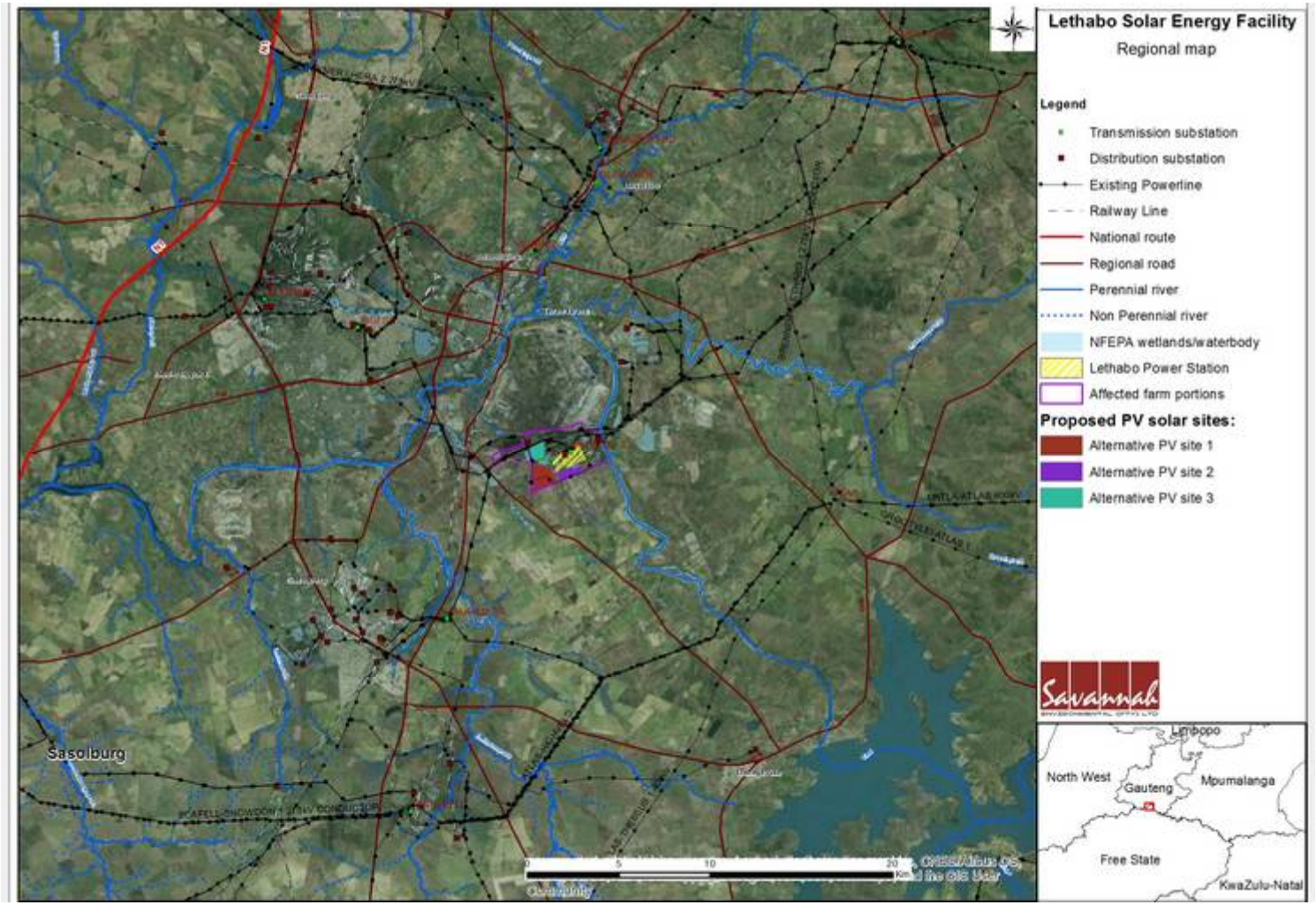


**Figure 4.1:** Regional context of the Lethabo PV Solar Energy Facility project site showing the site location as well as existing infrastructure in the area

## 4.2 Climatic Conditions

The climate for the site has been derived from climatic data summarised for Standerton located about 22 km south-west of Lethabo Power Station. The area receives about 650 - 750 mm of rain on average per year. From May to September, rainfall is minimal, with most rainfall occurring from late October to March, peaking between November and January. Temperatures in summer peak during December and January at a daily average of 26°C, with an average of 17°C for June. During July, night temperatures are on average -1°C, with frosts during winter common.

## 4.3 Biophysical Characteristics of the Study Area

### *4.3.1. Topography and Geology*

The proposed sites are located in a bowl that has been formed by a major meander in the Vaal River. The base of the bowl is set at around 1445m amsl. Land rises gently to north, south, east and the west to between 1495 to 1510m amsl. The proposed sites are located close to the slopes of the southern edge of the bowl. This adjacent landform is likely to have a significant influence on the extent of visibility to the south.

Figure 4.2 shows that all the three identified alternative area are completely underlain by rocks of the Early Permian Vryheid Formation. In the Main Karoo Basin of South Africa the Vryheid Formation is a sandstone and coal-rich stratigraphic unit that interfingers with (i.e., is transitional with and partially time equivalent to) the overlying Volkrust and underlying Pietermaritzburg Formations; both of which are both are predominantly argillaceous. Genetically the formation can be divided into lower fluvial-dominated deltaic interval, a middle fluvial interval (the coal-bearing zone) and an upper fluvial-dominated deltaic interval. The thickness and frequency of the sandstone units increases from the base of the formation, reaching their maximum in the middle fluvial interval and then decrease again towards the overlying Volksrust Formation. To the south and south-east the Vryheid Formation grades laterally into undifferentiated, deep-water argillites of the Ecca Group The Vryheid Formation is one of sixteen (16) recognised stratigraphic units that constitute the Permian Ecca Group. During the deposition of the Ecca Group the basin was dominated by a large sea (the salinity levels of this water body remain unresolved). The exception to this model was the deposition of the coal-bearing strata of the Vryheid Formation along the northern margin during an episode of deltaic progradation into the basin.

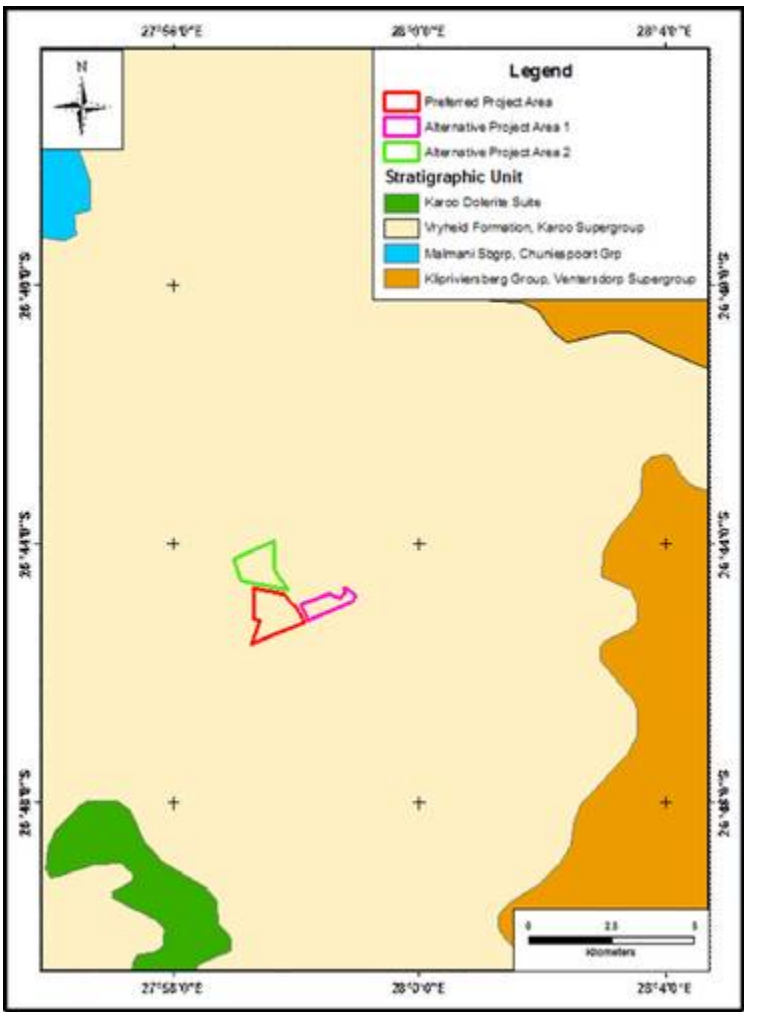


**Figure 4.2:** Map of the geology underlying the project area and its surroundings

### *4.3.2 Soil, Agricultural Potential and Land Capability*

The area under investigation is covered by only one land type - **Ca1** (Mixture of apedal, plinthic and clay soils). The distribution of soils with high, medium and low agricultural potential within each land type is also given, with the dominant class shown in bold type in Table 4.1.

**Table 4.1** Land types occurring (with soils in order of dominance)

| Land Type | Depth (mm) | Dominant soils | Percent of land type | Characteristics | Agric. Potential (%) |
|---|---|---|---|---|---|
| **Ca1** | 750-1200<br><br>500-1200<br><br>750-1200 | Longlands 10/20<br><br>Kroonstad 20/21<br><br>Avalon 20/21/23/24 | 27%<br><br>19%<br><br>17% | Grey-brown to grey, sandy apedal soils on mottled, sandy clay loam soft plinthite<br><br>Grey-brown to grey, sandy apedal soils on structured, gleyed clay<br><br>Brown to yellow-brown, sandy/loamy apedal soils on mottled, sandy clay loam soft plinthite | High: 14.0<br>**Mod: 74.4**<br>Low: 11.6 |

### *4.3.3. Vegetation*

The study sites fall within the original extent of the Central Free State Grassland (Figure 4.3) as defined by Mucina and Rutherford (2006). The Central Free State Grassland (Unit Gh 6) is a relatively short grassland on undulating plains. In its original form, it is dominated by *Themeda triandra* whilst *Eragrostis curvula* and *E. chloromelas* become more dominant in degraded habitats. Severely degraded clayey bottomlands are often dominated by dwarf karroid shrubs, whilst riverine areas and severely overgrazed/trampled low-lying areas are prone to encroachment by *Acacia karroo* (Mucina and Rutherford 2006). This vegetation type is not officially listed as a threatened ecosystem, but it is regarded as vulnerable (Mucina and Rutherford 2006) due to large portions of it being transformed either for cultivation or by dams, with only small portions that are protected such as in the Rustfontein Dam Nature Reserve.

At the time of compiling this report, no systematic conservation plan for the Free State has been published. The conservation planning thus applicable is the gazetted National List of Threatened Ecosystems. The Central Free State grassland has not been included in the currently listed threatened ecosystems.

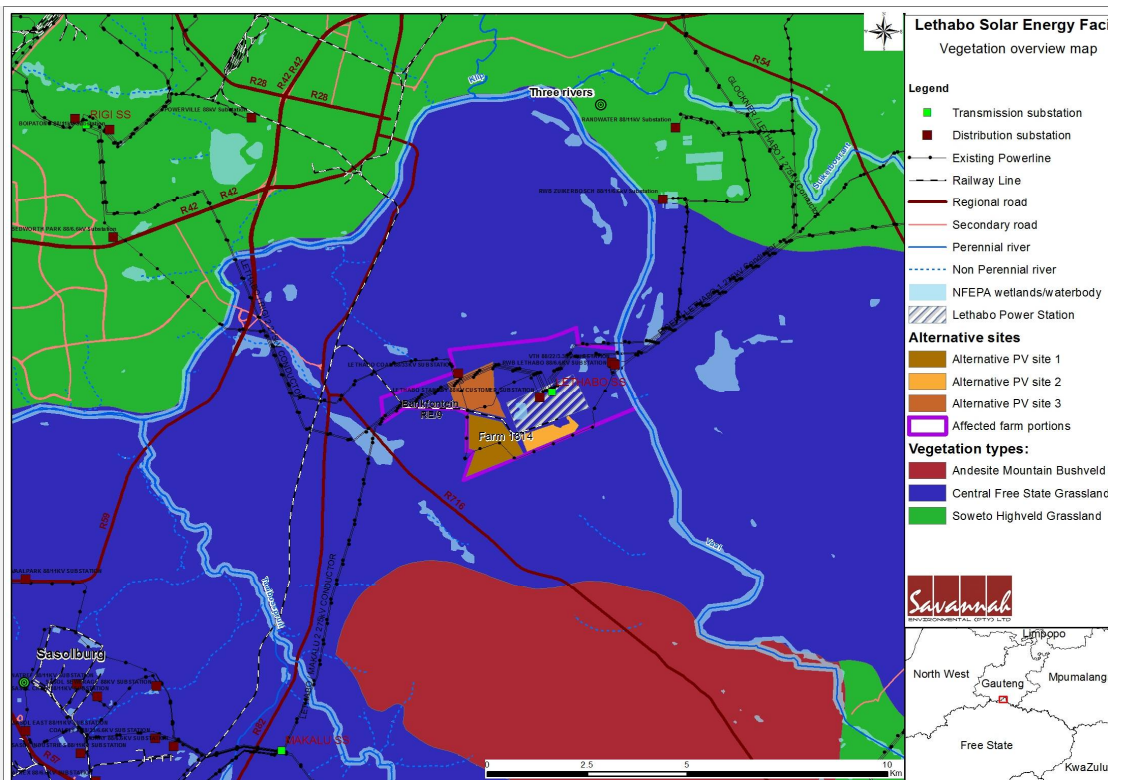


**Figure 4.3**: The original extent of the vegetation types on the proposed development site after Mucina and Rutherford (2006)

### i. Species of conservation concern

**Flora community**

A total of 1432 plant species have been recorded in the Sasolburg/Vereeniging Area according to the SANBI database. It is unlikely that all of these species will occur within the project area, whilst species not previously recorded may be present. Of the previously recorded species, 32 species have a red-data status. The presence of these species on site will have to be verified during a detailed field study. Given the apparent past high disturbance of the study area, the likelihood for red data species or even a very high species diversity on site is considered to be low. Rather, it is expected that a high number of the 262 previously recorded alien invasive species may be present as a result of the previous disturbances in the area.

**Faunal Community**

No faunal species of conservation concern are likely to occur within the study area as a result of the previous transformation and disturbance on the proposed project site.

### *4.3.4. Drainage and Wetlands*

The Vaal River bows to the east, north and west of the sites at a distance of 1.48km at its closest point. Several open waterbodies are located within the arc of the river, the

closest being 830 m north of the proposed site. Artificial furrows are installed around the power station draining water eastwards and away from the study sites (Figure 4.4). One concrete reservoir is the only National Freshwater Ecosystem Priority Areas (NFEPA) wetland that has been demarcated within the study site and its 500m buffer (Nel *et al.,* 2011). Inspection of aerial photos from 2012, provided by the office of the surveyor general, showed no obvious rivers or channelled waterways on or within 500m of the sites. A 20 m interval contour map was used for the estimations of the slope and altitude. The proposed site has a ~0.5% north facing slope, with the altitude ranging from ~1460-1450 m.a.s.l. Slopes of ~1.3% and ~1.8% in north and north easterly directions respectively occur on alternative site 2. Based on the landscape setting, any wetlands found in the study area are likely to be seeps, depressions, wetland flat or floodplain related.

### 4.4. Land uses and Visual Quality

The area around the Lethabo PV site is characterised by three distinctive land use namely:

» Heavy industrial development which includes the adjacent Lethabo Power Station (Figure 4.5), open cast mining areas to the north and west of the proposed alternative sites, Mittal Steel to the north of Vereeniging and the Sasol refinery in Sasolburg to the south west. These activities include large industrial structures such as cooling towers, overhead conveyors and other industrial buildings that are visible over a wide area. This existing infrastructure has an overwhelming impact on landscape character in the area.
» Urban development includes the towns of Vereeniging and Vanderbijlpark to the north of the Vaal and Sasolburg to the south west. These are relatively dense urban areas that are generally inward looking.
» Agricultural development which includes small holdings to the south of the proposed alternative sites and closer to the urban areas and larger farming units that are generally located to the south and east. Farms are generally a mixture of arable and pastoral.

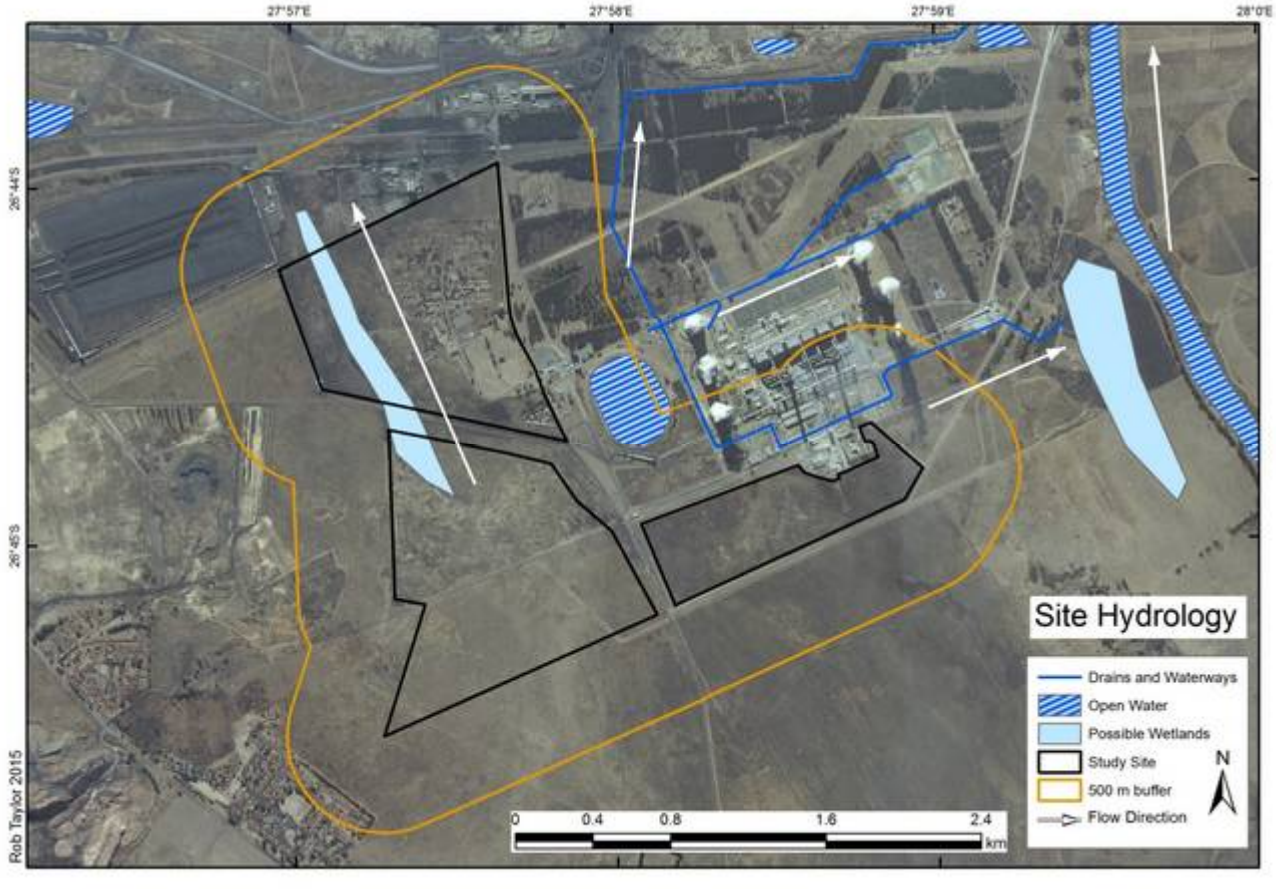


**Figure 4.4:** Site hydrology showing drains and waterways. The arrows indicating the direction of water flow.

**Figure 4.5**: View of Lethabo Power Station from the agricultural areas to the south east.

Possible Sensitive Receptors or places within the landscape which due to use could be sensitive to landscape change include:

- Area Receptors which include:
  - Urban areas on the fringes of Sasolburg, Vereeniging and Vanderbijlpark.
  - Areas that is important for tourism and recreational use such as local golf courses, Emerald Resort, the Vaal River Corridor and the Vaal Racecourse.
- Linear Receptors which include main routes through the area. The most sensitive of these is likely to be the R54 as this is the main route to the Vaal Dam which is a major local recreation and tourism destination.
- Point Receptors that include isolated and small groups of homesteads that is generally located within the Agricultural Landscape to the south and east of the area.

### 4.5. Access and Transport Routes in the Region

The site can be accessed from the R716 regional road which lies west of the proposed site connecting Vereeniging to Deneysville. Within the site itself, access is already established, this is used for the power station, these will be utilised for construction purposes (and later limited access for maintenance).

### 4.6 Social Characteristics of the Study Area and Surrounds

The purpose of the section is to provide an overview of the current socio-economic baseline environment and context in which the proposed project will take place within the Metsimaholo Local Municipality (MLM) and Fezile Dabi District Municipality (FDDM) in the Free State Province. This section of the report will provide a strategic understanding

of the socio-economic profile of the study area, in order to develop a better understanding of the socio-economic dynamics as a background to the development of the project. The data presented in this section has been largely derived from the Free State Census 2011 Municipal Report, FDDM IDP 2012-2017, MLM IDP 2014/2015, the Census Survey 2011 (Stats SA), as well as the local government handbook 2012.

### *4.6.1 Population*

The population trends in a geographical area affect the rate of economic growth through the provision of labour and entrepreneurialism and the demand for goods and services. These trends also indicate the number of people who are likely to be impacted by the proposed project. The proposed development will be constructed in the FDDM within the MLM. The population of the FDDM in 2011 was approximately 488 036 people, of which 149 108 people reside in the MLM. The average annual population growth rate in the study area is estimated by comparing data from 2001 to 2011.

### *4.6.2 Employment profile*

The MLM is largely populated by potentially economically active population. In the MLM the unemployment rate is 32% and there are approximately 20 528 people who are unemployed. This implies that there is a lot of human capital available for any kind of work, but also that there is space for training and developing economically active population in the relevant fields needed. This could increase the employment level and decrease the poverty level in the local area. Local workers should be utilised as much as possible for the proposed development in order to alleviate local unemployment.

### *4.6.3 Household income levels*

The MLM has the lowest percentage of low income households and the highest percentage of middle and high income households in the district. The average household incomes of the MLM are as follows:

» 59.1% of households are classified as low income earners.
» 33.1% of households are classified as middle income earners;
» 7.8% of households are classified as high income earners.

The high percentage of low income households indicates that that there is a high demand for employment opportunities which will help decrease the dependence on forms of assistance either from government and or non-government organisations. The high poverty level of 59.1% has social consequences such as not being able to pay for basic needs and services. The lower average income levels indicate a higher demand for employment opportunities in the economy. However skill levels are less likely to improve unless education levels improve which will lead to more skilled people which will in turn lead to the opportunity to earn higher income levels. This means that there

should be less focus on the quantity of job creations and more focus on the quality of jobs created.

### *4.6.4. Access to services*

Access to basic services is generally greater in the MLM than at a provincial level demonstrating that service delivery is generally more accessible. This is attributed to high population density in the MLM which decreases the cost of infrastructure development and service delivery compared to less dense areas.

### *4.6.5. Economic trends*

Fezile Dabi DM is the second largest contributor to the Provincial GGP (31%) and Motheo District Municipality being the largest (35%) contributor. The economy of Fezile Dabi DM (4%) has been the largest growing economy in the province (FDDM IDP 2012-2017). The economy of the Free State Province has been restructuring from a primary sector economy to a tertiary economy. This shift has been happening also on the economy of Metsimaholo LM. The shift of the economy from a primary to a tertiary economy is resulting in a large number of jobs losses and the mining sector is identified as suffering the largest loses.

## 4.8 Heritage features of the region

### *4.8.1. Heritage and archaeology*

Very little research has been done in this area and the following studies were consulted for this report: archaeological impact assessment (vd Walt et al 2005) and a heritage Impact study (Bruwer 2006). Heritage features identified in these studies include mostly Stone Age components and historical features. The area has been historically used for extensive plantations and this would have destroyed and disturbed any surface evidence of heritage features. Graves can be expected anywhere on the landscape.

### *4.8.2. Palaeontology (Fossils)*

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

The study area is completely underlain by potentially fossiliferous sedimentary rocks of the Early Permian Vryheid Formation The most conspicuous and common components of the palaeontological record of the Ecca Group in general are the plant macrofossils of the *Glossopteris* flora. Two large and conspicuous leaf form taxa dominate the *Glossopteris* flora; these being *Glossopteris* and *Gangamopteris*. Within the upper Ecca (containing the Vryheid Formation) *Gangamopteris* has ceased to occur with only *Glossopteris*

present (Anderson and McLauchlan, 1976). In that summary it is indicated that the Vryheid Formation can be expected to contain the plant macrofossils *Buthelezia*, *Sphenophyllum*, *Rangia*, *Phyllotheca*, *Schizoneura*, *Sphenopteris*, *Noeggerathiopsis*, *Taeniopteris*, *Pagiophyllum* and *Benlightfootia* and the wood taxa *Australoxylon* and *Prototaxoxylon*. In addition to the above records can be added the observations of Tavener-Smith *et al*., (1988) where it was noted that both *Glossopteris* and *Vertebraria* occur within the palaeontological record of the formation.

Animal body fossils are rare within the Ecca Group in general (excepting the time equivalent faunas of the Whitehill Formation). However, no reptile fossils have been identified within the Vryheid Formation. Hobday and Tavener-Smith (1975) reviewed trace fossil assemblages identified within the Vryheid Formation. Within that fossil assemblage they identified two forms (*Helminthiopsis* and *Taphrelminthopsis* within horizontally laminated siltstones and mudstones that represent part of the deep water *Nerites* community.

# SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED LETHABO PV SOLAR ENERGY FACILITY CHAPTER 5

This chapter presents the potential issues identified for the proposed Lethabo PV Solar Energy Facility and its associated infrastructure, and provides recommendations for further studies required to be undertaken in the EIA phase.

Specialist scoping reports are included within **Appendix D to K** wherein the potential issues relating to the project are identified and described in detail. Some environmental impacts are expected to be of greater significance than others and require a greater level of investigation

A discussion of the potential cumulative impacts associated with the proposed project is presented in Section 5.5.

## 5.1 Approach to the Identification of Issues

An understanding of the activities to be undertaken during the construction process is necessary to predict the potential impacts of the facility on the environment. These have been explained in detail in Chapter 2 of this report and include:

**Construction Phase:**

» land clearing for site preparation and access routes
» transportation of supply materials and fuels
» construction of foundations involving excavations and placement of concrete (if required)
» construction of on-site substation, overhead power line and underground cables
» operating cranes for unloading and installation of PV panels (where required)
» commissioning of new installations
» waste removal and rehabilitation of disturbed sites.

**Environmental issues**: associated with construction activities may include, amongst others, alteration of land use, soil erosion, visual impacts, threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna and social impacts (as indicated in Section 5.2).

**Operational Phase**

Operational activities will include regular maintenance of the PV installation and all associated site infrastructure.

**Environmental issues**: specific to the operation of the Solar Energy Facility could include visual impacts, impacts on biodiversity and impacts on agriculture due to the changes in land use.

**Decommissioning Phase**

Decommissioning activities would include removal of project infrastructure and site rehabilitation. Similar to the construction phase, environmental issues associated with decommissioning activities may include, among others, noise impacts, soil erosion, and threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna. Impacts associated with decommissioning are expected to be similar to those expected for the construction phase.

## 5.2 Scoping of Issues associated with the Proposed Solar Energy Facility and Associated infrastructure

The text and tables below provide an indication of the potential direct and indirect environmental issues and impacts which have been identified during the Scoping phase of the EIA and which may be relevant during the construction and operational phases of the Solar Energy Facility. Impacts associated with decommissioning of the project are expected to be similar to those associated with the construction phase.

### *5.2.1 Potential impacts on avifauna*

While renewable energy sources such as solar energy hold great potential to alleviate dependence on fossil fuels they are not without their environmental risks and negative impacts. Poorly sited or designed solar energy facilities can have negative impacts on not only vulnerable species and habitats but also entire ecological processes. These impacts are extremely variable and are dependent on a number of contributing factors which include the design and specifications of the development, topography, habitats capable of supporting various bird species as well as the number and diversity of birds present at the development site. Solar energy facilities may impact birds and bird populations in three key ways (Table 5.1). These can be grouped as either lethal, direct mortality impacts (i.e. collisions with the PV panels) that affect individual birds; or the non-lethal, less direct impacts (habitat destruction and disturbance) that are common to most forms of development.

**Table 5.1**: Potential impacts on avifauna

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | **Construction** | | |
| Habitat Loss | This impact is likely to have dire consequences for the smaller grassland bird species (i.e. larks) with small home ranges as entire territories could be removed during construction activities. The grassland vegetation present on all the three alternative sites appears to be degraded to some extent and as a result may not be able to support the more sensitive grassland species and any habitat destruction impacts that may occur are likely to only affect local bird populations.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None identified at this stage |
| Disturbance and Displacement | Construction of solar energy facilities requires a significant amount of machinery and labour to be present on site for a period of time. For shy, sensitive species or ground nesting birds' construction activities are likely to be a cause of temporary disturbance or even result in displacement from the site entirely. In addition, species commuting around the area may become disorientated, avoid the site and fly longer distances than usual as a result and for some species this may have critical energy implications (Smallie, 2013).<br><br>The study area is already subjected to a fairly significant degree of disturbance associated with the mining and energy generation activities in the immediate vicinity of the two sites. It is therefore difficult to predict at this stage how significant the disturbance impacts will be on local bird populations in the short or long-term. However based on the footprint of the PV facility and the bird species likely to occupy the study area, low to moderate impacts are probable. | Local | Confirmation of any breeding in the areas during subsequent phases of the EIA process will result in identification of any no go areas |

| Issue | Nature of Impact and Applicable listed activities (GN 544, 545 &546 of 18 June 2010) | Extent of Impact | 'No go' areas |
|---|---|---|---|
| | » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| **Operation Phase** | | | |
| Mortality as a direct collisions with solar panels | Bird mortality has been shown to occur due to direct collisions with solar panels. Species affected included water birds, small raptors, doves, sparrows and warblers (Kagan *et al*, 2014). In some cases, the reflective surfaces of PV panels act as attractants for approaching birds. These surfaces may be confused for large water bodies, causing disorientation in the same manner as windows do, resulting in injury or death.<br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None identified at this stage |
| Collisions with power line infrastructure | Collisions are the biggest single threat posed by power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Several existing power lines traverse through the study area and it is a proven fact that placing a new line next to an existing line reduces the risk of collisions to birds. The reasons for that are two-fold, namely it creates a more visible obstacle to birds and the resident birds, particularly breeding adults, are used to an obstacle in that geographic location and have learnt to avoid it (APLIC 1994). | Local | None identified at this stage |
| Disturbance and Displacement | Similarly, but to a lesser extent, ongoing maintenance activities at the operational facility, are likely to cause some degree of disturbance to birds in the general vicinity.<br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15* | Local | None identified at this stage |

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | » *GN 546: 14(i)* | | |
| Other Impacts | Birds could have an impact on the PV arrays once the facility becomes operational. These include:<br>» Defecation on the PV cells by birds utilising or flying over the facility. A build-up of faecal matter on the panels is likely to cause interruptions to and/or reduced production of power at the facility;<br>» Certain bird species may be attracted to the solar arrays, using the PV structures on which to perch, roost or even nest. An increase in the number of birds roosting, nesting and feeding at the facility could lead to increased defecation on the solar infrastructure and panel obstruction, resulting in conflict between the local bird populations and facility operators.<br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | N/A |

**Gaps in knowledge and recommendations for further study**

At this early stage of the assessment process, the confidence with which these impacts have been evaluated is low. In addition, the identification of those species that may be impacted upon is also extremely difficult, primarily due to the lack of available knowledge and experience in South Africa regarding solar PV plants, and their possible impacts. Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the avifaunal specialist field since 2006. However bird behaviour cannot be reduced to formulas that will hold true under all circumstances.

A more detailed analysis of micro habitats (focusing on those habitats within the site boundaries) and the species that these habitats are able to support will be conducted by means of a site visit to the study area during the EIA phase as described in Chapter 7.

### *5. 2.2 Potential impacts on ecology (flora and terrestrial fauna)*

Potentially sensitive areas were delineated for the scoping study from visual inspection of Google imagery and available delineations of the Threatened Ecosystems and wetlands database (as available from the BGIS website). The areas thus identified as sensitive (Figure 5.1) are depressions, seepage areas and wetlands. These habitats are sensitive because of their ecosystem functions – providing specialised niches for flora and fauna, creating corridors in the landscape, filtering water, catching sedimentation and concentrating water runoff from catchments. The sensitivity analysis provided may only be considered as a *preliminary* assessment that will be updated after a detailed field visit and detailed wetland delineation. Overall, it may be possible to position the PV arrays in such a way around confirmed wetlands and seepage areas to prevent any negative impact.

Impacts of the proposed development will be mostly on the vegetation and supporting substrate. Potential expected impacts are listed in Table 5.2, but it must be stressed that this evaluation is preliminary and will only be finalised after a detailed field study of the area. Impacts on animals are regarded as minimal unless the development affects their specific (limited) habitat, as animals are capable of moving away during construction and smaller species possibly resettling afterwards.

Given the apparent past high disturbance of the study area, the likelihood for red data species or even very high species diversity on site is considered to be low. Rather, it is expected that a high number of the 262 previously recorded alien invasive species may be present.

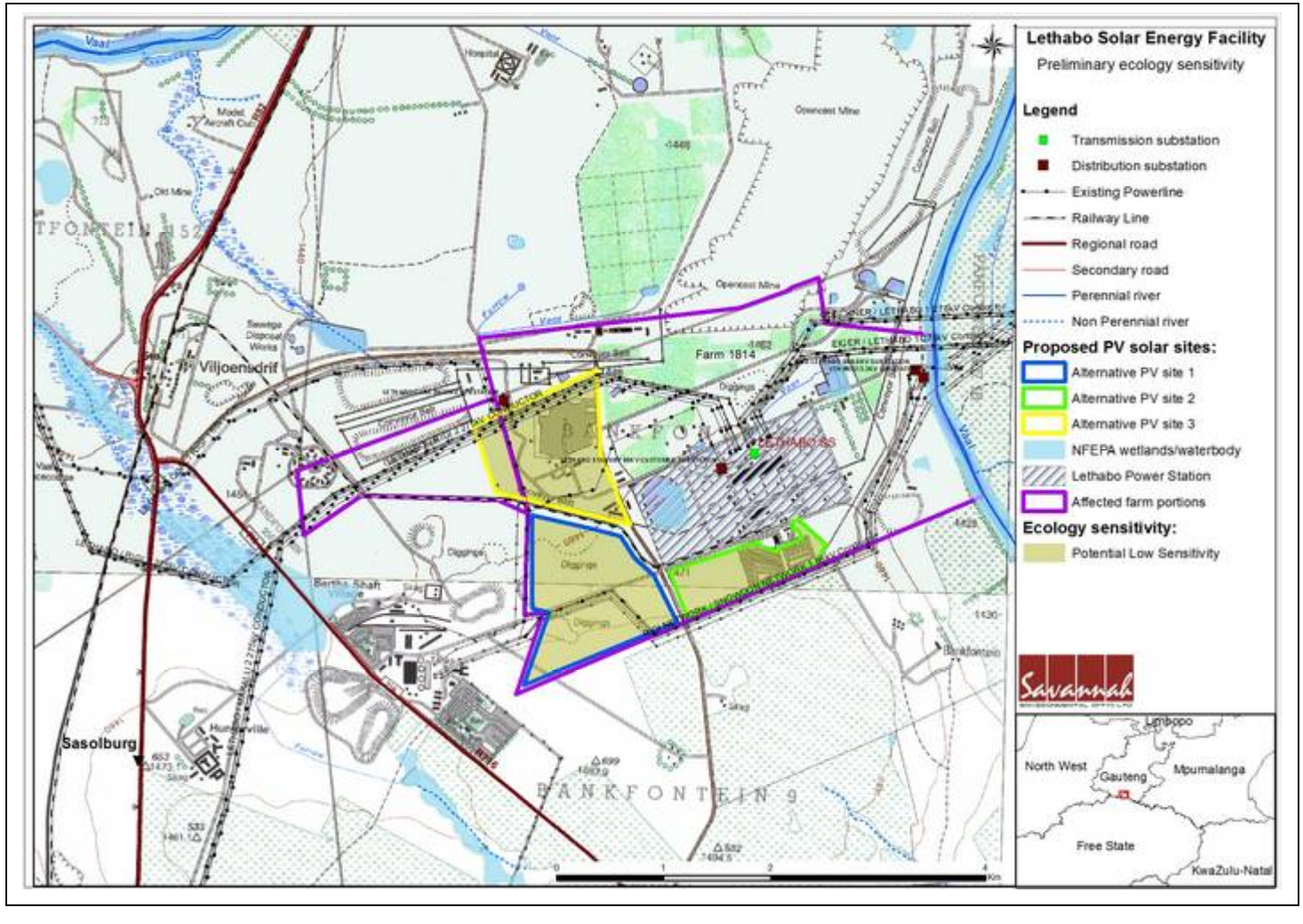


**Figure 5.1**: Preliminary ecological sensitivity map of the study site and surrounding area

**Table 5.2:** Potential impacts on ecology

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **No-Go Areas** |
|---|---|---|---|
| | **Construction Phase** | | |
| Disturbance or loss of indigenous natural vegetation | Construction of infrastructure may lead to direct loss of semi-natural vegetation, causing a reduction in the overall extent of specific species and vegetation cover. Consequences of the potential impact of loss of indigenous semi-natural vegetation occurring may include:<br><br>» Increased vulnerability of remaining vegetation portions to future disturbance, including erosion;<br>» General loss of habitat for sensitive species;<br>» General reduction in biodiversity;<br>» Disturbance to processes maintaining biodiversity and ecosystem goods and services; or<br>» Direct loss of ecosystem goods and services.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | The only "no-go" areas are identified to date are confirmed wetland areas. A more detailed investigation will be undertaken as part of the EIA phase. |
| Disturbance or loss of threatened / protected plants | Several protected or threatened plant species are expected to occur on and adjacent to the proposed development site. Flora is affected by loss or change of habitat due to infrastructure development, as plants are immobile. In the case of threatened plant species, a loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences of this may include:<br><br>» Fragmentation of populations of affected species<br>» Reduction in area of occupancy of affected species<br>» Loss of genetic variation within affected species | Local | The only "no-go" areas identified to date are confirmed wetland areas.<br><br>Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely. |

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **No-Go Areas** |
|---|---|---|---|
| | » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| Loss of habitat for threatened and /or protected vertebrates | Threatened animal species are indirectly affected primarily due to loss or alteration of habitat. Animals are generally mobile and, in most cases, can move away from a potential threat. The biggest threat to any fauna species may come from collision with vehicles during construction, or getting trapped in excavations, or being killed intentionally (illegally) by construction staff.<br><br>Threatened species include those classified as critically endangered, endangered, or vulnerable. For any other species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:<br><br>» Reduction in area of occupancy of affected species; and<br>» Loss of genetic variation within affected species.<br><br>There are some red data terrestrial vertebrate species that could occur in the study area. The presence of these red data fauna species must be confirmed.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | The only "no-go" areas identified to date are confirmed wetland areas.<br><br>Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely. |
| Impacts on wetlands | The generally low slopes and soil conditions in the area have, over time, created several smaller wetlands – ranging from small depressions to larger seepage areas, vleis and wetlands, of which the exact nature and extent still needs to be determined during a detailed field visit. | Local | The delineation of the study area has already taken larger mapped wetlands into |

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **No-Go Areas** |
|---|---|---|---|
| | Construction of the PV array, if it occurred within the immediate catchments of any of these wetland areas, would lead to some direct or indirect changes to the surface hydrology of these areas, but would not greatly affect the seepage of water into lower-lying wetlands. This effect on the hydrology of the larger landscape or loss of habitat for species that depend on this habitat type should be minimal, if a suitably wide buffer zone will be maintained between the wetlands and the proposed development. Further recommendations will depend on the wetland study during the EIA phase.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | consideration, but smaller wetlands may still exist within the study area; the delineations of wetlands will have to be studied during a more detailed investigation undertaken as part of the EIA phase. |
| Establishment and spread of declared weeds and alien invader plants. | Major factors contributing to the invasion by alien invader plants includes high disturbance (such as clearing for construction activities, disturbed servitudes next to transport routes or past cultivation) and unsustainable grazing practices. Exotic species are often more prominent near infrastructural disturbances than within less disturbed natural vegetation. Consequences of this may include:<br><br>» Loss of indigenous vegetation;<br>» Change in vegetation structure leading to change in various habitat characteristics;<br>» Change in plant species composition;<br>» Change in soil chemical properties;<br>» Loss of sensitive habitats;<br>» Loss or disturbance to individuals of rare, endangered, endemic and/or protected species;<br>» Fragmentation of sensitive habitats;<br>» Change in flammability of vegetation, depending on alien species; | Local | None |

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **No-Go Areas** |
|---|---|---|---|
| | » Hydrological impacts due to increased transpiration and runoff; and<br>» Impairment of wetland function.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| Unexpected impacts | The chances for the following occurring are extremely small, but unexpected accidents do happen. During construction, clear method statements must be available to make it clear how to deal with the following immediately should these occur:<br><br>» Any accidental spill of hydrocarbons (oil, fuel, etc.)<br>» Any accidental spill of other chemicals<br>» Any occurrence of wild fires | Local to regional | None |
| **Operation Phase** | | | |
| Disturbance or loss of indigenous natural vegetation due to shading | PV panels create large areas of intensive shade that will not be tolerated by most of the species present on site, as these have evolved with a high daily irradiance. Consequently, it can be expected that within the Solar Energy Facility footprint, species composition will change significantly. No locally representative studies or experiments have been undertaken up to date, thus it cannot be predicted which and what density of vegetation may persist. The majority of indigenous grasses, having the $C_4$ carbon-fixing mechanism, are adapted to very high levels of irradiance. A sparser or less stable vegetation beneath the PV panels may:<br><br>» Increase the magnitude of negative effects of disturbances to remaining vegetation, including erosion- and invasion risk;<br>» Lead to a reduction in biodiversity and ecosystem resilience;<br>» Increase habitat fragmentation (depending on location of impact);<br>» Disturb processes maintaining biodiversity and ecosystem goods and | Local | The only "no-go" areas identified to date are confirmed wetland areas. |

| Issue | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **No-Go Areas** |
|---|---|---|---|
| | services; or<br>» Lead to a direct loss of ecosystem goods and services.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| Altered runoff patterns due to rainfall interception by PV panels and compacted areas | PV panels create large surfaces of rainfall interception, concentrating rainfall at the edges from where it flows onto the ground in larger, concentrated quantities opposed to small drops being directly absorbed by the ground or intercepted by vegetation. This may lead to a localised increase in runoff during rainfall events, which may result in accelerated erosion.<br><br>Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating an increase in runoff. Runoff will thus have to be monitored and channelled where necessary to prevent erosion or degradation of lower-lying drainage lines, seepage areas, and rivers beyond the development area.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local and surroundings | The only "no-go" areas identified to date are confirmed wetland areas.<br><br>Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely. |

**Gaps in knowledge and recommendations for further study:**

» The initial desk-top investigation of the study area indicates that placement of components of the solar energy facility could be on previously transformed semi-natural areas, but that there may also be sections of vegetation with a high conservation value. However, provided the final layout has been designed in accordance to findings of a field investigation, it is not expected that the development will compromise the survival of any of the species of conservation concern.
» The presence and delineation of all wetlands will need to be confirmed by a detailed wetland study.
» It must be noted that there is a possibility of species that have not been captured in the POSA SANBI species database for the area up to date, may in fact be found within the study area.
» A detailed ecological survey and sensitivity assessment will be undertaken during the EIA phase according to the methods outlined in Chapter 7.

### *5.2.3 Potential Impacts on Wetlands*

Several open waterbodies are located within the arc of the river, the closest being 830 m north of the proposed site. Artificial furrows are installed around the power station draining water eastwards and away from the study sites (Figure 5.2). One concrete reservoir is the only NFEPA wetland that has been demarcated with in the study site and its 500m buffer (Nel *et al.,* 2011). Inspection of aerial photos from 2012, provided by the office of the surveyor general, showed no obvious rivers or channelled waterways on or within 500m of the sites. A 20m interval contour map, allowed for estimations of the slope and altitude. The proposed site has a ~0.5% north facing slope, with the altitude ranging from ~1460-1450 m.a.s.l and slopes of ~1.3% and ~1.8% in north and north easterly directions respectively on the alternative site. Based on the landscape setting, any wetlands found in the study area are likely to be seeps, depressions, wetland flat or floodplain related.


**Figure 5.2**: Site hydrology showing drains and waterways. The arrows indicating the direction of water flow.

**Table 5.3:** Potential impacts on wetlands

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | **Construction and operation Phase** | | |
| Impact on surface water resources (construction and operation) | » Loss of riparian systems resulting from the physical removal of the narrow strips of riparian zones within the road crossings or at pylon positions, being replaced by hard engineered surfaces. This biological impact would however be localised, as a large portion of the remaining catchment would remain intact.<br>» Impact on riparian systems through the possible increase in surface water runoff on riparian form and function<br>» Increase in sedimentation and erosion within the development footprint<br>» Impact on localized surface water quality - During both preconstruction, construction and to a limited degree the operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) associated with site-clearing machinery and construction activities could be washed downslope via the ephemeral systems.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | They are possible wetland areas visible on site, these will be regarded a no-go areas. A more detailed investigation will be undertaken as part of the EIA phase. |

**Gaps in knowledge and recommendations for further study:**

In order to inform the Environmental Authorization process in accordance with the EIA Regulations stipulated within the National Environmental Management Act (Act No. 107 of 1998), as well as the Water Use Licence application process which specifies that activities within 500m from wetlands or riparian areas are excluded from the General Application of Authorization S21 (c) and (i) water uses (government gazette No. 389), wetland and riparian delineations and functional assessments will be conducted to inform activities on the proposed and alternative site for the Lethabo solar photovoltaic facility in the Free State.

### *5.2.4 Potential Impacts on Soil and Agricultural Potential*

The area under investigation is covered by only one land type, Ca1 (Mixture of apedal, plinthic and clay soils). Much of the area comprises grey or yellow-brown, sandy or loamy apedal soils on soft (or occasionally hard) plinthite. The depths vary somewhat, with small areas of shallow soils or clay soils also occurring. The moderately high rainfall in the area means that rain-fed cultivation can be successfully practiced on suitable soils.

The major impact on the natural soil resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. With the possibility of high potential soils in the vicinity, this impact would in all probability have an important significance, although local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact.

**Table 5.4:** Potential Impacts on Soil, Land Use and Agriculture

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| **Construction Phase** | | | |
| Loss of agricultural land use | Due to direct occupation by PV panels and other infrastructure, including roads, for the duration of the project. This will take affected portions of land out of agricultural production.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Site | None |
| Soil erosion | Due to alteration of the surface run-off characteristics, this may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None |
| Degradation of vegetation | Degradation of vegetation due to vehicle trampling, during the construction phase.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None |
| Loss of topsoil | Due to poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15* | Local | None |

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | » *GN 546: 14(i)* | | |
| **Operation Phase** | | | |
| Loss of agricultural land use | Loss of agricultural land use due to direct occupation by PV installation and other infrastructure, including roads, for the duration of the project.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None |
| Soil erosion | Due to alteration of the surface run-off characteristics, this may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None |

**Gaps in knowledge and recommendations for further study:**

The significance of agricultural impacts is influenced by the limited agricultural potential of the land which is suitable only for grazing. As a result, agricultural impacts are not likely to be of high significance. Mitigation measures can also be put in place to reduce the significance of certain of these impacts, such as erosion.

The following assessments will be undertaken in the EIA phase:

» More detailed assessment of soil conditions;
» Assessment of erosion and erosion potential on site;
» Assessment of the impacts of specific construction activities and layout on soil conditions;
» Assessment of specific on-site agricultural activities.

Detail regarding the above is provided in further detail in Chapter 7.

### *5.2.5 Potential impacts on Heritage & Paleontological and Resources*

**Paleontological impacts**:

The effects of the required construction operations to the geological strata underlying the project area will be restricted to the Early Permian Vryheid Formation; this geological unit is known to be fossiliferous. The probability of the project resulting in a negative impact on the paleontological heritage of the Vryheid Formation has been assessed as moderate. Any negative impact on the fossil materials will potentially be highly significant due to the scientific and cultural importance of many of the fossils that may be expected to be present. However, the social benefits of the project have been classified as beneficial, herein, as the project aims to provide renewable electricity to the increasingly stressed national power grid.

**Heritage Impacts:**

Based on the current information obtained for the area at a desktop level it is anticipated that any archaeological sites that occur within the proposed development area will have a Generally Protected B (GP.B) field rating and all sites should be mitigatable and no red flags are identified. Graves are of high social significance and can be expected anywhere in the landscape.

**Table 5.5:** Potential Impacts on Heritage & Paleonthology

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | **Construction Phase** | | |
| Potential impacts on heritage resources | » Archaeology: There is a low to medium likelihood of finding Middle Stone Age (MSA) sites scattered over the study area similar to finds made to the north (Huffman 1999). The construction phase of the project could directly impact on surface and subsurface archaeological sites. The project could have a low to medium impact on a local scale.<br>» Historical finds: Historical finds include middens, structural remains and cultural landscape. No homesteads/structures are visible on Google earth in the study area. Without a field survey it is not possible to determine the age of the buildings. The construction of the project can directly impact on both the visual context and sense of place of historical sites. The construction phase of the project could have a low – medium impact on a local scale.<br>» Burials and Cemeteries: Graves and informal cemeteries can be expected anywhere on the landscape and the location of any graves will have to be confirmed during a field visit. The construction and operation of the proposed project could directly impact on marked and unmarked graves.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local | None identified to date. To be confirmed during EIA Phase |
| Potential movement, damage, or destruction of fossil material | » Damage or destruction of fossil materials during the construction of project infrastructural elements to a maximum depth of those excavations. Many fossil taxa (particularly vertebrate taxa) are known from only a single fossil and, thus, any fossil material is potentially highly significant. Accordingly, the loss or damage to any single fossil can be potentially significant to the understanding of the fossil heritage of South Africa and to the understanding of the evolution of life on Earth in general. Where fossil material is present and will be directly affected by the | Local | None identified to date. To be confirmed during EIA Phase |

| | | | |
|---|---|---|---|
| | building or construction of the project's infrastructural elements the result will potentially be the irreversible damage or destruction of the fossil(s).<br><br>» Movement of fossil materials during the construction phase, such that they are no longer *in situ* when discovered. The fact that the fossils are not *in situ* would either significantly reduce or completely destroy their scientific significance.<br><br>» The loss of access for scientific study to any fossil materials present beneath infrastructural elements for the life span of the existence of those constructions and facilities.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| **Operation Phase** | | | |
| Potential impact on sense of place | The proposed solar energy facility and its infrastructure could directly impact on both the visual context and sense of place of historical sites.<br><br>» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local and regional | None identified to date. To be confirmed during EIA Phase |

**Gaps in knowledge and recommendations for further study**

This desktop study has not identified any paleontological reason to prejudice the progression of the Lethabo Solar Energy Facility within either of the identified alternative locations, subject to the recommended damage mitigation procedures being enacted as outlined in the Heritage report (**Appendix F**). A Phase 1 Archaeological Impact Assessment is recommended, during these, study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described.

A detailed heritage survey and assessment will be undertaken during the EIA phase as described in Chapter 7.

### *5.2.6 Potential Visual Impacts*

The nature of a view is generally more critical to areas that are associated with recreation, tourism and in areas where view is critical to land values. Sensitive receptors or places within the landscape which could be sensitive to landscape change due to current use include:

» Urban areas on the fringes of Sasolburg, Vereeniging and Vanderbijlpark. Should there be a significant impact on these areas, it is possible that there could be significant objection from residents; however, the landscape analysis has indicated that it is unlikely that the proposed development will be visible to these areas. Areas that is important for tourism and recreational use such as local golf courses, Emerald Resort, the Vaal River Corridor and the Vaal Racecourse. As with the urban landscape areas, the landscape analysis indicates that these areas are unlikely to suffer significant impact mainly due to existing vegetation and screening afforded by existing industry.
» Linear Receptors which include main routes through the area. The most sensitive of these is likely to be the R54 as this is the main route to the Vaal Dam which is a major local recreation and tourism destination. From the landscape analysis above, it seems likely that views of the proposed development from these routes will either be largely screened by existing vegetation or will be mitigated by existing industrial structures.
» Point Receptors that include isolated and small groups of homesteads those are generally located within the Agricultural Landscape to the south and east of the area. Vegetation within the agricultural area is likely to provide significant screening of the proposed development. It is also likely that existing industrial structures will provide significant mitigation.

The Zones of Theoretical Visibility (ZTV) for site alternatives 1, 2 and 3 have been evaluated using Arc Spatial Analyst GIS from Figure 5.2, 5.3, and 5.4, the following can be deduced:

- Alternative 1will largely be visible to the north and west. The assessment indicates that this alternative is likely to impact similar areas and have a similar intensity of impact as Alternative 1. It may however be slightly more visible than Alternative 1 to the R716, the R82 and areas to the west within 5km.
- Alternative 2 is likely to be more visible that alternative 1, being visible to approximately the same extent as alternative 1 to the north and west and also being visible for extensive areas to the east. Having said that however, it needs to be pointed out that the visual intensity (extent of development visible) to the east is likely to be low with the greatest impact intensity occurring at a distance in excess of 5km from the proposed development
- Alternative 3 is likely to be the least visible. This alternative will largely be visible to the north and west. Apart from the immediate vicinity of the proposed development, the greatest impact is likely to be at a distance of approximately 8km from the edge of the development. At this distance the proposed development is unlikely to be obvious particularly that where visible it will be seen in the context and against the backdrop of the Lethabo Power Station and adjacent mining operations.

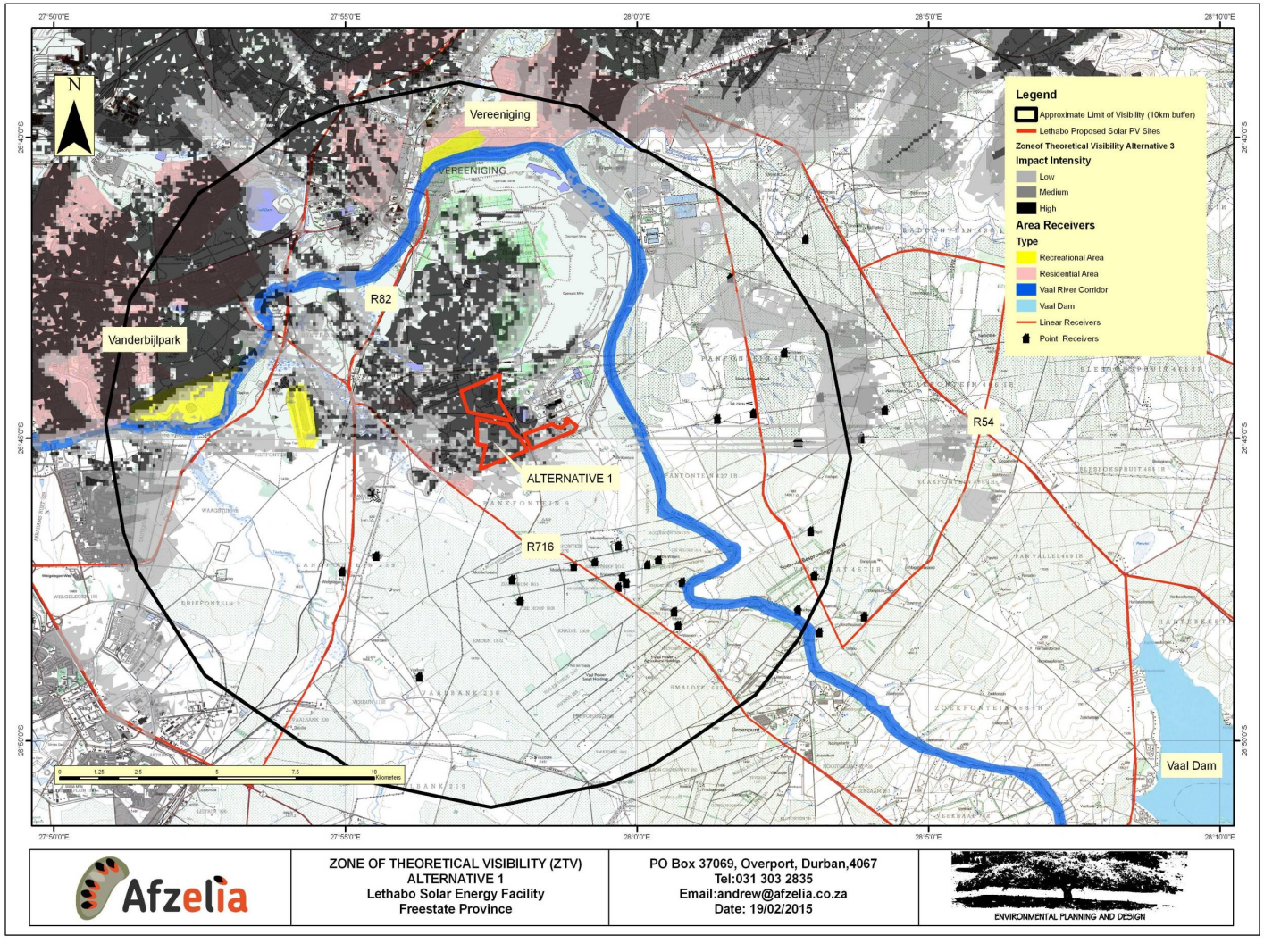


**Figure 5.3:** Zone of Theoretical Visibility – Alternative 1

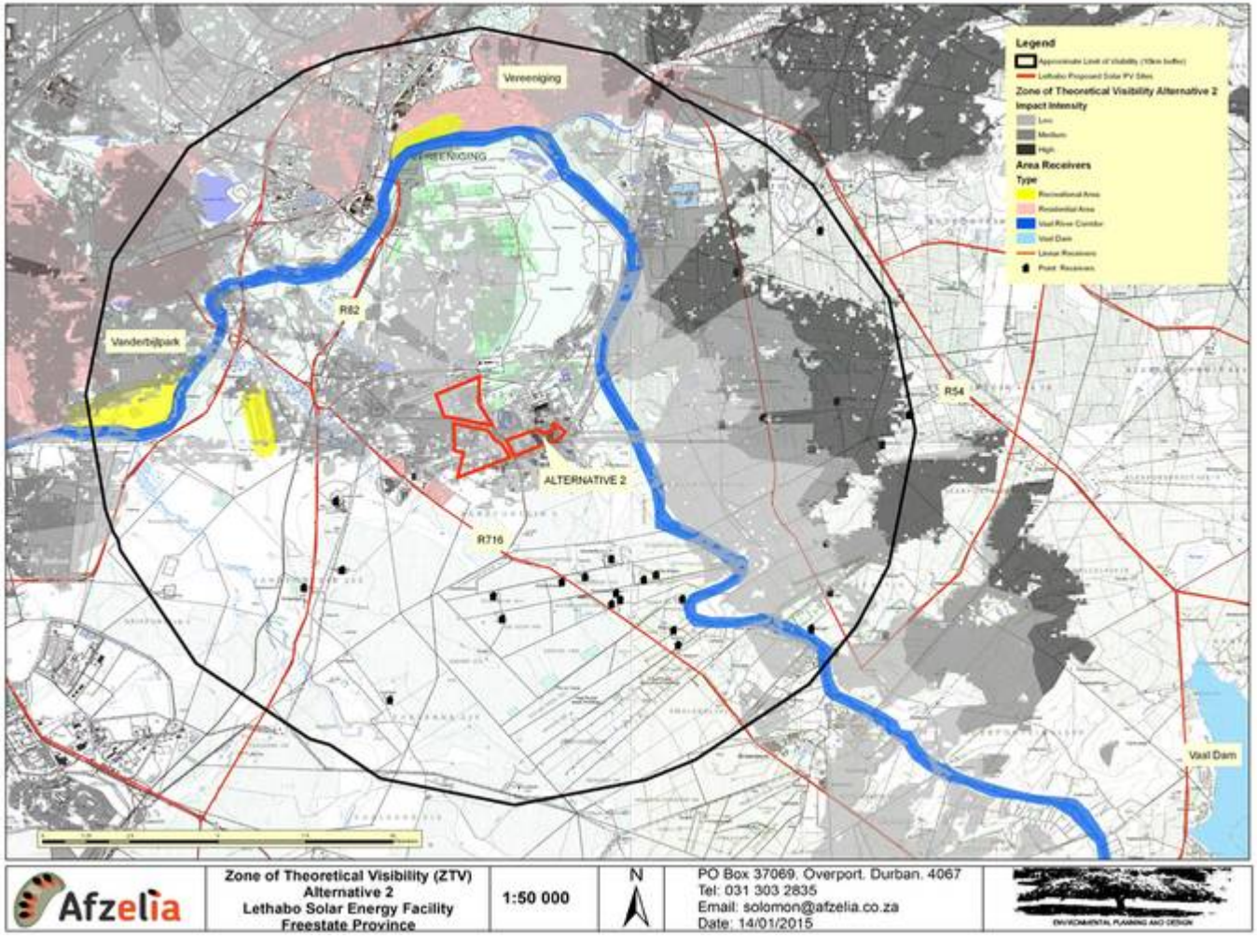


**Figure 5.4:** Zone of Theoretical Visibility – Alternative 2.

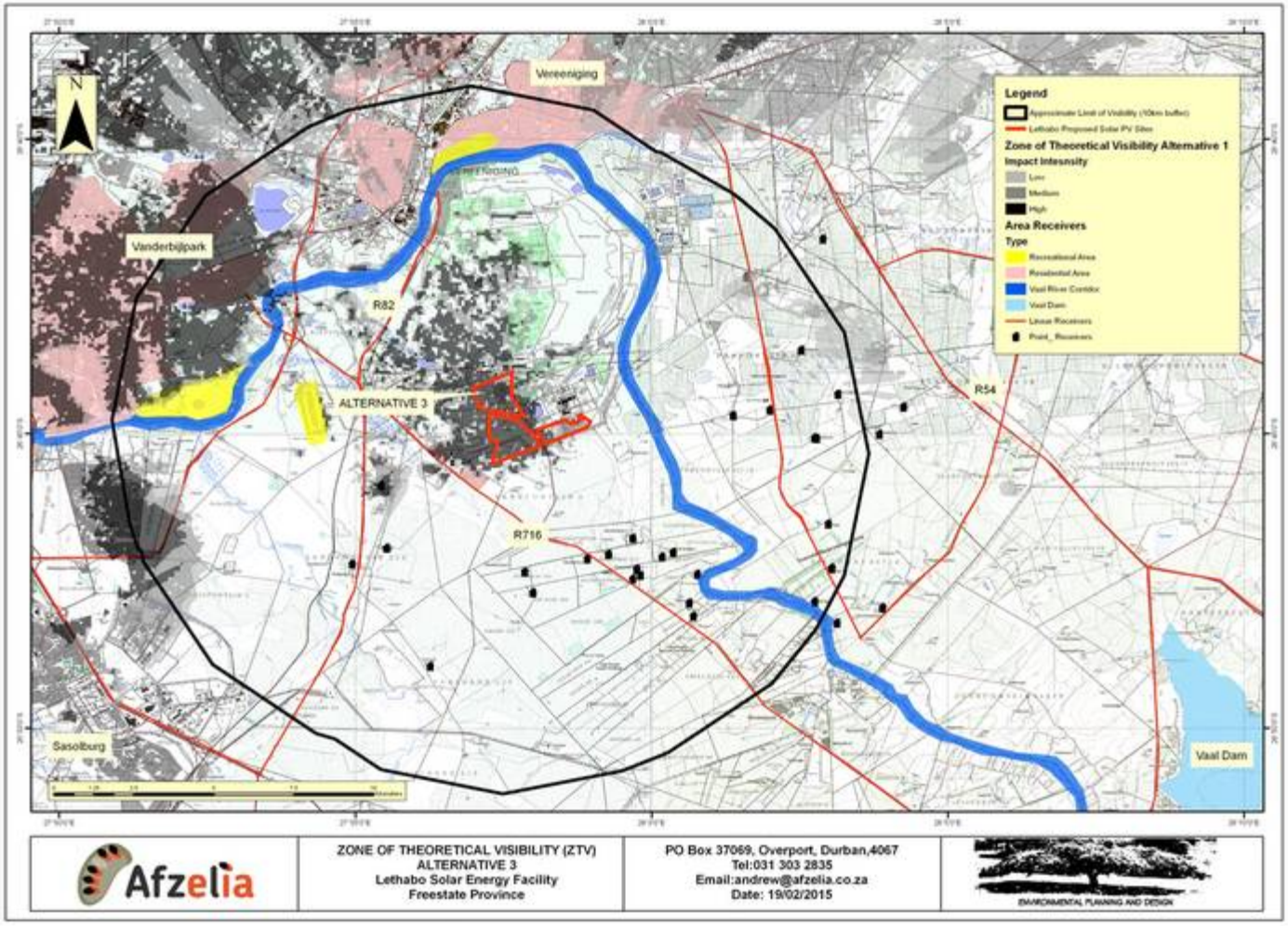


**Figure 5.5:** Zone of Theoretical Visibility – Alternative 3.

**Table 5.6:** Potential visual impacts

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| **Construction Phase** | | | |
| Change of character of the broader landscape | Construction of alternatives 1 and 3 is likely to be most obvious from within the Industrial Landscape within which it is proposed and from Urban areas immediately surrounding it. Changes to these character areas due to construction are not likely to be significant. | Local | None identified |
| Change of character of the broader landscape | Construction of alternative 2 is likely to be less obvious than alternatives 1 and 3 from within the Industrial Landscape within which it is proposed and from Urban areas immediately surrounding it. However it could be more obvious to rural areas to the east. Changes to these character areas due to construction however, are not likely to be significant. | Local | None identified |
| Change in the nature of outlook for individual visual receptors | » It is unlikely that construction of any alternative will be obvious from within the Vaal River Corridor.<br>» It is possible construction of all alternatives may be visible the southern edged of Vereeniging and Vanderbijlpark to the north however it is unlikely that construction will be obvious and it certainly will not be seen from within the urban areas.<br>» It is unlikely that construction of any alternative will have significant impact on any of the identified recreational areas.<br>» It is possible that construction of all alternatives could impact on users of the R716 and R82. Alternative 3 is likely | Local | Not possible to confirm without a site visit but unlikely. |

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| **Operation Phase** | | | |
| Change of character of the broader landscape | The proposed development (all three alternatives) is likely to be most obvious from within the Industrial Landscape within which it is proposed. Changes to this character area are not likely to be significant. | Local | None identified |
| Change in the nature of outlook for individual visual receptors | » It is possible that the proposed development (all three alternatives) could impact on the edges of urban areas to the north of the Vaal River. However due to distance and intervening industrial elements, the change in view is unlikely to be obvious from these areas.<br>» It is possible that alternative 2 could be visible from farmsteads to the east. However because the development will be seen in the context of heavy industrial elements, the nature of the view is not likely to change significantly.<br>» It is possible that the proposed development could impact on users of the R716 and R82. However because the development will be seen in the context of heavy industrial elements, the nature of the view is not likely to change significantly. | Local | Not possible to confirm without a site visit but unlikely. |

**Gaps in knowledge and recommendations for further study:**

Alternative 2 could possibly have greater impact on the recreational area of the Vaal River Corridor when compared with Alternatives 1 and 3.

No alternative is likely to have significant impact on local recreational areas or the Vaal River Corridor.

Alternatives 1 and 3 could have a greater intensity of impact (larger area of development visible) on Residential Areas than Alternative 2, however, due to distance and the density of buildings and internal vegetation, this difference is unlikely to be significant.

Alternative 2 could have greater impact on homesteads within the Agricultural Area particularly to the east of the Vaal when compared with Alternatives 1 and 3. However, because of distance and the mitigatory effect of existing vegetation, this additional impact is unlikely to be significant.

From the perspective of possible impacts on Visual Receivers, none of the alternatives are likely to have significant impact. Whilst visual impacts are indicated as likely to be low, due to the nature of the proposed development, the fact that there is potential to impact on a rural and riverine landscape, a visual impact assessment is recommended in order to assess the significance of the impact.

### *5.2.7 Potential Social Impacts*

The potential positive social impacts during the construction phase are largely linked to the creation of employment and skills development opportunities. The potential negative impacts are linked to the impact on local road surfaces associated with the transport of heavy components and the impact on local communities and current farming activities associated with the presence of construction workers on the site.

During the operation phase the potential exists for further, albeit limited, job creation and some skills development (positive impacts). However, there is also the potential for impacts on the social dynamics of the study area due to the construction of the proposed project. On a regional scale, the operation of the project could potentially result in positive changes in the quality of lives of many by means of strengthening the current electricity supply for the greater area. On a national scale, the proposed project could aid with the government's aim to assist in meeting the government's target for renewable energy.

A number of key social issues are potentially associated with the construction and operation of the solar energy facility as noted in Table 5.7.

**Table 5.7:** Potential social impacts

| **Issue** | **Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)** | **Extent of Impact** | **'No go' areas** |
|---|---|---|---|
| | **Construction phase** | | |
| Socio-economic benefits (positive impacts) | » Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard;<br>» It is anticipated that the more skilled positions could be filled by individuals from South Africa;<br>» Should employment be linked to training and capacity building it would further the positives in this regard;<br>» At this stage it is not anticipated that local procurement would be achievable for the technology requirements associated with a project of this nature. Local procurement would be more focused on the procurement of general construction materials, goods and services.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local and regional | N/A |
| Negative socio-economic impacts | » A large number of construction vehicles utilising the regional road of the R716 and internal access roads for a period of 18-24 months during the construction phase could have a negative impact on the roads. Construction vehicles crossing over the roads to access the site could increase the risk of accidents as well as continuous utilisation of the road over the construction period with heavy construction vehicles could increase the wear and tear on the R716 and internal access roads;<br>» An influx of workers and jobseekers to an area (whether locals are employed or outsiders are employed) could increase the safety risks in the local area and have an impact on the local social dynamics. Should locals be employed it could minimise the perceived and actual risk in this regard.<br>» An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed. Therefore | Local and regional | N/A |

| Issue | Nature of Impact and Applicable listed activities (GN 544, 545 &546 of 18 June 2010) | Extent of Impact | 'No go' areas |
|---|---|---|---|
| | introducing an external workforce to the local area will put pressure on local services and local community. This would, however, also depend on the size of the workforce.<br>» During the construction phase adjacent landowners could be negatively affected by the dust and noise created as a result of the construction activities.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |
| **Operation phase** | | | |
| The potential positive impacts which could arise as a result of the operation phase include the following: | » During the operational phase employment opportunities would be created which could result in benefits to unemployed individuals within the local communities.<br>» Capacity building and skills development throughout the life of the facility could be to the benefit of the employees and could assist them in obtaining transferable skills.<br>» During the operational phase local procurement for general materials, goods and services (e.g. Transport, catering and security) and other spin-off benefits could materialise.<br>» The presence of permanent security personnel at the facility could be beneficial to the overall security measures implemented in the area.<br>» The proposed project could assist in the generation of "green energy" which would lessen South Africa's dependency on coal generated energy and the impact of such energy sources on the bio-physical environment. The project thereby providing clean, renewable energy supply.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | Local and Regional | N/A |
| The potential negative | » The permanent visual impact associated the solar energy facility (solar | Local and Regional | N/A |

| Issue | Nature of Impact and Applicable listed activities (GN 544, 545 &546 of 18 June 2010) | Extent of Impact | 'No go' areas |
|---|---|---|---|
| impacts which could arise as a result of the operation phase include the following: | facility / access roads / firebreaks and so forth) would alter the landscape. Perceptions with regards to the intensity of such an impact are expected to differ among landowners, stakeholders and other individuals. It is anticipated that each person would experience such an impact in a different way depending on their perception of solar energy facility itself, the activities undertaken on the surrounding area, their interest in the project and their exposure to the project on a daily basis. The proposed development is located in an industrial area so the visual implications and impact on sense is predicted to be of low significance.<br>» The facility could increase the risk of veld fires in the area.<br>» The distribution power line required to evacuate power into the Eskom grid via the one of the substations near the proposed facility could further the negative visual impacts on the landscape.<br><br>» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)*<br>» *GN 545: 1 & 15*<br>» *GN 546: 14(i)* | | |

**Gaps in knowledge and recommendations for further study:**

The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs (adopted by DEA&DP in the Western Cape in 2007 and supported by DEA). The approach will include:

» Review of existing project information, including the Planning Documents;
» Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);
» Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc;
» Identification and assessment of the key social issues and opportunities;
» Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimisation and management measures to be implemented; and
» Finalisation of the SIA Report.

### 5.3 Cumulative impacts

Cumulative impacts, in relation to an activity, refer 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 activities or undertakings in the area. For cumulative effects analysis to assist the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). Boundaries must be set so analysts are not attempting to measure effects on everything. Therefore, the cumulative impacts associated with the proposed Lethabo PV Solar Energy Facility have been viewed from two perspectives within this report:

» Cumulative impacts associated with the scale of the project.
» Cumulative impacts associated with other relevant approved or existing solar developments/power generation facilities within 30 km radius of the proposed facility.

Most development impacts are indirect, subtle, and cumulative or unfold over several years following construction or commencement of the operation of the development. While a possible mechanism for an impact to occur can usually be identified, the actual likelihood of occurrence and its severity are much harder to describe (Hill and Arnold, 2012).

The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant.

The anticipated cumulative impacts on agricultural resources, ecological, visual and social receptors are not considered to be of high significance as identified at this Scoping stage of the process. In terms of the visibility of the project, the introduction of a new man made element that will be visible by a visual receptor but the proportion of rural or riverine character when compared with heavy industrial character will remain the same. This means that the development will be seen against a backdrop of existing heavy industrial elements. This relates to a relatively low level of additional visual intrusion seen in the context of the large level of intrusion due to existing major industrial elements, cumulative impacts of this new development to the larger area is likely to have low or no influence on the nature of the areas due to heavy industrial and large mining areas located next to the project site. Existing industrial structures are likely to provide significant screening particularly from middle distance and distance views. From a distance small scale development may also be viewed against a backdrop of larger industry which is also likely to make it less obvious.

# CONCLUSIONS CHAPTER 6

**Eskom Holding SOC Ltd** is proposing to establish a 75MW photovoltaic solar energy facility and associated infrastructure on a site within the Lethabo coal fired power station boundary, approximately 25 km north-east of Sasolburg in the Free State Province.

This Scoping Report aimed at detailing the nature and extent of the Solar Energy Facility on the proposed study area, identifying potential issues associated with the proposed project, and defining the scope of the studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

The conclusions and recommendations of this Draft Scoping Report are the result of desk-top evaluations, on-site inspections of impacts identified by specialists, and the parallel process of public participation. Through the public consultation process every effort is being made to include representatives of all stakeholder groupings in the study area and the Province.

A summary of the conclusions of the evaluation of the proposed Lethabo PV Solar Energy Facility project is provided below. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 7 of this report.

## 6.1. Conclusions drawn from the Evaluation of the Proposed Site for Development of a Solar Energy Facility

The proposed **Lethabo PV Solar Energy Facility** is expected to have a net generating capacity of up to 75 MW (depending on the alternative selected) and includes the following associated infrastructure:

» Solar panels (fixed/tracking technology) with an export capacity of up to 75MW.
» Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, alternative making use of ground screws to support the PV panels.
» Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
» An on-site substation or switching station.
» A power line to facilitate the connection of the solar energy facility from the onsite substation to Lethabo power station or nearest grid access point

» Internal access roads
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity

Three alternative sites are being considered for the proposed project – the alternative 1 site with a development footprint of approximately 112ha, alternative 2 development footprint of 52ha (which would accommodate a smaller facility if selected) and alternative 3 of approximately 130 ha. The majority of potential impacts identified to be associated with the construction and operation of the proposed solar energy facility are anticipated to be localised and restricted to the development footprint. A more accurate understanding of the final development footprint will be obtained during the EIA Phase with the availability of a facility layout plan and detailed specialist investigations.

The key issues and potential impacts identified through this scoping study associated with the Lethabo PV Solar Energy Facility project are summarised in Table 6.1

**Table 6.1:** Summary of the potential impacts associated the Lethabo PV Solar Energy Facility development

| **Construction / Decommissioning Impacts** | **Extent** |
|---|---|
| Habitat Loss | L |
| Disturbance and Displacement | L |
| Disturbance or loss of indigenous natural vegetation | L |
| Disturbance or loss of threatened / protected plants | L |
| Loss of habitat for threatened and /or protected vertebrates | L |
| Impacts on wetlands | L |
| Establishment and spread of declared weeds and alien invader plants. | L |
| Disturbance or loss of indigenous natural vegetation | L |
| Disturbance or loss of threatened / protected plants | L |
| Loss of habitat for threatened and /or protected vertebrates | L |
| Impacts on wetlands | L |
| Establishment and spread of declared weeds and alien invader plants. | L |
| Potential impacts on heritage resources | L |
| Potential movement, damage, or destruction of fossil material | L |
| Loss of agricultural land use | L |
| Soil erosion | L |
| Degradation of vegetation | L |
| Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard; | L-R |
| It is anticipated that the more skilled positions could be filled by individuals from South Africa; | L-R |
| An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed | L |
| Visual impact of construction traffic, deliveries, laydown areas, accommodation, offices. | L |
| Impact on surface water resources (riparian systems) | L |

| **Operational Impacts** | Extent |
|---|---|
| Mortality as a direct collisions with solar panels | L |
| Collisions with power line infrastructure | L |
| Disturbance and Displacement | L |
| Disturbance or loss of indigenous natural vegetation due to shading | L |
| Altered runoff patterns due to rainfall interception by PV panels and compacted areas | L |
| Loss of agricultural land use | L |
| Soil erosion | L |
| Contribution of clean energy | N |
| Employment opportunities | L-R |
| General landscape degradation or changes to landscape character | L |
| Change to the views of visual receptors. | L |
| Impact on surface water resources (riparian systems) | L |

L **Local** R **Regional** N **National** I **International**

As is evident from the table above, the majority of potential impacts identified to be associated with the construction of the Lethabo PV Solar Energy project are anticipated to be localised and restricted to the proposed site itself (apart from social impacts – job creation which could have more of a regional positive impact), while operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa). However, areas of potential environmental sensitivity were identified through the scoping phase. These are shown in Figure 6.1. These include depressions and wetlands such as dams and pans.

The portion of the site which is proposed to be used for development, and particularly these areas if impacted, will be subject to survey and ground-truthing during the EIA phase of the project. The sensitivity map does not represent no-go areas, but rather an outline of potentially sensitive areas identified through scoping within which more detailed investigation is required. These potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase of the process (refer to Chapter 7 for more details). The sensitivity map will be further refined in the EIA phase on the basis of these specialist studies, in order to inform the final design of the facility. In order to assess potential impacts within sensitive areas, the preliminary layout for the solar energy facility will be based on sensitivities identified in the scoping phase, and provided for consideration in the EIA phase.

The conclusions of the studies undertaken within this Scoping Study are as follows:

**Avifauna –** Due to the presence of existing habitat degradation and disturbance associated with the mining and energy generation activities in the study area, it is anticipated that the proposed Lethabo Solar Photovoltaic Facility can be constructed at either of the identified sites with acceptable levels of impact on the resident avifauna. Potential impacts that were identified relating to the PV plant itself are: bird collisions with PV panels; loss of habitat; disturbance; and the nesting of birds on plant infrastructure, of which habitat destruction is likely to be the most significant. Potential impacts of associated infrastructure include the following: collision of large terrestrial birds with overhead power lines; electrocution of birds on pylons; nesting of birds on pylons; habitat destruction and disturbance. Certain levels of habitat destruction and disturbance may also result from the construction of internal access roads, additional on-site substations and operations buildings

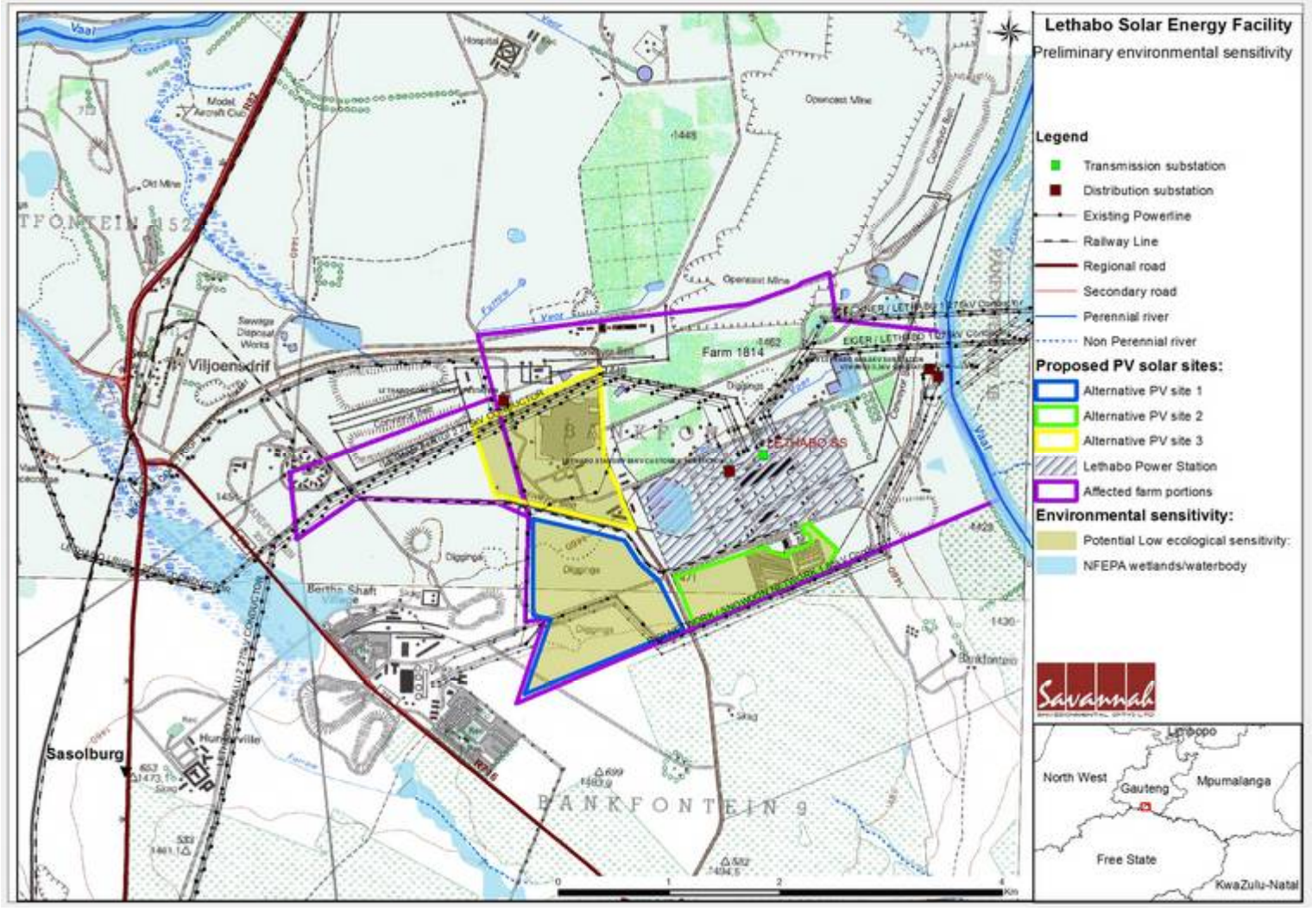


**Figure 6.1**: Desktop environmental sensitivity map of the proposed Lethabo PV Solar Energy Facility development site showing that the site is of potentially low ecological sensitivity.

**Ecologically sensitive areas on the site -** Although most of the study area appears to have been previously disturbed (Figure 6.1), the actual state of the ecosystem will have to be studied in detail during the peak growing season, before a definite assessment statement can be made as to the ecological impact of the proposed development. The largest concerns currently identified are:

» All wetland areas on and adjacent to the study area will have to be delineated to determine suitable buffer areas between them and the proposed development
» The ecological state of the vegetation of the study area needs to be assessed in detail to correctly identify its conservation status
» All indigenous and alien invasives, weeds and potential invasives within the development area will have to be cleared prior to development and controlled after construction until decommissioning
» An ongoing monitoring program will be necessary to control and/or eradicate newly emerging invasives
» Newly cleared soils will have to be revegetated and stabilised as soon as construction has been completed

**Heritage and palaeontology -** This desktop study has not identified any paleontological reason to prejudice the progression of the Lethabo Solar Energy Facility within either the preferred project location or the identified alternative location, subject to the recommended damage mitigation procedures being enacted.

This scoping study revealed that a range of heritage sites occur in the larger region and similar sites can be expected within the study area. Every site is relevant to the Heritage Landscape, but it is anticipated that no site in the study area could have conservation value. The following conclusions are applicable to the following sites:

» Archaeological sites: All sites could be mitigated either in the form of conservation of the sites with in the development or by a Phase 2 study where the sites will be recorded and sampled before the client can apply for a destruction permit for these sites prior to development.
» Historical finds and Cultural landscape: Several structures occur within the study area and could possibly be older than 60 years and protected by heritage legislation. This assumption will however need to be verified in the field.
» Burials and cemeteries: Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved within a development. These sites can however be relocated if avoidance is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave

sites must be confirmed during the field survey and the public consultation process.

**Soils & agricultural potential –** The area investigated is comprised of mainly moderately deep to deep soils, with a small percentage of shallow soils. As such, the area can be considered as at least moderate to high potential for agricultural purposes, taking into consideration the annual rainfall.

**Social impacts:** The most important potential social benefits associated with the construction and operations of the project refer to the job opportunities and possible socio-economic spin-offs created. New economic activities such as this project having the potential to assist with the developmental challenges that much of province is faced with, providing employment and skills development to local community and contributing to the social, economic and institutional development of the local area. The benefit of employment opportunities and disposable income in the local project area has the opportunity to improve levels of health, education and service delivery with the exposure to such opportunities. Additional employment and associated indirect economic benefits will maintain and improve the quality of life of these communities. The main negative impacts are associated with the influx of in-migrants and intrusion impacts associated with the construction phase and the visual impact of the facility and associated infrastructure while in operation, with possible subsequent negative social consequences and/or impacts

**Visual / Social Receptors:** The brief assessment undertaken for the scoping stage indicates that because the project is proposed against the backdrop of the Lethabo Power Station which includes associated infrastructure such as internal buildings, HV overhead power lines, coal stockpiles, a PFA tip and above ground conveyors, visual impacts of the proposed solar array are generally unlikely to be significant. In terms of possible landscape degradation, the landscape does not appear to have any specific protection although the Vaal River corridor has obvious local importance as do the residential areas and recreational areas indicated on mapping. Rural areas to the east and the road corridors that pass through them also have some importance in their own right and as approach corridors to the Vaal Dam. In terms of visual intrusion or obstruction impacting on visual receptors, the initial investigation indicates that generally these impacts are not likely to be significant. Due to the above listed implications Alternative 1 is favoured from the perspective of landscape change as development of this site is likely to be less visible than development of Alternatives 2 and 3. However, neither none of the alternatives is are likely to result in significant landscape change and neither or are is likely to have significant impact on the more important natural areas around the Vaal River / Agricultural Areas approaching the Vaal Dam or Urban Areas

**Cumulative effects:** Cumulative impacts of this new development to the larger area is likely to have low or no influence on the nature of the areas due to heavy industrial and large mining areas located next to the project site. Existing industrial structures are likely to provide significant screening particularly from middle distance and distance views. From a distance small scale development may also be viewed against a backdrop of larger industry which is also likely to make it less obvious.

**Environmental fatal flaws:** At this stage, there are no fatal flaws associated with the Lethabo PV Solar Energy Facility site on Farm 1814, next to the Lethabo power station. Further investigation is required. From an environmental perspective, all three site are acceptable at this point of the assessment, however, from a technical point of view the environmental personnel at the Lethabo Power Station are not too keen on alternative 3 for the following reasons:

» This area has the most indigenous trees and plants.
» The coal stock yard is close by that will have a negative impact on the panels due to dust blow off.
» Transmission lines also cross this area that limit the available space
» The Lethabo recreational hall and soccer field are also in this area

Based on the above, it is recommended that only Alternative 1 and 2 sites be considered going forward in the EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

## 6.2. Evaluation of the Potential Issues with Associated Infrastructure - Power Line, Invertors, Substation and Access Roads

In order to connect the Lethabo PV Solar Energy Facility to the power grid, the Eskom intends on building on-site substation and power line for which will connect into the existing substation located on the site.

Potential issues identified to be associated with a proposed overhead power line, substation, access roads and invertors include impacts on flora, fauna and ecological processes, impacts on avifauna as a result of collisions and electrocutions, potential impacts on heritage sites and visual impacts. The potential impacts associated with the power line, substation, access roads and inverters will be considered in detail within the EIA phase. Recommendations regarding preferred locations for this infrastructure and appropriate mitigation measures (if required) will be made.

At this stage, there are no fatal flaws associated with the associated infrastructure of the Lethabo PV Solar Energy Facility site on the Farm 1814. Further investigation is required. It is recommended that the proposed site can

be considered in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

# PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

This Draft Scoping Report includes a description of the nature and extent of the proposed Lethabo PV Solar Energy facility and associated infrastructure with details regarding the Scoping Phase, as well as the issues identified and evaluated through the Scoping Phase. This chapter provides the context for a Plan of Study for the Environmental Impact Assessment (EIA) which is relevant to both the development of the solar facility and the proposed power lines.

The Plan of Study describes how the EIA Phase will proceed and includes details of the specialist studies required to be undertaken for those potential impacts recorded to be of potential significance. The key findings of the Scoping Phase includes inputs from authorities, the public, the proponent and the EIA specialist team and are used to inform the Plan of Study for EIA together with the requirements of the NEMA EIA Regulations of June 2010 and applicable guidelines.

## 7.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

» Provide an overall assessment of the social and biophysical environment affected by the Lethabo PV Solar Energy Facility (including associated infrastructure) and its associated infrastructures.
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the Lethabo PV Solar Energy Facility (including infrastructure) and its associated infrastructures.
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
» Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with Lethabo PV Solar Energy Facility and its associated infrastructure, including design, construction, operation and decommissioning; and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project. All feasible alternatives (including the 'do nothing' alternative) will be assessed.

### 7.2. Authority Consultation

Consultation with the regulating authorities (i.e. DEA and the Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA)) has been undertaken and will continue throughout the EIA process. On-going consultation and input from DEA and Free State DETEA will include the following:

» Submission of a Final Scoping Report following a 30-day public review period of this draft scoping report (and consideration of comments received).
» Submission of a Final EIA Report following a 30-day public review period of the draft EIA Report.
» A consultation meeting and site visit (if necessary) with DEA and DETEA in order to discuss the findings and conclusions of the EIA Report.

Should there be substantive changes between any draft reports and final reports, the final reports will be made available for public review for an additional 21 days prior to the submission to DEA.

### 7.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA Phase:

» **The 'do nothing' alternative:** Eskom does not establish the proposed Lethabo PV Solar Energy Facility on the Lethabo power station
» **Site alternatives:** Both alternative site 1 and alternative site 2 will be assessed further in the EIA phase,
» **Layout/design alternatives:** in terms of the design of the facility, particularly the layout of the PV panels and corridors/servitudes for associated infrastructure such as the access roads and power line.
» **Alternative technology combinations:** The facility is proposed to consist of photovoltaic **(PV) panels** (the preferred technology (static or tracking) is to be confirmed in the EIA phase) with a net generating capacity of up to 75 MW.

### 7.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

Based on the findings of the Scoping Study, the following issues were identified as requiring further investigation within the EIA:

**Table 7.1:** Issues requiring further investigation during the EIA Phase and activities to be undertaken in order to assess the significance of these potential impacts relevant to Lethabo PV Solar Energy Facility.

| Issue | Activities to be undertaken in order to assess significance of impacts | Specialist |
|---|---|---|
| Avifauna | The following is recommended for the EIA phase of this avifaunal study:<br>» Approximations of bird community structure of the proposed development site and immediate environs through standard survey techniques (i.e. point-counts or line transects).<br>» Identification of risk-categories of bird functional groups, relative to their range, foraging behaviour and habitat fidelity.<br>» Identification of resident' species by conducting thorough nest searches and proving breeding attempts per species. In order to confirm breeding attempts it is vitally important that the site visit be scheduled in the appropriate seasons.<br>» The micro habitats on site will be assessed for their suitability for the key species,<br>» A personal observation list of species recorded whilst on site will be compiled.<br>» The literature review will be revised.<br>» All identified direct, indirect and cumulative impacts will be rated according to a pre-determined set of criteria, as supplied by Savannah Environmental (Pty) Ltd (refer to Section 7.5).<br>» The sensitivity zones and suitable buffer zones will be identified and mapped.<br>» Where necessary and possible recommended mitigation measures for the management of the identified impacts will be developed and described. | Megan Diamond o Feathers Environmental Services |
| Ecology (Flora, fauna & Avifauna) | As part of the EIA process, a field survey of the vegetation will be undertaken, and results will include:<br>» As part of the EIA process, a detailed field survey of the vegetation will be undertaken, preferably between February to April, and results will include:<br>* A phytosociological classification of the vegetation found on the study area according to vegetation survey data and its TWINSPAN analysis<br>* A corresponding description of all defined plant communities and their typical habitats, including a full species list for each plant community and a representative photographic record taken on site of each community<br>* A map of all plant communities within the boundaries of the study area<br>* A description of the sensitivity of each plant community, based on sensitivity criteria<br>* A full assessment of direct, indirect and cumulative impacts | Marianne Strohbach of Savannah Environmental |

| Issue | Activities to be undertaken in order to assess significance of impacts | Specialist |
|---|---|---|
| Wetlands | The delineation method documented by the Department of Water Affairs and Forestry (2005), will be followed throughout the field survey. This guideline describes the use of indicators to determine the outer edge of the wetland and riparian areas such as soil and vegetation forms as well as the terrain unit indicator. A hand held GPS will be used to capture GPS co-ordinates in the field. 1:50 000 cadastral maps and recent aerial imagery will be used as reference material for the mapping of the preliminary wetland boundaries. These will be converted to digital image backdrops and delineation boundaries will be imposed accordingly after the field survey. | Robert Taylor of Limosella Consulting |
| Soils & Agricultural potential | The landscape represented by land type Ca1 has a great mixture of agricultural potential, so more detailed survey investigation would be required to delineate the areas of the various soil types.<br>The above requirements together with requirements for an EIA specialist report includes:<br>» Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential.<br>» Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers).<br>» Map soil survey points.<br>» Describe the topography of the site.<br>» Do basic climate analysis and identify suitable crops and their water requirements.<br>» Summarise available water sources for agriculture.<br>» Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options.<br>» Describe the erosion, vegetation and degradation status of the land.<br>» Determine and map, if there is variation, the agricultural potential across the site.<br>» Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts. | Garry Patterson of ARC-Institute for Soil, Climate and Water |
| Archaeology, Heritage and Palaeontology | The following methodology will be adopted for the EIA phase study to assess direct, indirect and cumulative impacts on heritage resources:<br><br>**Archaeology and Heritage:**<br>» This scoping study highlighted the fact that Iron Age settlements, historic homesteads and graves can occur in the study area. Therefor in order to comply with the National Heritage Resources Act (Act 25 of 1999) a Phase 1 Archaeological Impact Assessment must be | » Jaco van der Walt of Heritage Contracts and Archaeological Consulting<br>» Barry Millstead (BM Geological Services) |

| Issue | Activities to be undertaken in order to assess significance of impacts | Specialist |
|---|---|---|
| | undertaken. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met.<br>**Palaeontology**:<br>» This desktop study has not identified any paleontological reason to prejudice the progression of the Lethabo Solar Energy Facility within either the preferred project location or the identified alternative location, subject to the recommended damage mitigation procedures being enacted. No additional studies (e.g., a Full Paleontological Assessment) are required to be performed on any of the three alternative project areas. | |
| Visual Impacts | The following methodology will be used in preparation of the VIA report.<br>» Identification of issues raised in scoping phase, and site visit: Likely issues have already been identified in this scoping analysis. These issues will be verified from a site visit as well as response from stakeholders to the scoping documentation.<br>» Description of the receiving environment and the proposed project The receiving environment has been described and categorised. This will be verified from a site visit.<br>» Establishment of view catchment area, view corridors, viewpoints and receptors Zones of theoretical visibility and visual receptors have been established from GIS analysis. These will be verified from a site visit. Viewpoints will be identified from a site visit to represent views of visual receptors.<br>» Indication of potential visual impacts using established criteria. Areas of likely visual impacts have been identified and described from this scoping exercise. These impacts will be verified from a site visit. | John Marshall Afzelia Environmental Consultants and Environmental Planning and Design |
| Social Impacts | The main aim for the social report will be to determine the social impacts that may arise from the proposed development. The proposed approach that will be used for the SIA study will be based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on the international best practice, the key objectives in the SIA process will include:<br>» Describing and obtaining an understanding of the proposed development (type, scale, location), the communities likely to be affected and determining the need and scope of the | Candice Hunter of Savannah Environmental and Anton Pelser (external review) |

| Issue | Activities to be undertaken in order to assess significance of impacts | Specialist |
|---|---|---|
| | SIA;<br>» Collecting baseline data on the current social environment and historical social trends;<br>» Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;<br>» Assessing and documenting the significance of direct, indirect and cumulative social impacts associated with the proposed project;<br>» Assessing the project (including any feasible alternatives) and identifying potential mitigation and enhancement measures;<br>» Developing an Environmental Management Programme. | |
| Cumulative impact assessment | » Assess the potential for cumulative impacts associated with combined visibility for two or more solar facilities from one location.<br>» Asses the sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail)<br>» Consider the potential impact of solar facilities on the landscape, specifically given South African's strong attachment to the land and the growing number of solar plant applications.<br>» Identify significant positive cumulative impacts, specifically the establishment of a number of renewable energy facilities in the Metsimaholo LM, will create a number of socio-economic opportunities for the region, which, in turn, will result in a positive social benefit.<br>» Address the cumulative impacts associated with the construction of multiple facilities i.e. solar developments/power generation facilities within approximately 30km from the study area on the ecological, heritage, soil and agricultural potential and avifaunal impacts of the area once a preliminary layout is available. | Savannah Environmental |

### 7.5. Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  - Local extending only as far as the development site area – assigned a score of 1;
  - Limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  - Will have an impact on the region – assigned a score of 3;
  - Will have an impact on a national scale – assigned a score of 4; or
  - Will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be 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; or
  - 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); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be 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); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- The **status**, which will be described as *either positive, negative or neutral*.

» The degree to which the impact can be *reversed*.
» The degree to which the impact may cause *irreplaceable loss of resources*.
» The degree to which the impact can be *mitigated.*

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

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

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

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

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

As the developer has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. The EIA Report will be compiled, and will include:

» **Detailed description** of the proposed activity
» A description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies)
» A description of the **environment that may be affected by the activity** and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
» Details of the **public participation process** conducted, including:
  * Steps undertaken in accordance with the plan of study for EIA;
  * A list of persons, organisations and Organs of State that were registered as interested and affected parties;

  - A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
  - Copies of any representations, objections and comments received from registered interested and affected parties
- A description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
- An indication of the methodology used in determining the **significance** of potential environmental impacts
- A description and comparative **assessment of all alternatives** identified during the environmental impact assessment process
- A summary of the findings and recommendations of **specialist reports**
- A description of all environmental issues for each phase of the project that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- An assessment of each identified potentially significant impact
- A description of any assumptions, uncertainties and gaps in knowledge
- an environmental **impact statement** for each Phase of the project which contains:
  - A summary of the key findings of the environmental impact assessment; and
  - A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives
- A draft **environmental management programme** for each phase of the project
- Copies of specialist reports

The Draft EIA Report will be released for a 30-day public review period. Should there be substantive changes between the draft EIA report and the final EIA report, the final EIA report will be made available for public review for a period of 21 days prior to submission to the DEA. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the Final EIA Report, for submission to the authorities for decision-making.

### 7.6. Public Participation Process

A public participation process will be undertaken by Savannah Environmental. Consultation with key stakeholders and I&APs will be on-going throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to identify additional issues of concern or highlight positive aspects of the project, and to comment on the findings of the EIA Phase. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs regarding the project, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:

» Focus group or public meetings (pre-arranged and stakeholders invited to attend).
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants).
» Written, faxed or e-mail correspondence.

The Draft EIA Report will be made available for public review for a 30-day period prior to finalisation and submission to the DEA for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public feedback meeting will be held during this public review period.

### 7.7. Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table.

| Key Milestone Activities | Proposed timeframe[5] |
|---|---|
| Public review period for Draft Scoping Report | 18 March 2015 – 21 April 2015 |
| Finalisation of Scoping Report, release of the Final Scoping Report to the public, and submission of the Final Scoping Report to DEA | April 2015 |
| Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA | within 30 days of acknowledgement of the Final Scoping Report |
| Undertake specialist studies and public participation process | March 2015 – May 2015 |
| Make Draft EIA Report and Draft EMP available to the public, stakeholders and authorities | May 2015 |
| Finalisation of EIA Report, release of the Final EIA Report to the public, and submission of the Final EIA Report to DEA | June 2015 |
| Authority review period and decision-making | July 2015 – October 2014 |

[5] Indicative dates

## REFERENCES CHAPTER 8

» Diamond, M. 2014. Avifaunal Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Strobach, M. 2014. Ecology Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Van der Walt, J. 2014. Heritage Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Millstead, B. 2014. Paleontological Impact Assessment (desktop) for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Marshall, J. *et al*. 2014. Visual Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Hunter, C. 2014. Social Impact Assessment (desktop) for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Taylor, R. 2014. Wetland Scoping Report for the Proposed Lethabo PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process