ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL SCOPING REPORT

PROPOSED SANNASPOS PHOTOVOLTAIC (PV) SOLAR ENERGY FACILITY-PHASE 1, FREE STATE PROVINCE

DEA Ref. Nos:
14/12/16/3/3/2/360

FINAL SCOPING REPORT FOR SUBMISSION TO THE DEPARTMENT OF ENVIRONMENTAL AFFAIRS

Prepared for:

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SOLAR PROJECTs / EIA INFORMATION LIST – DEA & LEGAL REQUIREMENTS

According to the requirements of the DEA, site, technical and environmental information on the proposed project is to be included in scoping / EIA reports or to be appended to these reports.

1. General Site

No.	Information	Provided / Reference
1.1	Descriptions of all affected farm portions	Refer to Chapter 1 of this report.
1.2	21 digit Surveyor General codes of all affected farm portions	Refer to Chapter 1 of this report.
1.3	Copies of deeds of all affected farm portions	N/A
1.4	Photos of areas that give a visual perspective of all parts of the site	Refer Chapter 2
1.5	Photographs from sensitive visual receptors (tourism routes, tourism facilities, etc.)	
1.6	Solar plant design specifications including: » Type of technology » Structure height » Surface area to be covered (including associated infrastructure such as roads) » Structure orientation » Laydown area dimensions (construction period and thereafter) » Generation capacity of the facility as a whole at delivery points	Refer to Chapter 2 of this report.

2. Site maps and GIS information

No.	Information	Provided
2.1	All maps/information layers must also be provided in ESRI Shapefile format	Contained in the CD version of this report
2.2	All affected farm portions must be indicated	Refer to Figure 1.1 of this report – locality map
2.3	The exact site of the application must be indicated (the areas that will be occupied by the application)	Refer to Figure 1.1 of this report – locality map
2.4	A status quo map/layer must be provided that includes the following: Current use of the land on site including:	Chapter 4, Section 4.5
	2.4.1 Buildings and other structures	N/A
	2.4.2 Agricultural fields	Section 4.5

No.	Information	Provided
	2.4.3 Grazing areas	The farm portion is used for grazing.
	2.4.4 Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support areas	See Figure 4.8
	2.4.5 Critically endangered and endangered vegetation areas that occur on the site	Not Applicable
	2.4.6 Bare areas which may be susceptible to soil erosion	Figure 5.2
	2.4.7 Cultural historical sites and elements	Section 4.8
	2.4.8 Rivers, streams and water courses	Section 4.4.5.
	2.4.9 Ridgelines and 20m continuous contours with height references in the GIS database	
	2.4.10 Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs	Not Applicable to this site
	2.4.11 High potential agricultural areas as defined by the Department of Agriculture, Forestry & Fisheries	Not Applicable to this site
	2.4.12 Buffer zones (also where it is dictated by elements outside the site): 500m from any irrigated agricultural land 1km from residential areas Indicate isolated residential, tourism facilities on or within 1km of the site	The site does not occur within these areas
	2.4.13 A slope analysis map / layer that include the following slope ranges: less than 8% slope between 8% and 12% slope between 12%and 14% slope steeper than 18 %slope	See Chapter 5, and Appendix K for the map
	2.4.14 A map/layer that indicate locations of birds and' bats including roosting and foraging areas (specialist input required)	*These areas do not occur within the site*
2.5	A site development proposal map(s)/layer(s) that indicate:	*Refer to Appendix K*
	2.5.1 Position of solar facility	
	2.5.2 Foundation footprint	
	2.5.3 Permanent laydown area footprint	
	2.5.3 Construction period laydown footprint	
	2.5.4 Internal road indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible)	

No.	Information	Provided
	2.5.5 River, stream and water crossing of roads and cables indicating the type of bridging structures that will be used	
	Substation (s) and/ transformer (s) sites including their entire footprint	
	2.5.6 Cable routes and trench dimensions (where they are not long internal roads)	
	2.5.7 Connection routes to the distribution / transmission network	
	2.5.8 Cut and fill areas along roads and at substation /transformer sites indicating the expected volume of each cut and fill	
	2.5.9 Borrow pits	
	2.5.10 Spoil heaps (temporary for topsoil & subsoil and permanently for excess material)	
	2.5.11 Buildings including accomodation	

3. Regional map and GIS information

No.	Information	Provided
3.1	All maps/information layers must also be provided in ESRI Shapefile format	Maps contained in the CD version of this report & Appendix K
3.2	The map/layer must cover an area of 20km around the site	Contained in the CD version of this report
3.3	Indicate the following: » roads including their types (tarred or gravel) and category (national, provincial, local or private) » Railway lines and stations » Industrial areas » Harbours and airports » Electricity transmission and distribution lines and substations » Pipelines » Water sources to be utilizes during the construction and operational phases » Critical Biodiversity Areas and Ecological Support Areas » Critically Endangered and Endangered vegetation areas » Agricultural fields » Irrigated areas » An indication of new road or changes and upgrades that must be done to existing roads	Refer to Appendix K – Project maps

No.	Information	Provided
	in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams	

NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS	CROSS REFERENCE IN THIS SCOPING REPORT
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures	Section 1.4
(b) a description of the proposed activity	Chapter 1.3
(c) a description of any feasible and reasonable alternatives that have been identified	Section 2.1, 2.2, 2.3
(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— (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken	Section 1.1
(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	Section 3.3
(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	Section 3.3. 2
(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given	Appendix D
(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 E5
(i) a description of the need and desirability of the proposed activity	Section 1.2
(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	Section 2.1, 2.2, 2.3

NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS	CROSS REFERENCE IN THIS SCOPING REPORT
activity	
(k) copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties	Appendix E6
(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 E3
(m) any responses by the EAP to those representations and comments and views;	Appendix E6
(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-iv for information requested by DEA
(p) any other matters required in terms of sections 24(4)(a) and (b) of the Act.	Section 2.1, 2.2, 2.3
(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.	Section 3.3.2
(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.	Section 2.1, 2.2, 2.3 Layout alternatives to be provided in the EIA report.

PROJECT DETAILS

DEA Reference No. : 14/12/16/3/3/2/360 (Phase 1)

Title : Environmental Impact Assessment Process
Final Scoping Report: Proposed Sannaspos Photovoltaic (PV) Solar Energy Facility Phase, Free State Province.

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Client : SolaireDirect Southern Africa (Pty) Ltd

Report Status : Final Scoping Report for submission to the Department of Environmental Affairs

When used as a reference this report should be cited as: Savannah Environmental (2012) Final Scoping Report: Proposed Sannaspos Photovoltaic (PV) Solar Energy Facility on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe, Phase 1 (up to 75MW), Free State Province.

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PURPOSE OF THE SCOPING REPORT

SolaireDirect Southern is proposing to establish a commercial photovoltaic solar energy facility of up to 75MW as well as associated infrastructure on a site located approximately 45 km east of Bloemfontein in the Free State Province. The project is referred to as the **Sannaspos Solar PV Phase 1**. A larger site has been identified for consideration within an Environmental Impact Assessment (EIA). The proposed development will have an electricity generating capacity of up to 75MW. Associated infrastructure includes a substation, access roads and power line/s.

SolaireDirect Southern Africa (Pty) Ltd has appointed Savannah Environmental as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for the proposed facility. The EIA process is being undertaken in accordance with the requirements of the EIA Regulations of June 2010 (of GNR543) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

This Final 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 two development phases 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.

INVITATION TO COMMENT ON THE DRAFT SCOPING REPORT

The **Draft Scoping Report** was made available for public review at the following place, which lie in the vicinity of the proposed project area from **13 August 2012 – 13 September 2012:**

» Botshabelo Public Library

The report is also available for download on:
» www.savannahsa.com

EXECUTIVE SUMMARY

Background

SolaireDirect Southern Africa (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility of up to 75MW, as well as associated infrastructure on a site located approximately 45 km east of Bloemfontein in the Free State Province. The project is referred to as the Sannaspos Solar PV Phase 1 project. A larger site has been identified for consideration within an Environmental Impact Assessment (EIA). The development will have an electricity generating capacity of up to 75MW. Associated infrastructure includes a substation, access roads and power line/s.

Environmental Authorisations will be required to be obtained; as such, the project has been registered with the National DEA under following project name and EIA reference number:
Sannaspos Solar PV Facility - Phase 1 (DEA Ref. No 14/12/16/3/3/2/360)

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 of a facility of this nature is explored in more detail in this Final Scoping Report. It should be noted that SolaireDirect is also proposing the development of a 10 MW facility on Portion 0 of Farm 2962 Lejwe, this project would be referred to as Sannaspos Solar PV 2. A separate Basic Assessment Process for this project is being undertaken. This report will thus not focus on the Sannaspos Solar PV 2.

Project Location

The project facility is proposed on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe which falls within the Mangaung Metropolitan Municipality of the Free State Province. The identified site has existing road access via the N8 to Bloemfontein then a partially tar road to the proposed site. The larger extent of the farm portion covers an area of approximately 600 hectares. The development footprint and exact location on these farms is not precisely known at this stage but will be confirmed during the EIA Phase and is currently estimated to be approximately 150 hectares for the 75 MW. Therefore, the broader farm portion has been considered within this Scoping Report. On the basis of the findings of the Scoping Study, the facility can be appropriately placed within the larger site taking environmental and any other identified constraints into consideration.

Project Components

The proposed facility is envisaged to make use of **photovoltaic (PV)** technology with a maximum total generating capacity of up to **75 MW** and which will include following infrastructure:

- PV panels (up to 3.5m in height) and mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels);
- Cabling between the project components, to be lain underground where practical;
- Internal access roads and fencing;
- Construction of a 132 kV substation and power line on site connecting to the existing Sannaspos Substation located adjacent to the site; and
- Workshop area for maintenance storage, and offices.

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 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.

Evaluation of the Proposed Project

The main issues identified through this scoping study associated with the proposed wind energy facility are summarised in Table 1.

In order to assess potential impacts within sensitive areas, the preliminary layout for the PV solar energy facility will be considered in the EIA phase. This preliminary sensitivity analysis of the site should be considered by SolaireDirect in understanding which area of the site would be least impacted by the development of a PV solar energy facility in order to inform the preliminary infrastructure layouts for consideration within the EIA phase. Through the EIA phase more detailed studies will be conducted, and further sensitive areas will be marked, more accurately and in more detail than in this Final Scoping Report.

Evaluation of the Potential Issues with Associated Infrastructure - Invertors, Construction of a new of Substation and Internal Access Roads

In order to connect the solar energy facility to the power grid, invertors will be used, which will connect to the existing substation which is located on the site. The existing Sannaspos substation, which links into an existing 132 kV power line which passes on the northern boundary of the site, will be upgraded to facilitate the connection of the facility to the electricity grid. The final point of connection will be dependent on the requirements of and agreements with Eskom.

Potential issues identified to be associated with the construction of the substation, internal access roads

and invertors include impacts on flora, fauna and ecological processes, and potential impacts on heritage sites. Generally Protected sites, where mitigation is required prior to destruction of such heritage sites/ artefacts and visual impacts. The potential impacts associated the associated infrastructure will be considered in detail within the EIA phase. Recommendations regarding a preferred location for this infrastructure and appropriate mitigation measures (if required) will be made. Other infrastructure such as the internal substation location/s, access roads and the maintenance facility will also be considered in the EIA phase based on the preliminary layout to be provided by SolaireDirect Southern Africa (Pty) Ltd.

Table 1: Summary of significance of the potential impacts associated with the proposed PV solar energy facility development

Construction / Decommissioning Impacts	**Extent**
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of habitat for threatened / protected plants	L
Loss of protected trees	L
Impacts on watercourses and drainage areas	L
Establishment and spread of declared weeds and alien invader plants	L
Loss/Contamination of topsoil and usable soil	S
Soil loss/ erosion / degradation	L
Loss/destruction of heritage resources and Destruction of Burial Grounds & Grave	L
Discovery/destruction of unknown fossil deposits	L
Potential visual impact on sensitive Receptors in Middle- and Background represent mostly users of the road network	L
Visual impact on the intrinsic value and sense of place	L
Job creation and skills development of local people during construction (positive impact)	L-R
Economic spin-offs to local community.	L
Training and skills development opportunities for local communities and businesses	L-R
Safety and security risks to site and surrounds	L
Temporary disruptions in the daily living and movement patterns to neighbouring landowners	L
Operational Impacts	**Extent**
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/S
Destruction of Burial Grounds & Grave	L
Soil erosion	L
Loss of medium agricultural potential land on the site.	L
Visual impacts (intrusion, negative viewer perceptions, artificial lighting and reflection of PV Panels)	L
Employment opportunities	L-R
Safety and security impacts on the site and neighbouring land.	L
Contribution of clean energy	N

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

TABLE OF CONTENTS

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.

Clean Development Mechanism (CDM): An arrangement under the Kyoto Protocol allowing industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. The most important factor of a CDM project is that it establishes that it would not have occurred without the additional incentive provided by emission reductions credits. The CDM allows net global greenhouse gas emissions to be reduced at a much lower global cost by financing emissions reduction projects in developing countries where costs are lower than in industrialised countries. The CDM is supervised by the CDM Executive Board (CDM EB) and is under the guidance of the Conference of the Parties (COP/MOP) of the United Nations Framework Convention on Climate Change (UNFCCC) (refer http://unfccc.int/kyoto_protocol/mechanisms/items/2998.php).

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.

Generator: The generator is what converts the turning motion of a wind turbine's blades into electricity

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).

"Micro-siting": An international convention with regards to wind energy facilities. It refers to the process of specifically determining the position of each turbine based on the wind resource and topographical constraints in order to maximise production.

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).

Ramsar Convention on Wetlands: "The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (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/). South Africa is a Contracting Party to the Convention.

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

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

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

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
FS DEDTEA	Free State Department of Economic Development, Tourism and Environmental Affairs
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
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
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)
PGWC	Provincial Government of the Western Cape
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

SolaireDirect Southern Africa (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility of up to 75MW, as well as associated infrastructure on a site located approximately 45 km east of Bloemfontein in the Free State Province. The project is referred to as the Sannaspos Solar PV Phase 1. A larger site has been identified for consideration within an Environmental Impact Assessment (EIA). The proposed development will have an electricity generating capacity of up to 75MW. Associated infrastructure includes a substation, access roads and power line/s. A second phase of the PV facility is also being proposed on Portion 0 of Farm 2962 Lejwe. Phase 2 is proposed to have a capacity of up to 10MW. This phase of the project is the subject of a separate Basic Assessment process[1].

An EIA process and public participation process is being undertaken for the proposed Sannaspos Solar PV Phase 1 project. The nature and extent of this facility as well as potential environmental impacts associated with the construction of a facility of this nature is explored in more detail in this Final Scoping Report. The Scoping Report consists of eight chapters as follows:

» 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 description and desktop evaluation of the potential environmental and social impacts associated with 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.

1.1. Project Location

The project facility is proposed on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe which falls within the Mangaung Metropolitan Municipality of the Free State Province. The identified site has existing road access via the N8 to Bloemfontein then a gravel road to the proposed site. The larger extent of the farm portion covers an area of approximately 600 hectares. The development footprint and exact location on these farms is not precisely known at this stage but will be confirmed during the EIA

[1] This project has been registered with the Department of Environmental Affairs (DEA) under EIA Reference number: 14/12/16/3/3/1/615

Phase, and is currently estimated to be approximately 150 hectares for the 75 MW. Therefore, the broader farm portion has been considered within this Scoping Report. On the basis of the findings of the Scoping Study, the facility can be appropriately placed within the larger site taking environmental and any other identified constraints into consideration.

1.2. Project Components

The proposed facility is envisaged to make use of **photovoltaic (PV)** technology with a maximum total generating capacity of up to **75 MW**, which will include the following infrastructure:

» PV panels (up to 3.5m in height) and mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels);
» Cabling between the project components, to be lain underground where practical;
» Internal access roads and fencing;
» Construction of a 132kV substation and power line on the site linking the solar park to the existing Sannaspos Substation located adjacent to the site; and
» Workshop area for maintenance, storage and offices

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 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.

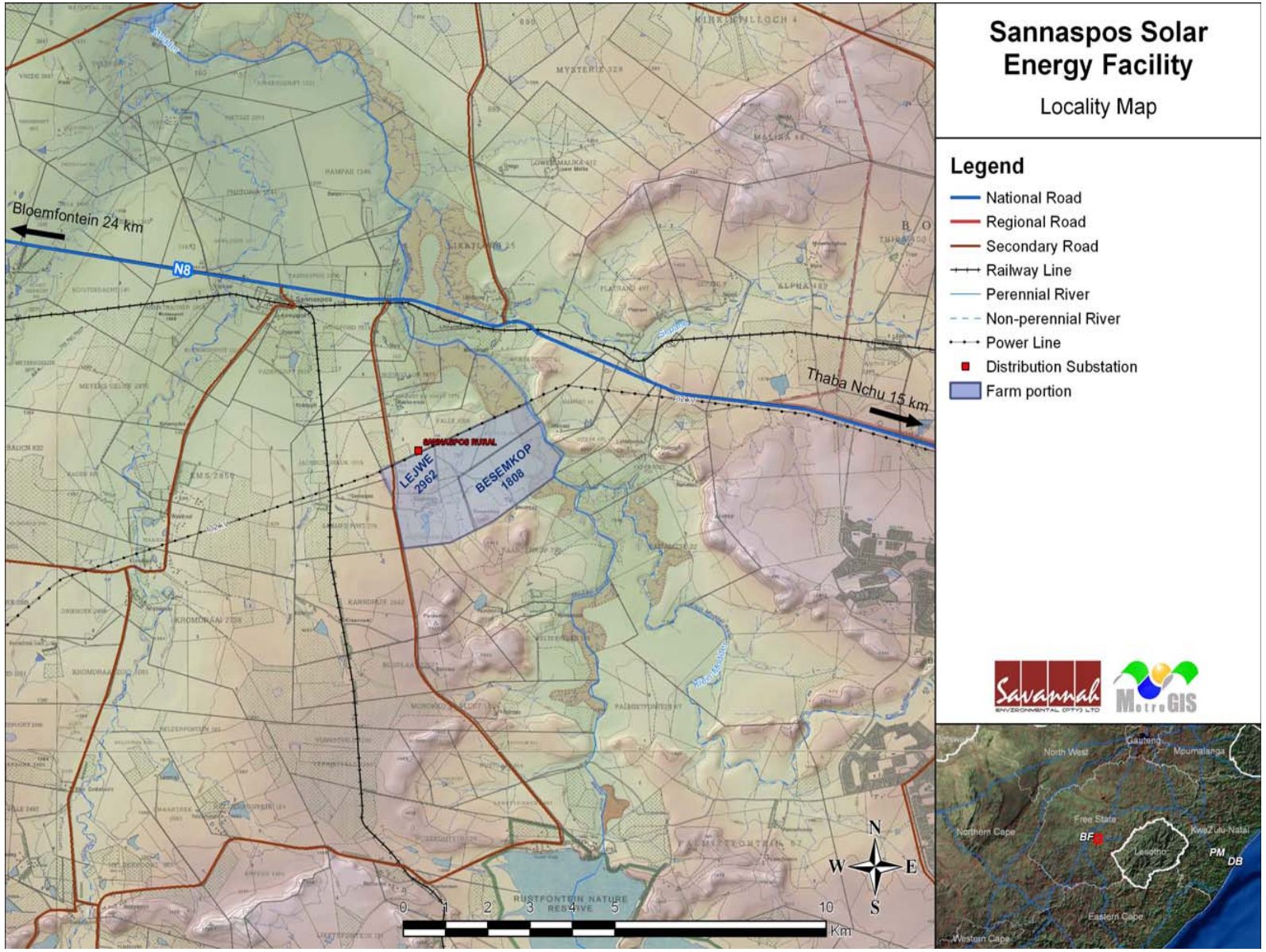


Figure 1.1: Locality Map Showing the proposed site for the Sannaspos PV1 Solar Energy Facility.

The scope of the proposed Sannaspos PV 1 Solar Energy Facility, including details of all elements of the project (for the design/planning, construction, operation and decommissioning Phases) is discussed in more detail in Chapter 2.

1.3. The Purpose of the Proposed Project

Globally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources and climate change. In order to meet the long-term goal of a sustainable renewable energy industry and to diversify the energy-generation mix in South Africa, a goal of 17,8GW of renewable generation capacity by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010. This energy will be produced mainly from wind, solar, biomass, and small-scale hydro (with wind and solar comprising the bulk of the power generation capacity). This amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

In responding to the growing electricity demand within South Africa, as well as the country's targets for renewable energy, SolaireDirect proposes the establishment of the Sannaspos project to add new capacity to the national electricity grid. SolaireDirect will be required to apply for a generation license from the National Energy Regulator of South Africa (NERSA), as well as a power purchase agreement from Eskom (i.e. typically for a period of 20 - 25 years) in order to build and operate the proposed PV facility. As part of the agreement, SolaireDirect will be remunerated per kWh by Eskom who will be financially backed by government. Depending on the economic conditions following the lapse of this period, the facility can either be decommissioned or the power purchase agreement may be renegotiated and extended.

1.4. Requirement for an Environmental Impact Assessment Process

The proposed Sannaspos PV 1 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) 107 of 1998. This section provides a brief overview of the EIA Regulations and their application to this project.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the

competent authority and the Free State Department of Economic Development, Tourism and Environmental Affairs (FS DETEA) will act as a commenting authority. Applications for authorisation have been accepted by DEA under the following application reference numbers **14/12/16/3/3/2/360 (Phase 1).**

The need to comply with the requirements of the EIA Regulations ensures that the competent authority is provided with 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. SolaireDirect has appointed Savannah Environmental as the independent Environmental Assessment Practitioner (EAP) to conduct the EIA process for the proposed project.

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).

In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR543; GNR544; GNR545; and GNR546, the following 'listed activities' are triggered by the proposed solar facility include:

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
GN544, 18 June 2010	10	The construction of a 132kV substation and overhead power line from the solar facility to the Eskom electricity grid.
GN544, 18 June 2010	11	The construction of the proposed solar facility may impede on drainage lines on the site.
GN 544, 18 June 2010	18	The crossing of drainage lines may result in 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 a watercourse
GN545, 18 June 2010	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more. The PV facility will have a generation capacity of up to

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of each listed activity as per project description
		75 MW.
GN545, 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; Except where such physical alteration takes place for: Linear development activities. Agriculture or afforestation where activity 16 in this schedule will apply. The development footprint would be in excess of 20ha.
GN546, 18 June 2010	4 (a) (ii) (ee)	The construction of a road wider than 4 metres with a reserve less than 13,5 metres The site may be located within a Critical Biodiversity Area. To be confirmed through the EIA process.
GN546, 18 June 2010	10 (a) (ii) (ee)	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. The site may be located within a Critical Biodiversity Area. To be confirmed through the EIA process.
GN546, 18 June 2010	14 (a) (i)	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation The site may constitute natural vegetation. To be confirmed through the EIA process.
GN546, 18 June 2010	19 (a) (ii) (ee)	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. The site may be located within a Critical Biodiversity Area. To be confirmed through the EIA process.

On the basis of the above listed activities, a Scoping and an EIA Phase are required to be undertaken for the proposed project. This process is to be undertaken in two phases as follows:

» The **Scoping Phase** includes the **identification** of potential issues associated with the proposed project through a **desktop study** and consultation with affected parties and key stakeholders. Areas of sensitivity within the broader site are identified and delineated in order to identify any environmental fatal flaws, and sensitive or no go areas. Following a public review period of the Draft report, this phase culminates in the submission of a Final Scoping Report and Plan of Study for EIA to the DEA.
» The **EIA Phase** involves a detailed **assessment** of potentially significant positive and negative impacts (direct, indirect, and cumulative) identified in the Scoping Phase. This phase includes detailed specialist investigations and public consultation. Following a public review period of the Draft report, this phase culminates in the submission of a Final EIA Report and a Draft **Environmental Management Programme** (EMP), including recommendations of practical and achievable mitigation and management measures, to DEA for review and decision-making.

This Final Scoping Report documents the evaluation of the potential environmental impacts of the proposed solar facility and forms part of the EIA process as described above. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

1.5. The Environmental Assessment Practitioners

Savannah Environmental was contracted by SolaireDirect as the independent Environmental Consultants to undertake both Scoping and EIA processes for the proposed project. Neither Savannah Environmental nor any its specialist sub-consultants on this project are subsidiaries of or are affiliated to SolaireDirect. 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. The EAPs from Savannah Environmental responsible for this project are:

» Jo-Anne Thomas is a registered Professional Natural Scientist and holds a Master of Science degree. She has 14 years' 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 involved in undertaking siting processes as well as EIAs for several renewable energy projects across the country.
» Sheila Muniongo - the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Management and 1 and half years' experience in environmental field. Her key focus is on environmental impact assessments, public participation, environmental management plans and programmes, as well as mapping different Environmental Projects. She is currently the responsible EAP for several renewable energy projects EIAs 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 sub-consultants to conduct specialist impact assessments:

» Ecology – Savannah Environmental
» Soil and agricultural potential – Viljoen and Associates
» Heritage resources – Zone Land Solutions
» Visual – Zone Land Solutions
» Social – Tony Barbour Consulting
» Palaeontology – Wits University Institute for Human Evolution

Refer to Appendix A for the curricula vitae for Savannah Environmental and the specialist sub-consultants.

SCOPE OF THE PROPOSED PROJECT CHAPTER 2

This chapter provides an overview of the proposed Sannaspos PV 1 Solar Energy Facility and details the project scope which includes the planning/design, construction, operation and decommissioning activities. This chapter also explores site-specific and technology alternatives as well as the "do nothing" option.

2.1. Overview of the Proposed Project

Phase 1 of the Sannaspos PV solar energy facility is proposed within Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe. The proposed location of the PV facility and associated infrastructure will be informed by the outcomes of the Scoping Study and will be assessed in the EIA phase and report. The larger farm portions cover an area of approximately 600 hectares, which is much larger than the development footprint for the facility (which has not been finalised as yet but is estimated at 150ha for 75MW). The facility can therefore be appropriately placed within the boundary of the larger site taking any identified environmental and other constraints into account.

The facility is proposed to accommodate up to 75 MW and will include the following infrastructure and activities:

» PV panels (up to 3.5m in height) and mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels);
» Cabling between the project components, to be lain underground where practical;
» Internal access roads and fencing;
» Construction of 132kV substation and power lines on the site;
» A workshop area for maintenance storage, and offices

2.2. Project Alternatives

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

2.2.1. Site Alternatives

A number of factors have been considered in determining a preferred site for development this includes, no competitors/developers in the area

Site Extent

Space is a restraining factor for the development of a solar energy facility. For example, a PV installation of 10 MW will require approximately 20ha in the case of the technology proposed for the present project. Therefore, it is estimated that an area of approximately 150 ha would be required for a facility of up to 75MW. The proposed site which is approximately 600ha in extent will therefore be sufficient for the installation of the proposed facility, and will allow space for the avoidance of any identified environmental constraints within the final design of the facility.

Site access

The site can be accessed easily via existing access roads from the N8 national road to Sannaspos and other main (partially tarred) and gravel roads.

Climatic Conditions

The economic viability of a photovoltaic plant is directly dependent on the annual direct solar irradiation values. A study of available radiation data shows that the proposed site is uniformly irradiated by the sun. In addition, compared to other areas in the country with similar irradiation, the site experiences moderate temperatures which are suitable for PV technology.

Gradient

A level surface area (i.e. with a minimal gradient in the region of 1%) is preferred for the installation of PV panels and specifically for PV technologies (Fluri, 2009). This reduces the need for extensive earthworks associated with the levelling of a site, thereby minimising environmental impacts. The proposed area for the proposed PV plant is generally on a flat location with slopes less than 5 degrees.

Grid Connection

The proposed facility is in a close proximity (approx. 500m) to the existing Sannaspos 132/22kV substation. This existing substation has enough capacity to accommodate the power which will be generated by the proposed PV Solar plant facility.

Competition

As far as could be determined, there are no competitors/developers in the area of the proposed facility.

Based on the above-mentioned considerations, SolaireDirect consider the proposed site as a highly preferred site for the development of a PV Solar Energy Facility from a technical perspective. No feasible site alternatives have been identified for consideration in this EIA process.

2.2.2. Layout and Design Alternatives

The Scoping Phase aims to identify potentially 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 for consideration in the EIA, and inform recommendations regarding a preferred alternative.

As indicated above, the proposed facility is expected to have a developmental footprint which is smaller than the broader site under investigation. Therefore, the facility and associated infrastructure (i.e. PV panels, on-site substation, internal roads, etc.) can be appropriately located in order to avoid sensitive areas within the broader site. Therefore the extent of the site allows for the identification of layout design and site-specific alternatives. Specific design alternatives will include *inter alia* the layout of the PV panels, and alternative routes for the power line corridor and the 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.

2.2.3 Technology Alternatives

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

2.2.4. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the proposed PV Solar Energy Facility. Should this alternative be selected then there will be no impacts at a local and a broader scale. From a local perspective, the identified site, which is zoned for agricultural purposes, would not be impacted on from an environmental perspective, and could be utilised for future agricultural activities, if feasible. However, at a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the facility is only proposed to contribute 75 MW to the grid capacity, this would assist in meeting the growing electricity demand

throughout the country and would also assist in meeting the government's goal for renewable energy.

The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits are explored in further detail in the South Africa REFIT Regulatory Guideline published by NERSA (March 2009), and include:

Increased energy security

The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a short timeframe and in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality in the short-term, while reducing expensive transmission and distribution losses.

Resource saving

It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres per annum. This translates into revenue savings of R26.6 million per annum, as fuel for renewable energy facilities is free while compared to the continual purchase of fuel for conventional power stations. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.

Exploitation of our significant renewable energy resource

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

Pollution reduction

The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation for power generation is a non-consumptive use of a natural resource which produces zero emissions.

Climate friendly development

The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for approximately 1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions.

Support for international agreements

The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.

Employment creation

Although the immediate opportunity for job creation is limited due to a lack of local skilled, the sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa in the long-term.

Acceptability to society

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

Support to a new industry sector

The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

Protecting the natural foundations of life for future generations

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

The do nothing alternative will be assessed in further detail within the EIA Phase of the process.

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

Solar energy facilities, such as those using PV panels, use the energy from the sun to generate electricity through a process known as the **Photovoltaic Effect**. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity.

A photovoltaic (PV) cell is made of silicone which acts as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. The PV cell is positively charged on one side and negatively charged on the other side and electrical conductors are attached to either side to form a circuit. This circuit then captures

the released electrons in the form of an electric current (direct current). An inverter must be used to change the direct current (DC) it to alternating current (AC). The electricity is then transmitted through a power line for distribution and use.

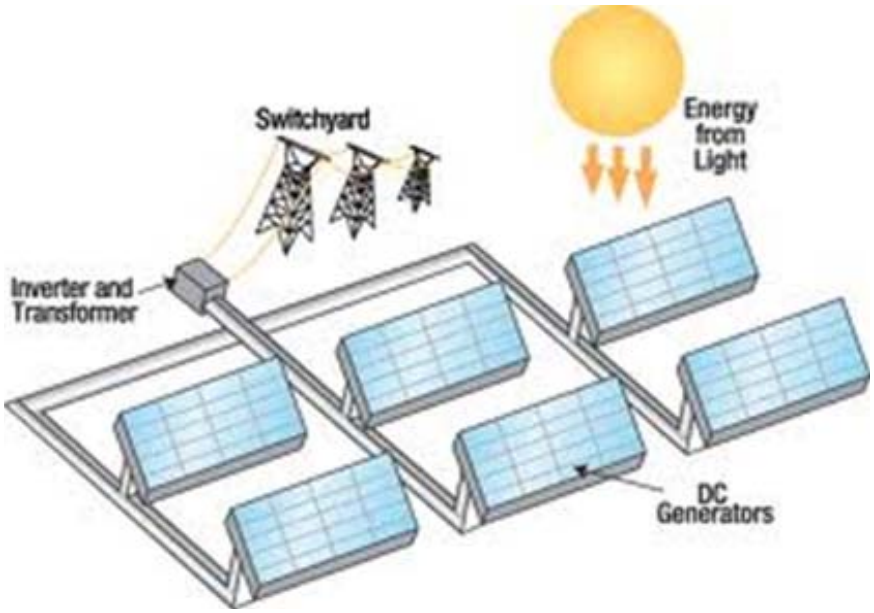


Figure 2.2: Schematic diagram of a PV plant (Sourced from: http://www.solar-green-wind.com/archives/tag/solar-cells)

The PV panels will be fixed to a support structure (as illustrated in Figure 2.3) set at an angle so to receive the maximum amount of solar radiation.

Figure 2.3: PV panels installed

The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

The Photovoltaic Effect is achieved through the use of the following components:

Photovoltaic Cells

An individual photovoltaic cell is made of silicone which acts as a semiconductor). The cell absorbs solar radiation which energises the electrons inside the cells and produces electricity. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. A single cell is sufficient to power a small device such as an emergency telephone. However, to produce 75 MW of power, the proposed facility will require numerous cells arranged in multiples/arrays which will be fixed to a support structure. The height of the PV arrays is expected to be up to 3.5 m.

2.4 Overview of the Construction Phase

In order to construct the proposed PV solar energy facility and associated infrastructure, a series of activities will need to be undertaken. The construction process is discussed in more detail below.

2.4.1 Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to, a geotechnical survey, a site topographic survey and, survey of substation site and road servitudes.

2.4.2 Establishment of Access Roads to the Site

Access to the site exists (from N8 Bloemfontein into a secondary roads then a gravel road). However within the site itself, access will be required to the individual facility. A safety firebreak band and roadway will be constructed around the perimeter of the site in order to prevent the spread of external fires entering the park and accommodate light service and maintenance vehicles. On the same principle, road design will be determined within detailed engineering in accordance with SABS standards and South African requirements (e.g. compacted road layer works and crushed stone surfacing). 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 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 as part of the detailed design of the facility.

2.4.3 Undertake Site Preparation

Site preparation activities will include clearance of vegetation at the footprint of each support structure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

2.4.4 Transport of Components and Equipment to Site

The components and equipment required for the construction of the proposed facility will be brought to site in sections by means of national and provincial roads and then proposed internal access road. Some of the components (i.e. transformer for the substation) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)[2] by virtue of the dimensional limitations (i.e. weight). Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the upgrade of the substation and site preparation.

2.4.5 Establishment of Laydown Areas on Site

Laydown and storage areas will be required for the typical construction equipment which will be required on site.

2.4.6 Erect PV Cells and Construction of a Substation & Invertors

The PV cells will be arranged in arrays. The frames will be fixed onto the ground with the use of concrete, depending on the soil conditions at the site. This 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 3.5 m.

Inverters will be installed to facilitate the connection between the solar energy facility and the Sannaspos 132/22kV substation (which is located on the site). A new 132/22kV substation will be constructed, and will include transformer bays and associated switching facilities, and this will be defined through engagement

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

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

2.4.7 Establishment of Ancillary Infrastructure

A workshop, storage areas, temporary contractor's equipment camp will be established on site. Miscellaneous electrical equipment such as Diesel generator sets will supply power to security and monitoring systems in the event of a grid failure; security system, fence and access control; fire detection system; weather monitoring equipment (rainfall, wind speed/direction, solar irradiation, air moisture); plant monitoring equipment and associated telecommunication links; and air-conditioning equipment inside inverter/transformer enclosures which will regulate the operating temperature of the inverters.

The establishment of these facilities and 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.

2.4.8 Undertake Site Rehabilitation

Once construction is completed and once all construction equipment is removed, the site must be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operation phase must be closed and rehabilitated.

2.5. Operation Phase

The electricity that is generated from the PV panels will be stepped up through the on-site inverters and transformers at the substation. The power will be evacuated from the on-site substation to feed into the electricity grid (existing substation) by two options. Option one is proposed to connect directly to the existing power line on site to the existing substation; option two is proposed to connect directly to the existing substation.

It is anticipated that full-time security, maintenance and control room staff will be required on site. Each component within the solar energy facility will be

operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities.

2.6. Decommissioning Phase

The solar energy facility is expected to have a lifespan of more than 20-30 years (with maintenance) and the power plant infrastructure would only be decommissioned once it has reached the end of its economic life. If economically feasible/desirable the decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology/ infrastructure available at that time. However, if not deemed so, then the facility would be completely decommissioned which would include the following decommissioning activities.

2.6.1. Site Preparation

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment (e.g. lay down areas) and the mobilisation of decommissioning equipment.

2.6.2. Disassemble of Components

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements. The followings are some of the decommissioning activities:

» PV panels will be removed from the aluminium or steel frames;
» PV panels will be transported to special recycling facilities (alternatively used at other operational sites);
» Electrical equipment (transformers) will either be re-used on other developments/projects, or sold;
» Underground cable runs (where applicable) can be removed;
» Gravel/chipstone on the access roads, onsite service roads, guardhouse foundations will be removed;
» Buildings, such as the guardhouse can be taken over by the landowner for operational purposes, alternately all the reusable material can be removed, the shells demolished and the rubble transported to a municipal waste site; and
» Disturbed land areas can be rehabilitated or replanting of indigenous vegetation could take place as well.

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 3

An Environmental Impact Assessment (EIA) process refers to that process (dictated by the EIA Regulations) which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project. 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 (EMP)) to the competent authority for decision-making. The EIA process is illustrated below:

Figure 3.1: The Phases of an EIA Process

SolaireDirect is also proposing the development of a 10 MW facility on Portion 0 of Farm 2962 Lejwe; this project would be referred to as Sannaspos Solar PV 2. A separate Basic Assessment Process for this project is being undertaken. This report will thus not focus on the Sannaspos Solar PV 2. The Scoping Phase for the proposed Sannaspos Solar PV 1 has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010 (as amended), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). In accordance with these Regulations, this scoping process 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 desk-top specialist studies, as well as a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs). A single public participation process is being undertaken to consider both phases of development, and allows for I&APs and stakeholders to comment on one or both of the development phases.

This chapter serves to outline 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 all phases 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:

» Clarify the scope and nature of the proposed activities.
» Clarify 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 published in Government Notice 33306 of 18 June 2010 (as amended), 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 a completed application form for authorisation in terms of Regulation 12 and 26 of Government Notice No R543 of 2010 to the competent authority (DEA).

» 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.
» Preparation of an Issues 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).
» Undertaking of independent specialist studies in accordance with Regulation 32 of Government Notice No R543 of 2010.
» Preparation of a Final Scoping Report and Plan of Study for EIA in accordance with the requirements of the Regulation 28 Government Notice No R543 of 2010.

The tasks are discussed in detail below.

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

As this is an **energy generation** project, 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 (FS DETEA) acts as a commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping process. This consultation has included the following:

» Submission of applications for authorisation to DEA for each phase of development, with a copy submitted to FS DETEA. Authorisation to continue with the Scoping Phase of the project was granted as this application was accepted by DEA under the reference number **14/12/16/3/3/2/360** allocated to the project by DEA

A record of all authority consultation undertaken prior to and within the Scoping Phase is included within Appendix B.

3.2.2. I&AP Identification, Registration and the Creation of an Electronic Database

The first step in the public involvement process was to identify 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 and Provincial government departments (including DEA, FS DETEA, SAHRA, Department of Water Affairs, Department of Agriculture and Land Reform; SANRAL, etc.)
» Government Structures (including the Provincial Roads Authority, municipal planning departments, etc.)
» Mangaung Metropolitan Municipality
» Potentially affected and neighbouring landowners and tenants
» Conservation authorities
» Industry and business
» CBOs and other NGOs.

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 project database will be updated on an on-going basis throughout the project process, and will act as a record of the parties involved in the public involvement process.

3.2.3. Notification of the EIA Process

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:

» Volksblad (Afrikaans advert placed on 20 June 2012)
» Snuffelblad (Afrikaans advert placed on 20 June 2012)

The advertisements informing the public of the Public meeting were advertised in the following newspapers;

» Volksblad (Afrikaans advert placed on 15 August 2012)
» Bloemnuus (Afrikaans advert placed on 17 August 2012)

In addition to the above advertisements and notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process. These parties included, inter alia:

» Relevant parties from Municipalities potentially affected (directly or indirectly) by the proposed project
» Communities and potentially affected landowners
» Organs of state having jurisdiction in respect of any aspect of the activity, including:

- Free State - Department of Economic Development, Tourism and Environmental Affairs (FS DETEA)
- Free State - Agriculture and Rural Development
- Free State - Public Works
- Free State – Roads And Transport
- Free State - Water Affairs
- South African Heritage Resources Agency
- SANRAL - Eastern Region
- Mangaung Metropolitan Municipality
- Eskom
- South African Civilian Aviation Authority
- Department of Energy
- National Department of Agriculture, Forestry and Fisheries

Copies of all the advertisements placed and notices distributed are contained in Appendix D of this report.

3.2.4. Public Involvement and Consultation

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

» All potential stakeholders and I&APs are identified and consulted with;
» Information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs;
» Participation by potential I&APs is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the application; and
» Comment received from stakeholders and I&APs is recorded.

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 E**). The BID was distributed to identified stakeholders and I&APs, and additional copies were made available at public venues within the broader study area.

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 and will continue to be provided for I&APs to have their issues noted after the release of the Final Scoping Report for public review, 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.

3.2.5. Identification and Recording of Issues and Concerns

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 Final Scoping Report.

3.2.6. 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	Refer Appendix
Marianne Strohbach of Savannah Environmental	Ecology	Appendix F
Nkosinathi Tomose of Zone Land Solutions	Heritage	Appendix G
Job Kibii of Wits University Institute for Human Evolution	Palaeontology	Appendix H
Tony Barbour of Tony Barbour Consulting	Social	Appendix I
Chris Viljoen of Viljoen and Associates	Soils and Agricultural potential	Appendix J
Jacques Louis Volschenk of Zone Land Solutions	Visual	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 F – K.

3.2.7. Public Review of Draft Scoping Report and Feedback Meeting

This is the final stage of the Scoping Phase. The Draft Scoping Report was made available for public review from 14 August 2012 – 14 September 2012 at the following locations:

» www.savannahSA.com
» Botshabelo Public Library

In order to facilitate comments on the Draft Scoping Report, a public meeting was held during the review period for the Draft Scoping Report as follows:

» **Date:** Tuesday, 4 September 2012
» **Time:** 16:30 - 18:00
» **Venue:** H Hall 3219 H2; Botshabelo

The public review process and details of the public meeting were advertised in regional and local newspapers. In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to **Appendix E**).

3.2.8. Final Scoping Report

The final stage in the Scoping Phase will entail the capturing of responses from stakeholders and I&APs on the Final Scoping Report in order to refine this report. It is this final 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 project and the related statutory environmental assessment process.

3.3.1. Regulatory Hierarchy

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

» *Department of Energy:* This department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity). Solar energy is considered under the White Paper for Renewable Energy (2003) and the Department undertakes research in this regard. It is the controlling authority in terms of the Electricity Regulation Act (Act No 4 of 2006).
» *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):* The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.
» *Department of Water Affairs (DWA):* This department is responsible for effective and efficient water resources management to ensure sustainable economic and social development.
» *Department of Agriculture, Forestry and Fishery (DAFF):* This department the custodian of South Africa's agriculture, fisheries and forestry resources and is primarily responsible for the formulation and implementation of policies governing the Agriculture, Forestry and Fisheries Sector.
» *South African National Roads Agency Limited (SANRAL):* This department is responsible for all National road routes.

At **Provincial Level**, the main regulatory agency is:

» *Free State Department of Economic Development, Tourism and Environmental Affairs DETEA* - This department is the commenting authority for this project.
» *Provincial Department of Agriculture*
» *Provincial Roads Authority*

At **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use, and the environment i.e. Mangaung Metropolitan Municipality.

» The Mangaung Metro Municipality covers an area of 6 863 km², and contains three prominent urban centres, which are surrounded by an extensive rural area. The three main urban areas are Bloemfontein, Botshabelo and Thaba Nchu. Bloemfontein, is the sixth largest city in South Africa, and is the capital of the Free State Province and therefore, serves as the administrative headquarters of the provincial government. It is also the Judicial Capital of South Africa.
» In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control. In this regard, the Mangaung Metropolitan Municipal has developed an Integrated Development Plan (2011-2012).
» By-laws and policies have been formulated by local authorities to protect visual and aesthetic resources relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc.

There are also numerous non-statutory bodies such as Solar Energy Associations and environmental lobby groups that play a role in various aspects of planning and the environment that will influence solar energy development.

3.3.2 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 Final Scoping Report:

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GN R543 - GN R546 in Government Gazette 33306 of 18 June 2010 (as amended))
» 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)
» International guidelines – the Equator Principles

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 PV Solar Energy Facility EIA

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Access to information (S32) » Right to just administrative action (S33)
National Environmental Management Act (Act No 107 of 1998)	» National environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment » NEMA EIA Regulations of June 2010 » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the competent authority (S24 – Environmental Authorisations) » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30) » Appeals against decisions made by authorities (S43)
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35)

Legislation	Applicable Sections
	» Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36) » 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) » 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 list ecosystems which are threatened and in need of protection (S52) » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened & protected species has been published in terms of S 56(1) - Government Gazette 29657. » 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). » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	» National, provincial and local ambient air quality standards (S9 - 10 & S11) » Listed Activities (S21) » Atmospheric Emissions Licenses (S22) » Measures in respect of dust control (S32) – no regulations promulgated as yet » Measures to control noise (S34) - no regulations promulgated as yet
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur » Requirement & methods to implement control

Legislation	Applicable Sections
	measures for alien and invasive plant species (Regulation 15E of GN R1048)
National Water Act (Act No 36 of 1998)	» National Government is the public trustee of the Nation's water resources (S3) » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use, as set out in Schedule 1. General Authorisation Government Gazette No. 20526 8 October 1999 is of relevance. » Duty of Care to prevent and remedy the effects of pollution to water resources (S19) » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20) » Definition of water use and requirement for water use licenses for certain activities (S21) » Requirements for registration of water use (S26 and S34) » Definition of offences in terms of the Act (S151)
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. » The Act provides listed activities requiring a waste license
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'. » Forests: The Act prohibits the destruction of indigenous trees in any natural forest without a licence.
Guideline Documents	
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

Legislation	Applicable Sections
Policies and White Papers	
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 RECIEVING ENVIRONMENT CHAPTER 4

This section of the Final Scoping Report provides a description of the environment that may be affected by the proposed Sannaspos PV 1 project. 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 both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices F – J.

4.1 Regional Setting: Location of the Study Area

The proposed PV Solar Energy Facility falls within the quarter degree grid 2926BA. The site is located approximately 45 kilometres east of Bloemfontein in the Free State Province, close to the province's border with Lesotho (Refer to **Appendix L)**. Bloemfontein is the capital city of the Free State Province.

Phase 1 of the Sannaspos PV Solar Energy Facility is proposed on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe within the Mangaung Metropolitan Municipality of the Free State Province. The site is located in a fairly remote area, and the closest town and administrative centre is in the town of Thaba Nchu, which is located ~15km east of the site. The Sannaspos region is a farming area, with many farms which are relatively small (i.e. 1000ha). Agricultural activities include sheep and cattle farming; and cultivation (crop production for animal feed).

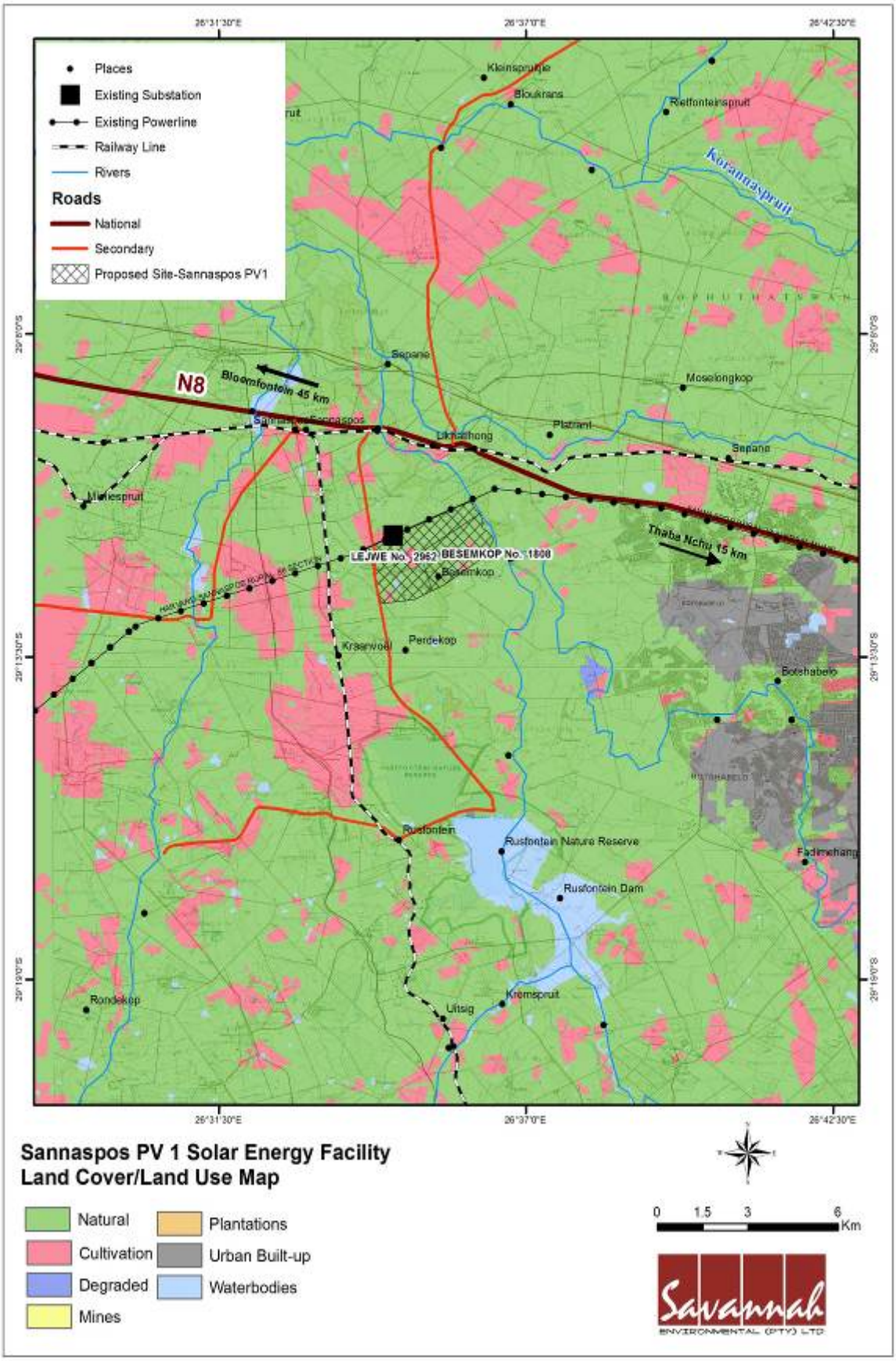


Figure 4.1: Land Cover / Land Use of the Study Area

4.2 Climatic Conditions

The climate for the region is semi-arid region with a highveld climate. The area on average receives approximately 410mm of rain per annum as shown on **Figure 4.2** below, with most of the rainfall occurring mainly during summer. The average midday temperatures range from approximately 16°C in June to 29°C in January. The region is the coldest during July when the mercury drops to 0°C on average during the night.

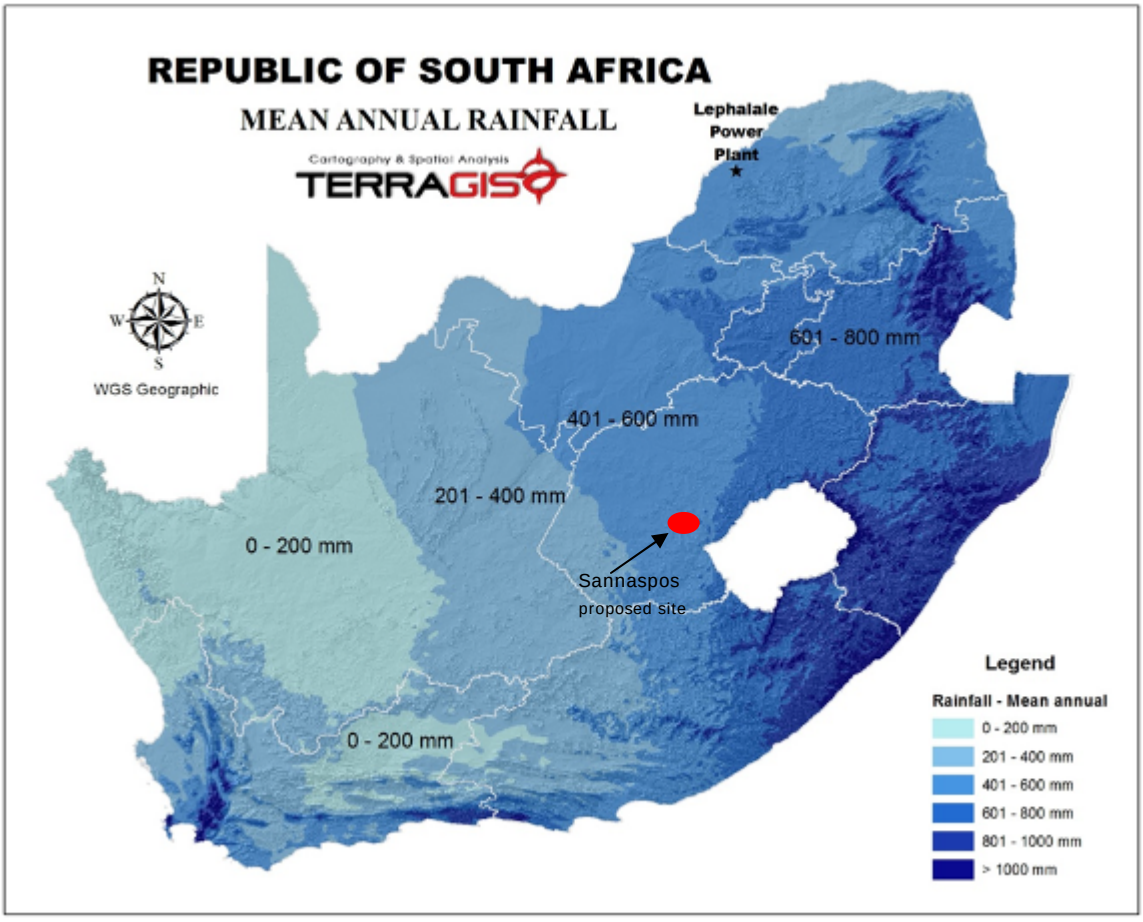


Figure 4.2: Rainfall map of South Africa indicating the survey site

4.3. Landuse and Landcover of the Study Area

The primary activity in the region is farming. As indicated in **Figure 4.1**, the area for the proposed site is predominantly covered in natural grassland with a small portion used for cultivation (agriculture). The land-use of the site is cattle and sheep farming.

4.4. Infrastructure, Access and Transport Routes in the Study Area

A national road (N8) and a railway line runs north of the proposed site. A main road (S417) linking from the N8 runs adjacent to the western boundary of the proposed site (refer to **Figure 4.1**). Two power lines run on the northern boundary of the study area from east to west, linking with the Sannaspos Rural 132/22kV Substation, located on the site itself.

4.5. Biophysical Characteristics of the Study Area

4.5.1 Topography

A relief map is shown in **Figure 4.3**. The study area is situated on land that ranges in elevation varying between 1340m and 1410m above mean sea level over a distance of approximately 3.5km. The terrain surrounding the farm is generally flat to gently undulating with a slight downward easterly slope that forms part of the river floodplain of the Modder River. The Digital Elevation Model (DEM) shows that there are very few prominent topographical manifestations in close proximity to the project site from which the proposed activity is particularly visually exposed. The project site is located below any ridgeline, sloping to the north. The most prominent topographical feature is the Korannaberg Mountains to the far-east.

Figure 4.3: Topography / Shaded Relief Map for the study area (Zonelandsolution July 2012)

4.5.2 Land Types (Soils) and Agricultural Potential

The site falls into three categories according to the Taxonomical Soil Classification System of South Africa which include Avalon, Clovelly and Mispah soils (Refer to **Figure 4.4** for the land type map of the area). A brief description of the land type in terms of soils, land capability, land use and agricultural potential is contained below.

Land Type

» Soils: The effective depth of the Avalon and Clovelly soils exceed 300mm inclusive of the Orthic A and Yellow Brown Apedalic B – Horizons. The Avalon, Clovelly and Mispah soils are characterised by neutral pH values (*5,3 and 7,2*) and low electrical conductivity values *(<250mS/m*). Under these conditions plant available nitrogen (*15-20mg/kg*), phosphorus (*10-15mg/kg*) and potassium (*>50mg/kg*) are readily available for plant uptake and sustainable plant growth. The *Orthic A-horizon* is typically characterised by a low dense structure and texture distribution of approximately 65% sand, 20% silt and 15% clay with drainage properties in order of 10mm/h. The dominant clay mineral in the *Orthic A – Horizon and Yellow Brown Apedalic B – Horizon* is

kaolinite (*1:1 layer silicate*), with a low buffer capacity due to the low cation exchange capacity (*<10cmol+/kg*). The soil horizons of the Clovelly, Mispah and Avalon (*except Soft Plinthic B – Horizon*) soil types are suitable for rehabilitation purposes.

» Land capability and land use: The current land use includes natural veld (616ha), ploughed land (53ha) and dams/pans/wetlands 14ha. Land capability includes 55ha arable, 557ha grazing, 14ha pans/dams/wetlands and 58ha wilderness of the total 684ha investigation area. No evidence of soil erosion was observed on any of the soils during the investigation.

» Agricultural potential: The agricultural potential of the Avalon and Clovelly soils is considered medium to high under dryland (*650mm/y rainfall*) and irrigation conditions *(>10-15mm/week 33-1,500kPa plant available water*). The agricultural potential of the Mispah soil is considered low.

The agricultural potential of the site ranges from low – medium high, of which 8% of the total proposed area is arable land. The remainder of the medium-high agricultural land is limited to extensive grazing mainly due to the low and erratic rainfall but also due to soil constraints. Under these conditions the agricultural potential is limited to grazing land uses.

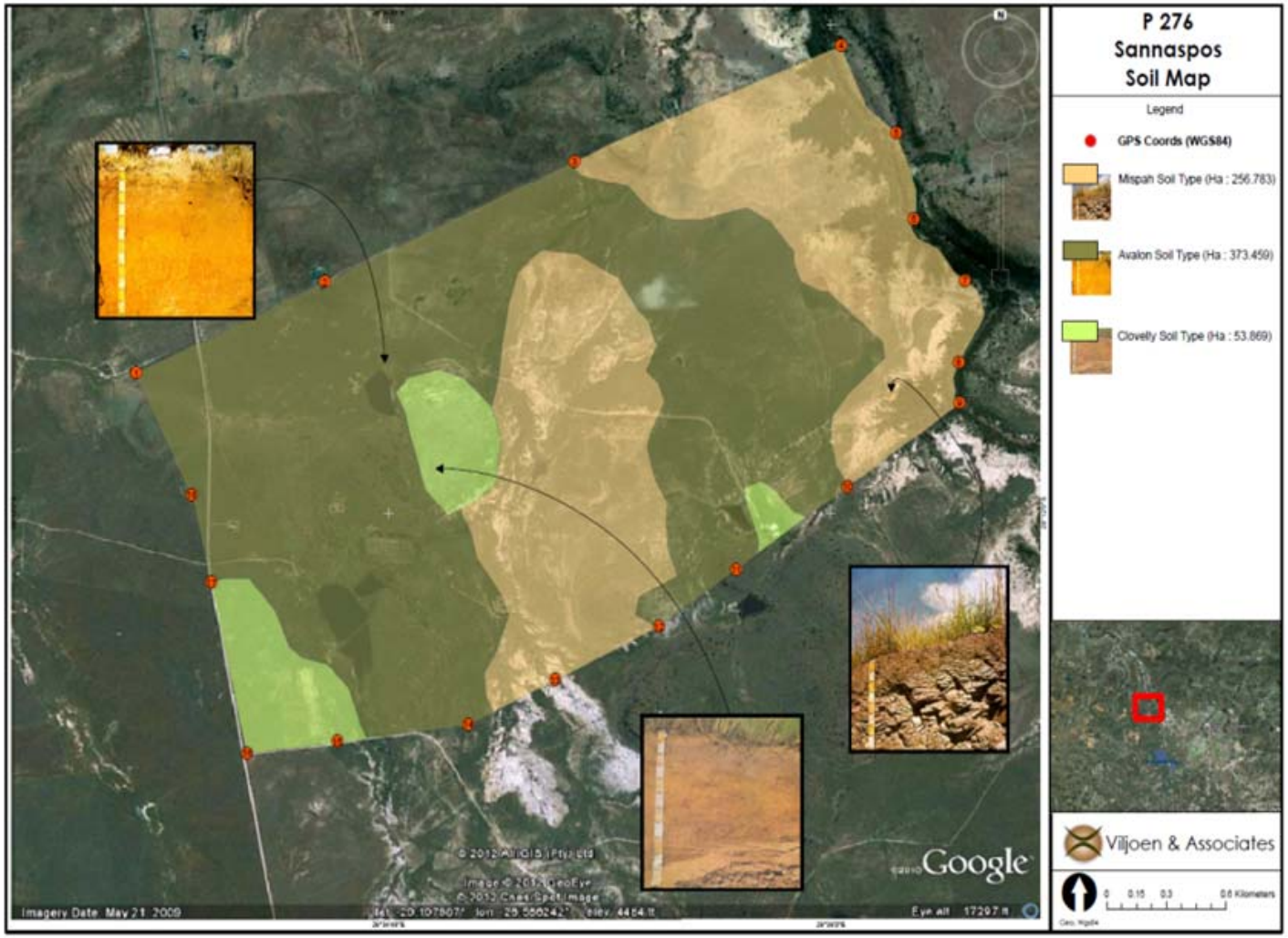


Figure 4.4: Soil type of the survey site.

4.6. Ecological Profile

4.6.1 Vegetation

The study site falls within the Central Free State Grassland as described by Mucina and Rutherford (2006). Towards the west and north west of the study area, but beyond it, are patches of Highveld Alluvial Vegetation and Bloemfontein Dry Grasslands, the latter listed as a vulnerable ecosystem in terms of National Legislation.

The Central Free State Grassland is relatively short grassland. 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 Karoo bushes, whilst riverine areas and severely tramples low-lying areas are prone to encroachment by *Acacia karoo* (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, whilst only small portions are protected, such as in the nearby Rustfontein Dam Nature Reserve.

4.6.2 Red List Plant Species

South Africa has adopted the IUCN Red List Categories and Criteria to provide an objective, rigorous, scientifically founded system to identify Red List species. **Table 4.1** describes these categories.

Table 4.1: Explanation of IUCN Ver. 3.1 categories (IUCN, 2001), and Orange List categories (Victor & Keith, 2004).

IUCN / Orange List category	Definition	Class
EX	Extinct	Extinct
CR	Critically Endangered	Red List
EN	Endangered	Red List
VU	Vulnerable	Red List
NT	Near Threatened	Orange List
Declining	Declining taxa	Orange List
Rare	Rare	Orange List
Critically Rare	Rare: only one subpopulation	Orange List
Rare-Sparse	Rare: widely distributed but rare	Orange List
DDD	Data Deficient: well-known but not enough information for assessment	Orange List
DDT	Data Deficient: taxonomic problems	Data Deficient

IUCN / Orange List category	Definition	Class
DDX	Data Deficient: unknown species	Data Deficient

Lists of plant species of conservation concern previously recorded in the quarter degree grids in which the study area is situated were obtained from the South African National Biodiversity Institute (SANBI). There are four species on this list which could occur in the study area, one listed as Critically Rare, and three listed as Declining. These Red List Plant Species that may occur in the broader study area are as follows:

» *Brachystelma duplicatum (*Critically Rare*)*
» *Hypoxis hemerocallidea* (Declining)
» *Pelargonium sidoides* (Declining)
» *Gunnera perpensa* (Declining)

4.6.3 Protected Plant Species

Certain plant species are protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004). According to Table 1 and Table 2 of the ecology specialist report (refer to **Appendix F**) there are a number of plant species of conservation concern, as well as grasses and forbs in the study area. Some of the protected species that can be found in the area include: *Cotyledon orbiculata* var. *oblonga*; *Aloe aristata*; *Raphionacme hirsute*; *Harveya pauciflora*; *Habenaria epipactidea*; *Tulbaghia leucantha*. However these will only be identifiable during the growing season, and thus any field survey of vegetation should only commence from about mid-November and be completed by April.

4.6.4 Red List and Protected Animal Species

The SANBI SIBIS database was referenced regarding terrestrial and avifauna historically recorded in the study area and surroundings. The likelihood of such species still occurring in the area was verified according to Apps (2000), and is presented in Table 3 of the ecology specialist report (**Appendix F**), and species of conservation concern or that are protected and most likely to occur in the study area listed. There are seven animal species of conservation concern that could occur in available habitats in the study area. This includes:

» Kori Bustard Vulnerable (VU)
» Lesser Kestrel Vulnerable (VU)
» Bald Ibis Vulnerable (VU)
» Ludwig's Bustard Vulnerable (VU)
» Martial Eagle Vulnerable (VU)
» African Grass-Owl Vulnerable (VU)

Whilst animals are mobile and the impact of new structures does not destroy animals as it does plants, they do depend on specific habitats. For all species that have a red-data status as indicated in the list (refer to Appendix F), the presence and suitable habitat of such species on sitre will need to be verified during this EIA process.

4.6.5 Protected Trees

Certain tree species are protected under the National Forest Act. According to Table 1 and Table 2 of the ecology specialist report (**Appendix F**) there are no protected tree species of conservation concern that could be found in the study area. However the absence of these will only be confirmed during the EIA phase when a field study is conducted during the EIA phase of the process.

4.6.6 Wetlands and Drainage lines

Potentially sensitive areas on the site were identified from visual inspection of Google imagery and past experience. The areas thus identified as potentially sensitive (see **Figure 4.5**) are wetlands – drainage areas, dams and vleis that could be remotely identified. These habitats are sensitive because of their ecosystem functions – providing specialised niches for fauna, creating corridors in the landscape, filtering water, catching sedimentation and concentrating water runoff from catchments.

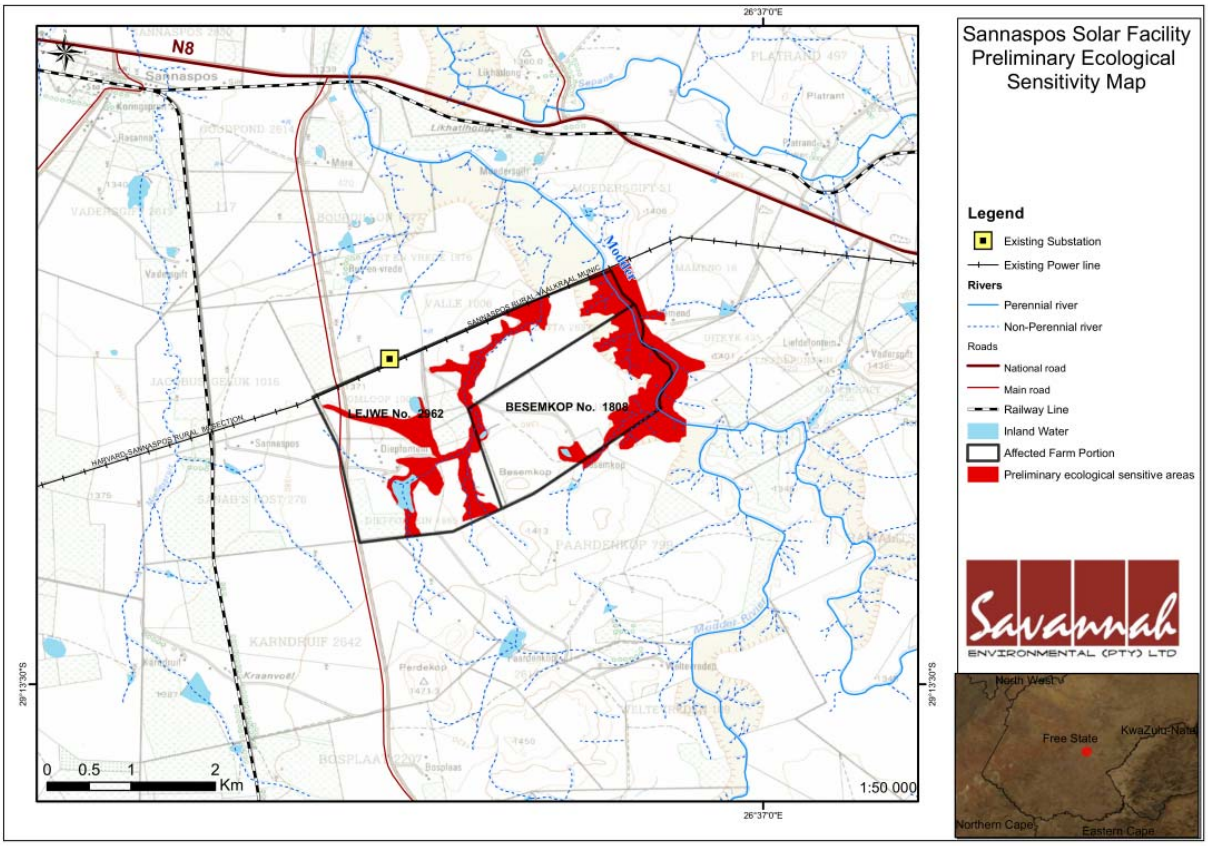


Figure 4.5: Preliminary sensitivity map of the study area.

4.7 Social Characteristics of the Study Area and Surrounds

4.7.1 Mangaung Metropolitan Municipality

The Mangaung Metropolitan Municipality (MMM) covers an area of 6 863 km², and contains three prominent urban centres, which are surrounded by an extensive rural area. The three urban areas are Bloemfontein, Botshabelo and Thaba Nchu. Bloemfontein, is the sixth largest city in South Africa, and is the capital of the Free State Province and therefore, serves as the administrative headquarters of the provincial government. It is also the Judicial Capital of South Africa. In terms of its contribution to the economy, Bloemfontein is de facto the economic hub of the local and regional economy. Attached to Bloemfontein is a large township; Mangaung. Botshabelo is located ~ 55km to the east of the site, and is the single largest township development in the Free State. However, it is highly under-developed and lacks most basic services. As a result, the majority of its residents rely on the City of Bloemfontein for employment and other economic activities. It is estimated that more than 17 000 people who reside in Botshabelo and Thaba Nchu commute to Bloemfontein daily. Thaba Nchu is located ~ 70 km east of Bloemfontein, beyond Botshabelo. The town used to be part of the Bophuthatswana "Bantustan". As a result it exhibits a large area of rural settlements located on former trusts lands. In addition, Thaba Nchu has a

scattered settlement pattern with 37 villages surrounding the urban centre – some located as far as 35km from settlement centres.

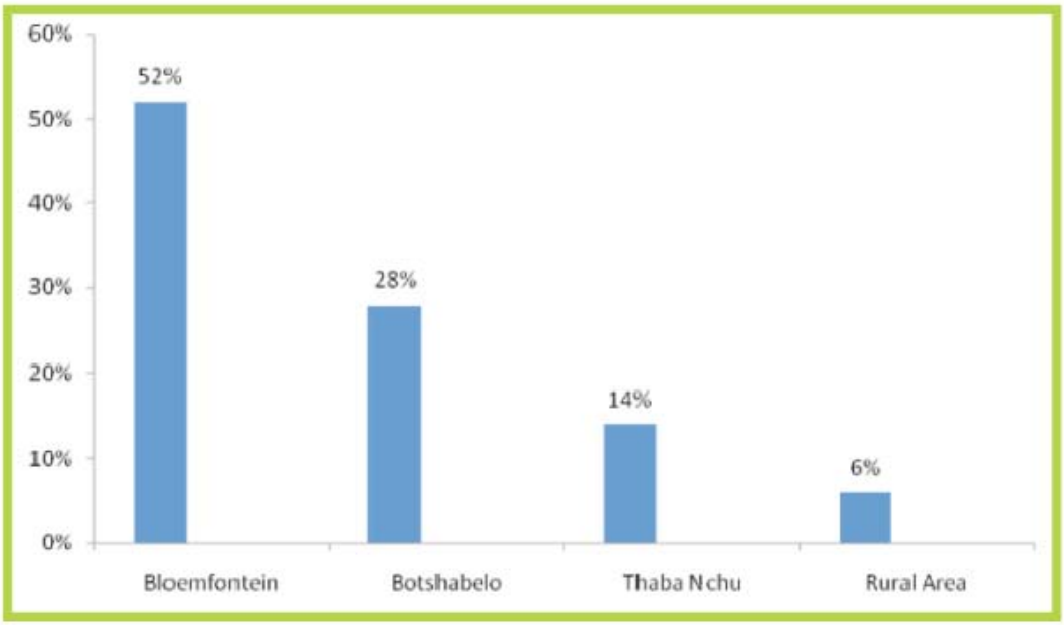
4.7.2 Population Dynamics

Over the last 10 years Mangaung has experienced rapid growth in population size. The population has increased from 645 440 in 2001 to 752 906 in 2007 (Stats SA, 2007), a combined growth rate of 16.6 % over the last 6 years. This translates to a growth rate of just more than 3% per annum and a projected population of ~ 900 000 people in 2011.

During the same time, the number of households increased from 188 876 to 202 762 in the corresponding years (Stats SA, 2007). The increase in the population and the number of household has been attributed to the migration of people to the area seeking better livelihood opportunities from other towns in the Free State Province, other provinces and the neighbouring country of Lesotho.

This rapid growth in population size has placed pressure on the MMM to provide adequate services and prevent backlogs from developing. The challenge has been exacerbated by the large number of indigent families who have migrated to the area and their inability to pay for services.

In terms of population distribution, the population is heavily skewed towards Bloemfontein. This is to be expected given the high level levels of inequalities between Bloemfontein and the other two major settlements of Botshabelo and Thaba Nchu. Approximately 94% of the total population of the MMM are urban, while only 6% are rural (**Figure 4.6**).



Source: Stats SA (2007)

Figure 4.6: Distribution of population in the MMM (Source MMM IDP)

4.7.3 Employment Status

The creation of employment opportunities amongst semi and unskilled persons remains a challenge. As a result, unemployment figures are still unacceptably high at 30%.

4.7.4 Basic Services

Due to its relatively high state of development, Bloemfontein inevitably attracts more than migrants, especially in the township of Mangaung. This has resulted in a growing backlog of services. The backlogs for water stood at 8.7%; 6.9% for sanitation; 15% for roads and 26% for stormwater in 2009 (IDP, 2010/2011)). The influx of migrants to the town has also resulted in rapid growth in informal settlements due to the shortage of housing. There are an estimated 45 informal settlements in Mangaung (IDP, 2010/2011).

4.7.5 Cultural or tourism significance

The Anglo-Boer war broke out on 11 October 1899 and influenced the cultural landscape of, in particular, the Free State in a significant manner. This was the last full-scale war to be fought on South African soil. The Free State contains 13 battlefield sites, 8 military monuments, 2 war museums, and 3 war and concentration camp cemeteries.

The Free State Department of Tourism, Environmental and Economic Affairs promote several tourism routes to celebrate inter alia these battlefields. In addition, the Active N8 Route is promoted as a tourism route to link Lesotho and Bloemfontein, passing inter alia Ladybrand, Thaba 'Nchu, Botshabelo and Maseru.

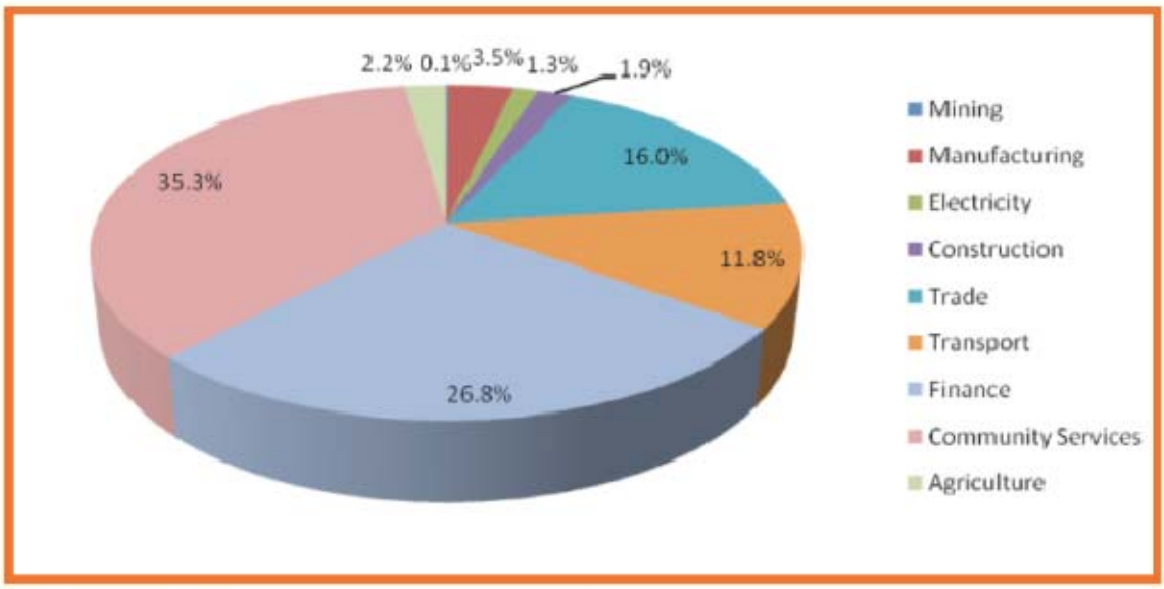
This route is also an alternative route for travellers from KwaZulu-Natal to the Eastern Cape and Cape Town via Bloemfontein. One can experience many tourist attractions, including museums depicting art, literature, war and military artefacts along the route.

Most visitors to the Free State will eventually travel through or stay over in Bloemfontein, making the Active N8 route very popular because of its proximity to the capitol.

Another route of importance as it relates to the project site is the BBT Heritage Route. This route was established to boost tourism in the Motheo region of the Free State in an attempt to alleviate poverty. The route follows the same alignment as the Active N8 Route en route to Thaba Nchu.

4.7.6 Economy

In terms of economic sectors, the Community Services sector (35.3%), followed by the Finance (26.8%), Trade (16%) and Transport (11.8%) represent the most important sectors in the MMM (see **Figure 4.7**). This highlights the key role played by the general government services followed by financial, real estate and business services. Manufacturing is in serious decline in the Municipality. These sectors generally rely heavily on skilled personnel. The IDP notes that the large majority of South Africans, particularly Africans, have been disproportionately affected by the legacy of Bantu education which renders them redundant in the current economic juncture that requires skilled and highly specialised labour. The IDP goes on to note that there is a need to diversify the region's economy to cater for all the sectors of the population, including small-scale farmers, and those lacking key requisite skills. The Agricultural sector, which is a key sector at a Provincial level, only contributes 1.3% to the MMM's economy. The MMM has a relatively well developed economy and is the largest contributor to the GDP of the province at 31.35% (Stats SA, 2007). The IDP indicates that economic growth has remained consistent at 3% per annum. However, the MMM is characterised by a reliance on service industries, and (ii) unequal distribution of economic activities. As result there has been unemployment, poverty and inequality remain challenges. Despite this the level of unemployment decreased from 40% to 30% between 2001 and 2007. The financial crisis of 2008 has resulted in the loss of ~ 1 million jobs in South Africa. The MMM is also likely to have been affected job losses.



Source: Stats SA (2007)

Figure 4.7: Sectors contributing to MLM economy (Source MMM IDP)

4.8 Heritage

4.8.1 Stone Age Archaeology

The Stone Age archaeology is divided into three categories, namely: the ESA, MSA and the LSA. These Stone Age industries are well documented throughout southern Africa regions including the Free State province where the current study is located. Below are detailed summaries of the traits that characterises each industry artefact and/or material culture.

» ESA – Early Stone Age:
The ESA is dated between 2.5m.y.a and 250 k.y.a (thousand years ago) – during this period predecessors of Homo Sapien Sapiens started making stone artefacts. In the Free State, the earliest known ESA industry is the Victoria West Stone Industry which also spreads to the Northern Cape where it becomes dominant. The Victoria West Stone Industry was first recorded and defined by R. A., Smith in 1915 and in the Free State region it is found along the Vaal River basin. Tools found in this industry included hand axes and what Smith refers to as 'Tortoise Cores' (Smith, 1920).

» MSA – Middle Stone Age:
The MSA stone artefact replace the dominant large and often imposing hand axes and cleavers that characterise the ESA. Such a distinction or transition in archaeological records has this far be dated to 250 k.y.a. During this period, smaller artefacts define the archaeological records and the most

dominant ones are flake and blade industry. The flakes and blade industries are often found in secondary context as surface scatters and occurrence like their predecessor industries. Malan (1949) defines the earliest MSA stone industry as the Mangosia and its distribution stretching across the Limpopo, the Qriqualand in Northern Cape, Natal, the Cape Point and the Free State our region of interest in the case. The MSA tools include flakes, blades and points. Their time sequence is often not known because they mostly occur in surface. Other industries within the MSA include:

- The Howieson's Poort which is known to have wide distribution throughout southern African including the Free State Province.
- The Orangia 128 to 75 k.y.a.
- Florisbad and Zeekoegat industries dated between 64 and 32 k.y.a - Florisbad is dominant in the Free State Province.

Most of the MSA stone artefacts are made from the following materials: fine grain quartzite, quartz, silcrete, chalcedony and hornfels (Binneman et al. 2011, see also Binneman et al. 2010a).

» LSA – Late Stone Age:
The LSA spans a period from 30 k.y.a to the historical time i.e. the last 500 years to 100 years ago. It is associated in archaeological records with the San hunter-gathers. However, the LSA archaeology was not only dominated by the San hunter-gathers because in some 2 k.y.a the southern Africa landscape was penetrated by the Khoekhoe pastoralist introducing sheep, cattle and goal along with them (e.g. Hall & Smith, 2000). Other than the material culture such as artefacts found within the LSA industries, burials or human remains become dominant in the landscape. In the coast they are often found buried underneath middens (dumpsites) (Deacon & Deacon 1999). Among stone tools, bifaces still continue and are supplemented by tanged barbed arrow heads made from the various materials found with the southern Africa regions. Dark or black fine grained chalcedony would have been the most preferred form of material in the Karoo (Northern Cape regions), the Free State Province and Lesotho (Humphrey, 1969).

4.8.2 Iron Age Archaeology

The Early Iron Age communities first appear in southern African archaeological records in the 1st Millennium AD. The eastern regions of the country were their preferred regions because of their rainfall patterns – summer rainfall climates conducive for ploughing and growing crops like sorghum and millet. In the Free State their first evidence is documented south-eastern region where they can into contact with the San people. Most of existing evidence about the Iron Age communities in the Free State dates to the 16th and 18th when they moved

across the Vaal River coming to contact with the San hunter-gather people (Klatzow 1994).

Among the well known and documented areas with evidence of the Iron Age farmers in the Free State region is the Caledon River Valley -known to have been settled by the Fokeng group of Iron Age speakers (the Sotho Speakers). The Fokeng are suggested to have later settled in Metlaeeng, after dwelling the foothill of Ntsuana-tsatsi between Frankfort and Vrede (Walton 1953). North of the Vaal River in what is today known as the Limpopo Province the Iron Age communities are known to have also practice the tradition of making rock art, especially during the last period of the Iron Age characterised by the different encounters between these communities and the colonial settlers. The Makgabeng rock art is known to have depict conflict scenes associated with the Malebogo Wars – war between Chief Malebogo of the Hananwa people and President Kruger of the ZAR (e.g. Van Schalkwyk & Smith,).

In the Free State rock art linked to the Iron Age communities by association, it is not directly executed or engraved by them. For example, in the south-eastern Orange Free State recordings of cattle paintings are found, with some depicting conflict scenes – figures include 'hour-glass' Sotho shields which Binneman (et al. 2011) argues could be referring to the period of unrest in southern Africa called Imfecane (or Difaqane in some literature). However, it would not be totally truthful to argue that the south eastern Free State only depict conflict paintings of sheep are found. One such site is known to exist on the Farm Kwartelfontein near Smithfield and is found in association with the depiction of cattle (Manhire et al. 1986).

These are some of the material culture expected to be found in the eastern Free State where our proposed development area for the Sannaspos Solar Power is located.

4.8.3 Colonial Archaeology

The Colonial or Historical archaeology is a period in archaeological records that refers to the last 500 years when European settlers and colonialists entered into southern Africa. Bloemfontein is one of the interior towns that were established by the European settlers of Dutch descent – the Afrikaans communities after the Trekked from the then Cape Colony to avoid British Administration. Various monuments, statues and memorials associated with this period are found across the Free State province. The same is true with architectural styles found in some of the still standing farmsteads. Also associated with colonial archaeology are two South African Wars commonly known as the Anglo-Boer Wars in the 1860s and in the late 1890s to 1901.

A monument commemorating this event has been established and its currently used as one of the tour attraction of the Free State province battle fields tours - refer to Figure 10 in **Appendix G** for its proximity location in the landscape. Other archaeological remains associated with these periods of unrest in the Free State Province are expected to be found in areas in and around the propose Sannaspos Solar Park.

The desktop study yielded information about the existence of heritage resources in the Free State regions. This included archaeological, historical and industrial heritage resources. The south-eastern Free State Province region proved, from a desktop search point of view, to be the most saturated region with known archaeological resources. This study falls directly in the south east of the province, located some 28km south-east of the capital Bloemfontein. However, even though the south-eastern regions of the Free State are known to be saturated in archaeological sites and resources, the proposed area of development yielded insignificant number of such resources. Two Middle Stone Age stone artefact scatters were found on the foothill of a Koppie in the Farm Besemkop. The bulk of sites identified within the proposed development area date to the historic period. Inscriptions were located on top of Besemkop koppie, these inscriptions only date to 41 years ago and can therefore not be considered to be worth of being given a status of rock art using the 100 year rule as stipulated in the NHRA, No. 25 of 1999 (Figure 15 of **Appendix G**).

The survey, therefore, only yielded three significant sites within the proposed development area. These sites include two cemeteries and a stone shed located within the Besemkop farmstead which has consist of modern buildings with exception to the shed itself (see **Figure 4.8**).

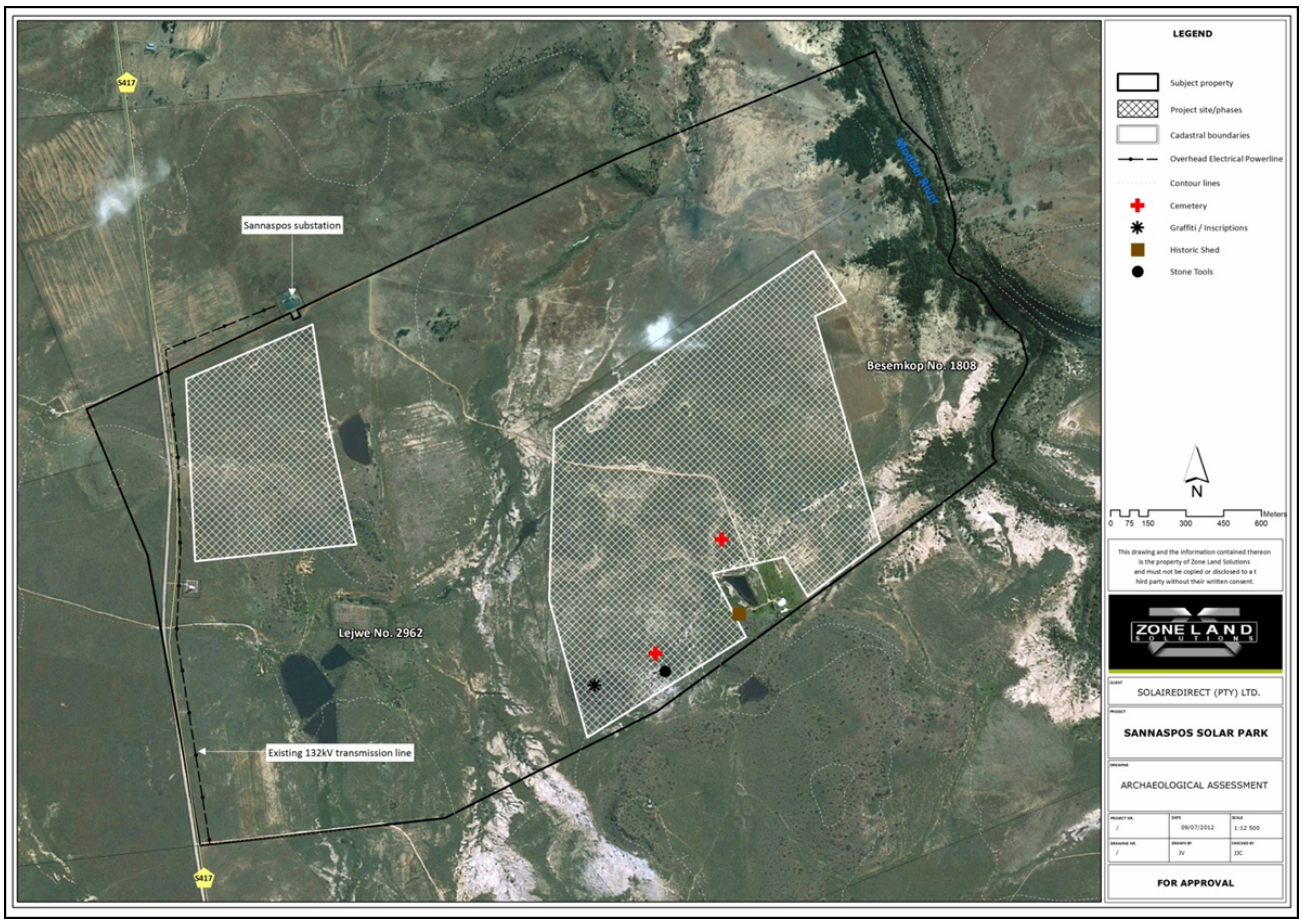


Figure 4.8: Distribution of heritage sites within Sannaspos study area- the sites are located on Farm Besemkop.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED SANNASPOS PV1 SOLAR ENERGY FACILITY CHAPTER 5

The potential impacts of the predominant phases of the proposed development (i.e. construction and operation) are identified, described and evaluated in this chapter. The majority of the environmental impacts are expected to occur during the construction phase for a facility of this nature.

Environmental issues associated with **construction and decommissioning** activities of a PV solar energy facility are similar and include, among others:

» Impact on fauna, flora and ecology.
» Impact on land use - inability to use arable land during construction of the facility.
» Impact on soils and agricultural potential.
» Impact on heritage resources.
» Social impacts (positive and negative).

Environmental issues specific to the **operation** of a PV solar energy facility could include, among others:

» Habitat transformation (limited to the footprint of the PV panels, access roads and associated infrastructure).
» Change in land-use and loss of arable land within the footprint of the facility.
» Potential soil loss within the footprint of the facility.
» Visual impacts (intrusion, negative viewer perceptions and visibility of the facility)
» Social impacts (positive and negative)

Table 5.1 and Table 5.2 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed project respectively. Impacts of the proposed facility are evaluated, and recommendations are made regarding further studies required within the EIA phase of the process.

5.1 Methodology for Impact Assessment during the Scoping Phase

The following methodology was used to determine the main issues and potential impacts of the proposed project during the scoping phase at a **desktop level** based on existing information:

» Identify **potentially sensitive environments** and **receptors** that may be impacted on by the proposed facility and the **types of impacts** (i.e. direct, indirect and cumulative[3]) that are most likely to occur.
» Determine the **nature and extent of potential impacts** during the construction and operational phases.
» Identify '**No-Go' areas**, if applicable.
» Summarise the potential impacts that will be **considered further** in the EIA Phase through specialist assessments. Tables 5.1 and 5.2 summarise the findings of the Scoping Phase undertaken for the construction and operation phases of the proposed development (the pre-construction and decommissioning phases will be discussed in further detail in the EIA Phase).

5.2 Assumptions made during the Evaluation of Potential Impacts

While evaluating potential impacts associated with the proposed project, it was assumed that the development footprint (the area that will be affected during the operational phase) will include the footprints for the solar components (i.e. PV panels), the invertors, construction of the on-site substation and associated infrastructure (i.e. internal access roads and buildings). However, during the construction phase, the entire extent of the broader site required for the proposed facility could suffer some level of disturbance. This is referred to as the construction footprint.

[3] The cumulative impacts are expected to be associated with the scale of the project and any existing impacts affecting the study area. Cumulative effects can only be assessed once the detailed layouts are known. They will then be considered in the detailed specialist studies to be undertaken in the EIA Phase.

Table 5.1: Evaluation of potential impacts associated with the Construction Phase

Overview of habitat

The Central Free State Grassland is relatively short grassland. Where 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 Karoo bushes, whilst riverine areas and severely tramples low-lying areas are prone to encroachment by *Acacia karoo* (Mucina and Rutherford 2006).

The proposed development site can be described as gently undulating to flat, with the highest portion in the south-western portion of the study area, draining in a north-easterly direction. This drainage is channelled through several larger tributaries into the Modderrivier located to the east and northeast of the study area. Within these drainage lines, several small dams have been created for agricultural purposes. The banks of the Modderrivier and larger drainage lines have been incised over the years, exposing the subsurface, and therefore it can be expected that soils may be erodible. Erosion is one of the immediate consequences of loss of vegetation cover.

Issue	Nature of Impact during Construction	Extent of Impact	No-Go Areas
Disturbance or loss of indigenous natural vegetation	Construction of infrastructure may lead to direct loss of vegetation, causing a localised or more extensive reduction in the overall extent of vegetation. Consequences of the potential impact of loss of indigenous natural vegetation occurring may include: » Increased vulnerability of remaining portions to future disturbance; » General loss of habitat for sensitive species; » Loss in variation within sensitive habitats due to loss of portions thereof; » General reduction in biodiversity; » Increased fragmentation (depending on location of impact); » Disturbance to processes maintaining biodiversity and ecosystem goods and services; and » Loss of ecosystem goods and services.	Local	No “no-go” areas have been identified at this stage; areas of potential sensitivity are shown in **Figure 5.1** for further investigation in the EIA phase.
Disturbance or loss of threatened / protected plants	Several red-data plant species could potentially occur on the site. Flora is affected by overall loss of habitat and is vulnerable to infrastructure development as species cannot move out of the path of the construction activities. In the case of threatened plant species a loss of a population or individuals could lead to a direct	Local	None identified at this stage, requires further investigation in the EIA phase.

	change in the conservation status of the species, and 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: » Fragmentation of populations of affected species » Reduction in area of occupancy of affected species » Loss of genetic variation within affected species These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chance of survival of the species.		
Loss of protected trees	According to the National Forests Act, no person may cut, disturb, damage or destroy any listed protected tree species. Any of these protected species could occur in any part of the study area, depending on local conditions. A permit is required from the Department of Agriculture, Forestry and Fisheries (DAFF) before any protected trees may be impacted.	Local	Location and occurrence of protected trees to be confirmed during the EIA Phase.
Loss of habitat for threatened and protected animals and birds	Threatened animal species are indirectly affected primarily by the overall loss of habitat, since direct construction impacts can often be avoided due to movement of individuals from the path of construction. Animals are generally mobile and, in most cases, can move away from a potential threat. 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: » Fragmentation of populations of affected species; » Reduction in area of occupancy of affected species; and » Loss of genetic variation within affected species. These may all lead to a negative change in conservation status of the affected	Local	No “no-go” areas have been identified at this stage; areas of potential sensitivity are shown in **Figure 5.1** for further investigation in the EIA phase.

	species, which implies a reduction in the chances of the species overall survival chances. There are a number of vulnerable and one endangered species that could occur in the study area, but there are no threatened, near threatened or protected species that occur in available habitats in the proposed study area. This will be confirmed in the EIA phase.		
Impacts on watercourses and drainage areas	The site is in a semi-arid area. There are several small drainage lines traversing the study area. According to the National Water Act, these are classified as wetlands or water resources. Construction, if it occurred within any of these areas, would lead to some direct or indirect loss of or damage to some of these areas or changes to the catchment of these areas. This may affect the hydrology of the landscape or lead to loss of habitat for species that depend on this habitat type.	Local	No "no-go" areas have been identified at this stage; however, some drainage areas do occur on the site as shown in **Figure 5.1**, to be further investigated in the EIA phase.
Establishment and spread of declared weeds and alien invader plants.	Major factors contributing to invasion by alien invader plants includes *inter alia* high disturbance (such as clearing for construction activities) and negative grazing practices. Exotic species are often more prominent near infrastructural disturbances than further away. Consequences of this may include: » Loss of indigenous vegetation; » Change in vegetation structure leading to change in various habitat characteristics; » Change in plant species composition; » Change in soil chemical properties; » Loss of sensitive habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; and » Impairment of wetland function.	Local	None identified at this stage.

	The extent to which the site contains alien plants will be determined in the EIA phase.		

Gaps in knowledge & recommendations for further study

» The initial desk-top investigation of the study area indicates that placement of components of the solar energy facility will have to be aligned mostly according to existing wetlands on the ground. Several protected and red-data species potentially occur on the site. However, it is unlikely that the development will compromise the survival of any of the species of conservation concern once the final layout has been designed in accordance to findings of a field investigation.
» Plant species of conservation concern will only be identifiable during the growing season, thus any field survey of vegetation should only commence from March and be completed by April.
» It must be noted that this area has not been extensively collected, thus 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 section 4

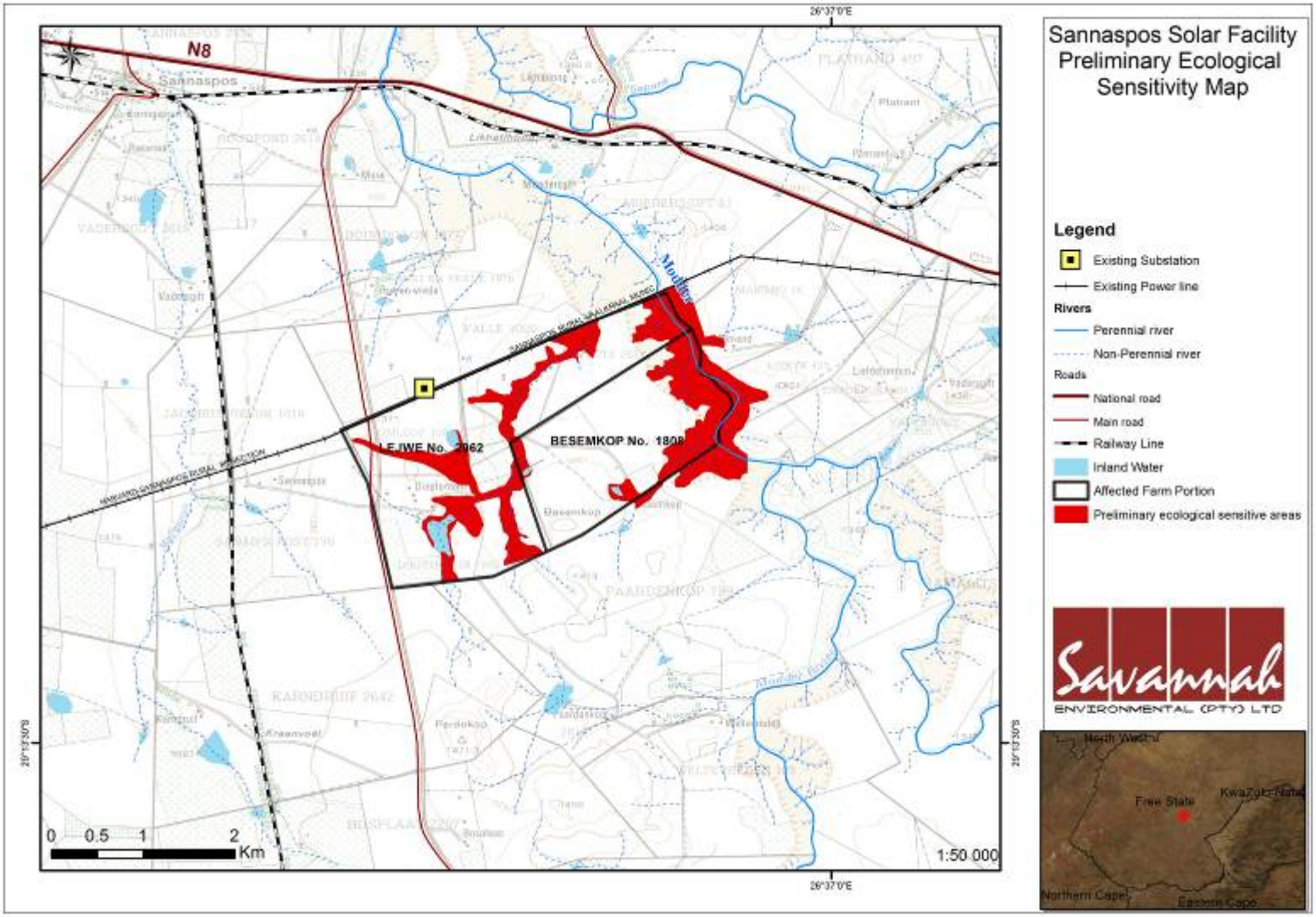


Figure 5.1: Preliminary Ecological and Habitat Sensitivity Map for the Sannaspos PV facility.

1. Impacts on Soils

The potential impacts and reasons/activities with proposed mitigation measures on the soil due to construction activities include:

» ***Loss of topsoil:***

This is due to stripping, handling and placement of the soil associated with the pre-construction land clearing and rehabilitation and it is recommended to strip all usable soil irrespective of soil depth.

» ***Change to soil's physical, chemical and biological properties:***

There is a high probability that topsoil will be loss due to wind and water erosion, which will alter the soils properties. Stockpiling and subsequent mixing of soil layers during handling will ultimately have a negative effect on altering the basic soil properties. It is suggested to implement live management and placement of topsoil where possible, improve the organic content of the soils, and maintains fertility levels through fertilisation and to curb topsoil loss as much as possible.

» ***Cumulative effect of the soil:***

Alteration of the natural surface topography due to reprofiling during construction after stripping will have an accumulation effect on the soils and careful consideration should be given to minimise compaction and ensure free drainage preferential surface water pathways.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Loss of topsoil and usable soil	Land transformation will lead to some losses of topsoil during construction and soil stripping.	Site	None identified at this stage
Contamination of topsoil and stockpiled soil	Topsoil may be contaminated during the construction. Soil contamination is the result of surface runoff and seepage. Contamination of stockpiled soil may occur due to seepage or contact with dirty surface water.	Site	None identified at this stage
Soil erosion	Soil stockpiles may be exposed to erosion by surface water and wind. The aspect that would cause erosion is runoff.	Local	None identified at this stage

Gaps in knowledge & recommendations for further study

» The potentially significant impacts to be assessed in the EIA phase will be limited to the classification of the soils as well as assessment of slopes and storm water impacts. These parameters will provide an indication to the project engineers regarding the erosion risk as well as inform the mitigation measures to be implemented on the site.

» A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated:

* Soil distribution (classification) on the site;

* Extent of degradation due to current land use (such as overgrazing);
* Erosion status and erodibility of the soils on the site; and
* Mitigation measures to arrest current impacts and manage future impacts associated with the development.

2. Impacts on Current Land Use and Agricultural Potential Due To Construction Activities

The current land use includes natural veld (616ha), ploughed land (53ha) and dams/pans/wetlands 14ha. Land capability includes 55ha arable, 557ha grazing, 14ha pans/dams/wetlands and 58ha wilderness of the total 684ha investigation area. No evidence of soil erosion was observed on any of the soils during the investigation. The agricultural potential of the Avalon and Clovelly soils is considered medium to high under dryland (650mm/y rainfall) and irrigation conditions (>10-15mm/week 33-1,500kPa plant available water). The agricultural potential of the Mispah soil is considered low.

The agricultural potential of the site ranges from low – medium high of which 8% of the total proposed area is arable land. The rest of the medium-high agricultural land is limited to extensive grazing; under these conditions the agricultural potential is limited to grazing land uses.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Temporary disturbance to grazing land-use of the farm during construction.	The major impact on the agricultural potential of the study area would be the loss of arable land due to the construction of the various types of infrastructure. However, 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, with little impact, especially given the low prevailing agricultural potential.	Local	None identified at this stage
Loss of arable land	The major impact on the agricultural potential of the study area would be the loss of arable land due to the construction of the various types of infrastructure if the portion of the site with high potential agricultural land were to be used.	Local	No "no-go" areas have been identified at this stage; however the arable land shown in Figure 9 (**Appendix I**) for further

			investigation in the EIA phase.

Gaps in knowledge & recommendations for further study

» The information contained in the land type survey upon which the Agricultural Potential Scoping Study was based, is of a reconnaissance nature. Only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Furthermore, other soils that were not identified due to the scale of the survey may also occur.
» Soils present on site will be confirmed through the detailed study to be undertaken in the EIA Phase of the process.

3. Heritage Impacts

South Africa is rich in diverse forms and types of heritage, ranging from natural to cultural heritage. The natural include among other things palaeontological, geological and the various plant and animal species that define the country. The cultural heritage, which dates as far back as 2.5 million years age (m.y.a), includes - Stone Age Archaeology, Iron Age Archaeology, Historical and Industrial Archaeology, the "Political/Historic" geographies.
Based on experience in the region, the following heritage sites, features and objects are expected to occur in the proposed development area:

» Stone Age heritage sites: There is a likelihood of finding Stone Age sites scattered over the study area. There is an increased likelihood of finding material near the foot hills and on hill tops and in shelters if any occur within the study area.
» Historic Period artefacts: This includes middens, structural remains and cultural landscape. The area was occupied at least from the 1900's and features dating to this period associated with farming may occur. The construction of the photovoltaic plant can directly impact on both the visual context and sense of place of historical sites. There are few if any structures identified in the area. Due to the visual nature of photovoltaic plants it can also have a direct impact on the sense of place as well as the cultural landscape.
» Burials and Cemeteries: Formal and informal cemeteries can be expected anywhere on the landscape, to be confirmed during the site survey.

Five heritage sites were identified on the site, and are referred to as: Sannas-1, 2, 3, 4 and Sannas-5. Sannas-1, Sannas-3 and Sannas-5 are deemed to be of High/Medium significance (see **Figure 5.2**). These sites are not seen as being under threat during the construction activities because they are located within close proximity to the Farm Besemkop farmstead which the author doubt it will be relocated to make way for the proposed development.

Construction activities such as clearing of land for the PV facility, shallow excavations for the PV panel mountings, substation and invertors and well developing access roads could lead to loss or damage of heritage resources. Based on the current information obtained it is anticipated that any sites that

occur within the proposed development area will have Generally Protected Significance, where mitigation is required prior to destruction of such heritage sites/ artifacts.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Potential loss of heritage artefacts	Loss and destruction of heritage artefact scatters during construction by either covering the in soil removing them from their current context which is already.	Local	None identified at this stage
Destruction of Burial Grounds & Grave	Construction activities will impact on the identified cemetery by destructing of the cemetery markers, exposing the remains and creating access challenges for the relatives of the deceased.	Local	None identified at this stage

Gaps in knowledge & recommendations for further study

» A Phase 1 Heritage Impact Assessment must be undertaken for the proposed development.

» It is recommended that the proposed project construction phase should pay special attention to possible encounter of archaeological resources and sites such as unmarked graves or stone and iron implements (dating to Iron Age and to events of the Second South African War as discussed above).

» Should such sites be discovered during the construction phase, construction activities need to be stopped with immediate effect and a professional archaeologist need to be called on site to inspect and investigate the finds and make recommendations on further actions that need to take place to rescue or mitigate the finds. For example, applying for rescue permits with SAHRA-BGG Unit in case of discovery of unmarked graves and SAHRA-APM Unit in case of archaeological and palaeontological remains.

» To achieve the above two recommendation – it is further recommended that an Environmental Control Officer should be inducted on heritage management before the commencement of construction activities and that he/she should be to take responsibility for heritage sites and resources during the construction phase of the project.

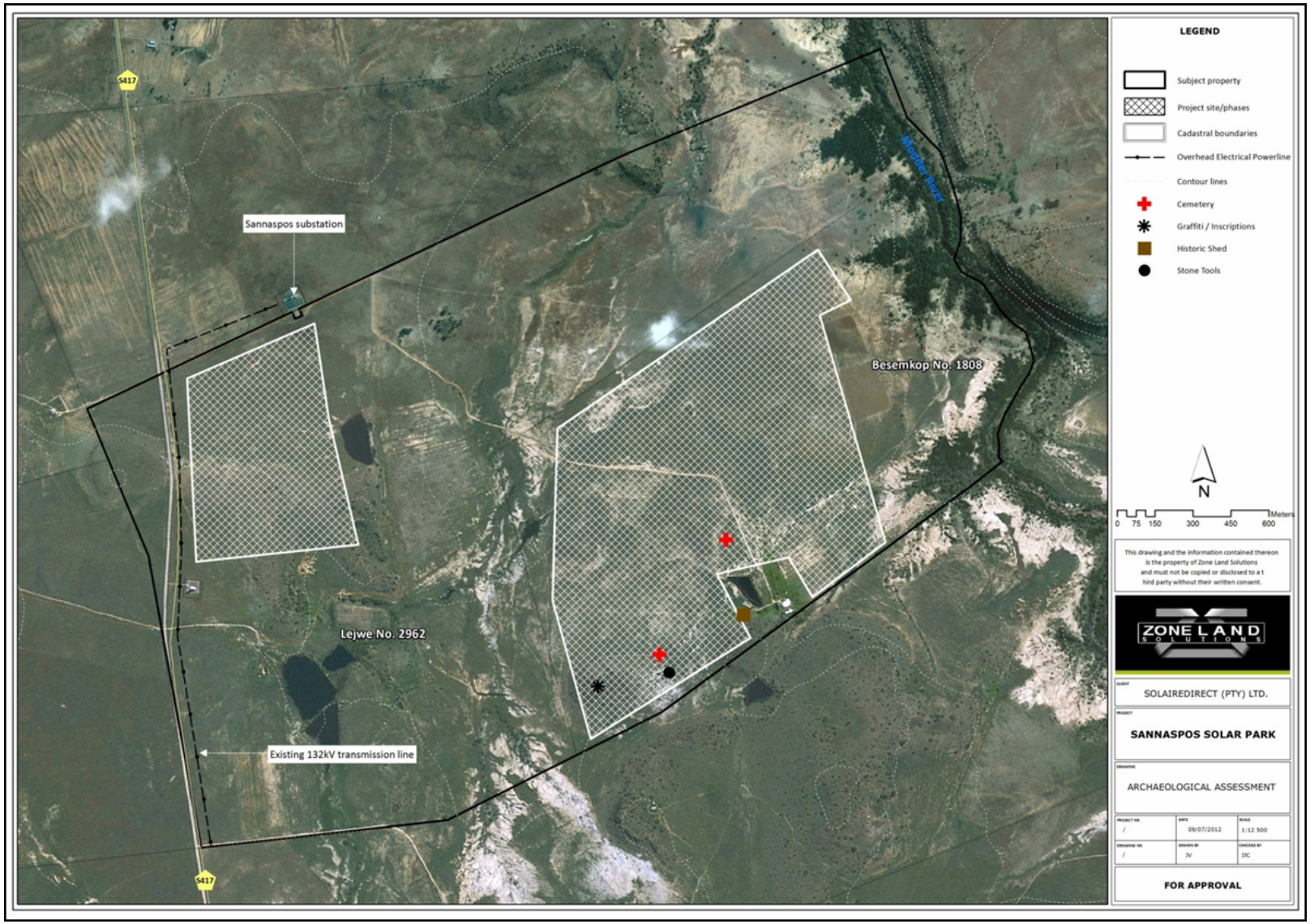


Figure 5.2: Distribution of heritage sites within Sannaspos study area- the sites are located on Farm Besemkop

4. Paleontological Impacts:

The bedrock geology of the study area is outlined on the 1: 250 000 Topo-Cadastral series of South Africa, 2926 Bloemfontein (Council for Geoscience, Pretoria; Theron, J.C. 1963). The site of the proposed Sannaspos Solar Power Development Facilities is underlain by sandstone and shale sediments that form the Beaufort Group, part of the Karoo Supergroup (Groenewald 1989).

The Beaufort Group (Karoo Supergroup) of formations are rich in Triassic and Permian fossils (Johnson et al., 2006) (Fig. 2 of **Appendix J**). Vertebrate fossils including retiles, mammal-like reptiles (Therapsids) (Figure 3 in **Appendix J**), amphibians and fish remains occur in the Beaufort Group (Rubidge et al., 1995). Invertebrate fossils, invertebrate burrows and trails, well-preserved leaf impressions, silicified wood and stem impressions have also been recorded from a number of localities in the Beaufort Group (Anderson et al., 1998; McLachlan & Anderson 1973; 1977; Riek, 1973, 1976, Rubidge et al., 1995).

Potential social impacts during construction include discovery/destruction of unknown fossil deposits (positive/negative)

Issue	Nature of Impact	Extent of Impact	No Go Areas
Discovery/destruction of unknown fossil deposits	Excavations during the construction phase may uncover previously unknown fossil deposits. This in itself is a positive aspect of the development. However, it is possible that fossils may be lost, damaged or destroyed in the course of the excavations, which is the negative aspect of the project. The negative impacts can be lessened or prevented altogether through engagement of qualified palaeontologist prior to the onset of the project, to sample, record and salvage fossil remains as well as assessing long-term impacts on fossil heritage.	Local	None identified at this stage

Gaps in knowledge & recommendations for further study

The greater region including where the development of the proposed Sannaspos Photovoltaic (PV) Solar Energy Facilities will be located is well known for abundant vertebrate, invertebrate and plant fossils spanning the Triassic and Permian epochs. Though not every single locality is bound to contain fossils, there is likelihood that excavations during construction may unearth fossil remains. These fossils can be lost, damaged or destroyed, and as such, the following is recommended:

» That a qualified palaeontologist be commissioned to undertake ground reconnaissance of the designated area prior to ground breaking.
» That construction manager(s) report any fossil finds encountered during construction to a qualified palaeontologist who will undertake necessary mitigation procedures in accordance with protocols of the South African Heritage Resources Agency (SAHRA).

5. Visual Impacts

Construction related activities which could impact on the overall visual aesthetics of the study site include construction of access roads and foundations, and establishment of the power line.

Potential impacts associated with these activities which have been identified during the Scoping Phase include:

» Impacts on observers travelling along the N8 highway and the S417 major link in close proximity to the proposed facility.
» Impacts on potentially sensitive receptors including, among others, individual/isolated landowners/homesteads located within areas of potential visual exposure.
» The potential visual impact of the construction of ancillary infrastructure (i.e. the power line, substation and internal access roads) on observers in close proximity of the facility.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Potential visual impact on sensitive Receptors in Middle- and Background represent mostly users of the road network	The sensitive receptors in the middle- and background of the generated viewshed represent mostly users of the road network. The N8 and, to a lesser extent, the S417 is the major link roads in the region and is the most sensitive receptors in terms of possible impacts as observers using these roads will come into direct view of the proposed activity.	Local	None identified at this stage
Visual impact on the intrinsic value and sense of place	Although almost completely lost, the sense of place of Sannaspos is vested in the cultural-historic events that occurred in the late 1900's. The sense of place attributes and intrinsic values has, to a large degree, further been lost with the introduction of the electrical substation and associated infrastructure in the region.	Local	None identified at this stage

Gaps in knowledge & recommendations for further study:

» Visual impacts during the construction phase are expected to be limited to the site and of short duration. These impacts are therefore not expected to be of significance and will not require detailed assessment in the EIA phase.
» It is furthermore recommended that the proposed project phases be relocated approximately 700m east of the S417 in order to establish a proper buffer between the observer and the observed view. In doing so, the project phases would also be outside the visual corridors of the respective Key Observation Points.

6. Impacts on the Social Environment

The main negative impacts are associated with the intrusion impacts associated with the construction phase. The most important potential social benefits associated with the construction of the project refer to the job opportunities and possible socio-economic spin-offs created, even of a very limited scale.

Potential social impacts during construction include:

» Job creation & skill development (positive impact) – limited opportunities
» Economic spin-offs to local community (positive impact)
» Safety and security risks to farmer's property and livestock (negative impact) due to influx of job seekers to the area
» Construction traffic (negative impact) and disturbances.

These impacts are discussed below.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Temporary job creation during construction phase.	Limited employment opportunities would be available during the construction phase. Even though the area has a low population density and education levels are low, it is still anticipated that there would be sufficient unemployed individuals that could be sourced as labourers for the unskilled to semi-skilled work required. Skilled positions would probably be filled by outsiders. If other applications for similar projects in the same area are approved and if the construction periods overlap it could have some impact on the availability of skills.	Local - Regional	None identified at this stage
Economic spin-offs to local community.	Due to construction activities, the small workforce will need accomodation and supplies. Other economic spin-offs include Local procurement of general construction materials and goods (e.g. cement, sand / stone etc.) and up and down-stream economic opportunities for the local, regional and national economy.	Local-Regional-National	None identified at this stage
Influx of people into the study areas including members of the construction crews and job seekers.	The presence of construction workers during the construction phase. The typical impacts associated with the presence of construction workers include increase in sexually transmitted diseases, including HIV/AIDS; increase in prostitution; increase in alcohol and drug related incidents; increase in crime; and creation of tension and conflict in the community etc..	Local	None identified at this stage
Training and skills	Potential opportunities for skills development and training during the construction phase would	Local -	None

development opportunities for local communities and businesses	result in long-term benefits for those involved. If proper enhancement measures are implemented the positive impacts in this regard could be increased.	Regional	identified at this stage
Security issues	Even though no construction workers are expected to be accommodated on site, an inflow of workers could, as a worst case scenario also pose some security risks. The negative impacts associated with the inflow of workers could, however, be limited should a local labour force be used.	Local	None identified at this stage
Disturbance of surrounding landowners	Disturbances to surrounding landowners can be in the following manner: » Stock losses (during the construction and operational phase); » Potential damage to farm infrastructure (predominantly during the construction phase); » Potential damage to roads associated with the transport of heavy equipment and increased traffic volumes (predominantly during the construction phase); and » Potential impact on farming operations due to the loss of productive land (predominantly during the operational phase).	Local	None identified at this stage

Gaps in knowledge & recommendations for further study

The Social Impact Assessment study will be conducted during the EIA Phase including:

» A further literature review
» Public consultation sessions and fieldwork
» An analysis of the social data collected
» Impact assessment (rating) and providing mitigation measures

Table 5.2: Evaluation of potential impacts associated with the Operational Phase

1. Impacts on Fauna, Flora and Ecology

Operation related activities which could impact on the fauna, flora and overall ecology of the study site include:

» Maintenance of surrounding vegetation as part of management of the facility.
» Maintenance of the overhead power line.
» Presence of impermeable surfaces associated with the substation and workshop area.

Areas of ecological sensitivity have been identified in **Figure 5.1** for further consideration in the EIA phase.

Issue	Nature of Impact	Extent of Impact	'No go' Areas
Disturbance or loss of indigenous natural vegetation due to shading	PV panels erected 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. As a consequence, it can be expected that within the Solar Energy Facility footprint, species composition will change significantly, and as no equivalent experiments have been undertaken in similar environments up to date, it cannot be predicted which and what density of vegetation may persist. A sparser or less stable vegetation beneath the PV panels may » Increased vulnerability of remaining portions to future disturbance, including erosion; » General loss of habitat for sensitive species; » Loss in variation within sensitive habitats due to loss of portions of it; » General reduction in biodiversity; » Increased fragmentation (depending on location of impact); » Disturbance to processes maintaining biodiversity and ecosystem	Local	No "no-go" areas have been identified at this stage and require further investigation in the EIA phase.

	goods and services; and » Loss of ecosystem goods and services.		
Altered runoff patterns due to rainfall interception by PV panels and compacted areas	The PV panels create large surfaces of rainfall interception, where rainfall is collected and concentrated at the edges from where it then moves onto the ground in larger, concentrated quantities opposed to small drops being directly absorbed by the ground. This may lead to a localised increase in runoff during rainfall events, which may results in localised erosion. Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating more localised runoff from those surfaces. This runoff will thus have to be monitored and channelled where necessary to prevent erosion over larger areas.	Local and surroundings	No "no-go" areas have been identified at this stage and require further investigation in the EIA phase.

Gaps in knowledge & recommendations for further study

» A detailed ecological survey and assessment will be undertaken during the EIA phase to determine which species could possible tolerate high levels of shade and the erosion potential of different landscapes within the study area

» Predictions about altered runoff patterns and possible species composition after shading will, however, be based on best knowledge available, not on actual facts.

2. Impacts on Soils

During the operation of the solar energy facility, exposed areas (areas were vegetation has been removed such as ground below the PV panels and substation / power line footprint) could be susceptible to wind/water erosion in the absence of soil erosion control measures. Soil contamination is possible, however marginal due to limited / no use of oils, diesel or fuels as maintenance PV panels require little in the way of maintenance (if pollen, dirt, dust, leaves, and other debris collect on the panels, it can be removed by spraying of water on the panels).

Issue	Nature of Impact	Extent of Impact
Loss of topsoil and usable soil	During the construction usable soil may be lost due to inefficient stripping practices.	Site

Contamination of soil	There is a high probability that topsoil will be loss due to wind and water erosion, which will alter the soils properties. Stockpiling and subsequent mixing of soil layers during handling will ultimately have a negative effect on altering the basic soil properties.	Site
Soil erosion	Surface runoff leads to soil erosion. Soil stockpiles will be exposed to erosion activities during operation of the tailings dam, return water dam and concentrator areas.	Local

Gaps in knowledge & recommendations for further study

The following activities will be undertaken as part of the Soil assessment in the EIA Phase:

» A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated:
» Soil distribution (classification) on the site;
» Extent of degradation due to current land use (such as overgrazing);
» Erosion status and erodibility of the soils on the site; and
» Mitigation measures to arrest current impacts and manage future impacts associated with the development.

Impacts on Agricultural Potential

The current land use includes natural veld (616ha), ploughed land (53ha) and dams/pans/wetlands 14ha. Land capability includes 55ha arable, 557ha grazing, 14ha pans/dams/wetlands and 58ha wilderness of the total 684ha investigation area. No evidence of soil erosion was observed on any of the soils during the investigation. The agricultural potential of the Avalon and Clovelly soils is considered medium to high under dryland (650mm/y rainfall) and irrigation conditions (>10-15mm/week 33-1,500kPa plant available water). The agricultural potential of the Mispah soil is considered low. Agricultural activities (i.e. grazing) on the site may be continued during the operation of the facility, and therefore there will be a limited (on the site itself) loss of low agricultural potential land. However, with the low prevailing agricultural potential on majority of the site, this impact would in all probability be of limited significance and would be local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be rehabilitated and used for a suitable land-use / activity.

Issue	**Issue**	**Extent**
Loss of medium agricultural potential land on the site.	Loss of arable land, however, at the end of the project life, it is anticipated that removal of the structures and rehabilitation of the site would allow for a suitable land-use / activity to occur on the site.	Local

Gaps in knowledge & recommendations for further study

Due mainly to the low agricultural potential of the soils and the prevailing climatic limitations for agriculture, the potential impacts on an area of low agricultural potential are expected to be of low significance and therefore no detailed agricultural potential investigation might not be necessary during the EIA Phase, although soils present on site will be confirmed through the detailed study to be undertaken in the EIA Phase of the process.
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3. Heritage Impacts

Issue	Nature of Impact	Extent of Impact	No Go Areas
Destruction of Burial Grounds & Grave	Operational activities will impact on the identified cemetery by destructing of the cemetery markers, exposing the remains and creating access challenges for the relatives of the deceased.	Local	None identified at this stage

Gaps in knowledge & recommendations for further study

» A Phase 1 Heritage Impact Assessment must be undertaken for the proposed development.
» It is recommended that the proposed project construction phase should pay special attention to possible encounter of archaeological resources and sites such as unmarked graves or stone and iron implements (dating to Iron Age and to events of the Second South African War as discussed above).
» Should such sites be discovered during the construction phase, construction activities need to be stopped with immediate effect and a professional archaeologist need to be called on site to inspect and investigate the finds and make recommendations on further actions that need to take place to rescue or mitigate the finds. For example, applying for rescue permits with SAHRA-BGG Unit in case of discovery of unmarked graves and SAHRA-APM Unit in case of archaeological and palaeontological remains.
» To achieve the above two recommendation – it is further recommended that an Environmental Control Officer should be inducted on heritage management before the commencement of construction activities and that he/she should be to take responsibility for heritage sites and resources during the construction phase of the project.

4. Visual Impacts

The viewshed analysis was undertaken in accordance with the Guideline Document for involving Visual Specialists in EIA Processes. Geographic Information Systems (GIS) technology was used to analyse and map information in order to understand the relationships that exist between the observer and the observed view. Key aspects of the viewshed are as follows:

» It is based on a single viewpoint from the highest point of the project site.
» It is calculated at 3.4m above the natural ground level to reflect the highest point of the PV panels.
» It represents a 'broad-brush' designation, which implies that the zone of visual influence may include portions that are located in a view of shadow and it is therefore not visible from the project site and vice versa. This may be as a result of landscape features such as vegetation, buildings and infrastructure not taken into consideration by the DEM.
» The viewshed generated from each of the selected observation points referred to in Annexure 2 (**Appendix K**) is calculated at 1.7m above the natural ground level to reflect the average height of person either walking or sitting in a vehicle.

Issue	Nature of Impact	Extent of Impact
Visual impact on sensitive Receptors in Middle- and Background	The sensitive receptors in the middle- and background of the generated viewshed represent mostly users of the road network. The N8 and, to a lesser extent, the S417 is the major link roads in the region and is the most sensitive receptors in terms of possible impacts as observers using these roads will come into direct view of the proposed activity.	Local
Visual impact on the intrinsic value and sense of place	Although almost completely lost, the sense of place of Sannaspos is vested in the cultural-historic events that occurred in the late 1900's. The sense of place attributes and intrinsic values has, to a large degree, further been lost with the introduction of the electrical substation and associated infrastructure in the region.	Local
Visual impact of artificial lighting as a result of the activity	The project site has a very low illumination factor. The occurrence of light sources in the vicinity of the project site is strictly confined to the townscape of Botshabelo more than 6km to the east. The effect of lighting creates a sky glow effect at night. The proposed PV 'string' will not include lights of any kind; however, the associated ancillary buildings and infrastructure may include some degree of lighting.	Local

	It is not expected that the proposed activity will contribute to the effects of sky glow or artificial lighting of the area.	
Impact of Reflection of PV Panels	Photovoltaic solar panels are designed to absorb sunlight in order to convert it into electricity. The more sunlight that is absorbed, the more energy can be produced. The polycrystalline silicone cell absorbs two-thirds of the sunlight reaching the panel's surface. This effectively means that only one-third of the sunlight reaching the surface of a solar panel has a chance to be reflected. In addition, the PV panels have a reflectivity of around 30%, while surface materials such as dry sand has a reflectivity of around 45% and grass-type vegetation at 25%. Moreover, PV panels are installed at a fixed angle of around 30°. The solar panels will therefore not noticeably alter the site's current amount of reflected, indirect sunlight.	Local

Gaps in knowledge & recommendations for further study:

The following activities will be undertaken as part of the Visual Specialist Study during the EIA Phase:

» Additional spatial analyses (with respect to visual distance/observer proximity, viewer incidence/viewer perception) should be undertaken in order to create a visual impact index that will further aid in determining potential areas of visual impact. This exercise should be undertaken for the core facility as well as for ancillary infrastructure, as these structures (e.g. the power line and substation) are envisaged to have varying levels of visual impact at a localised scale. Site-specific issues (which are mentioned above), and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact.

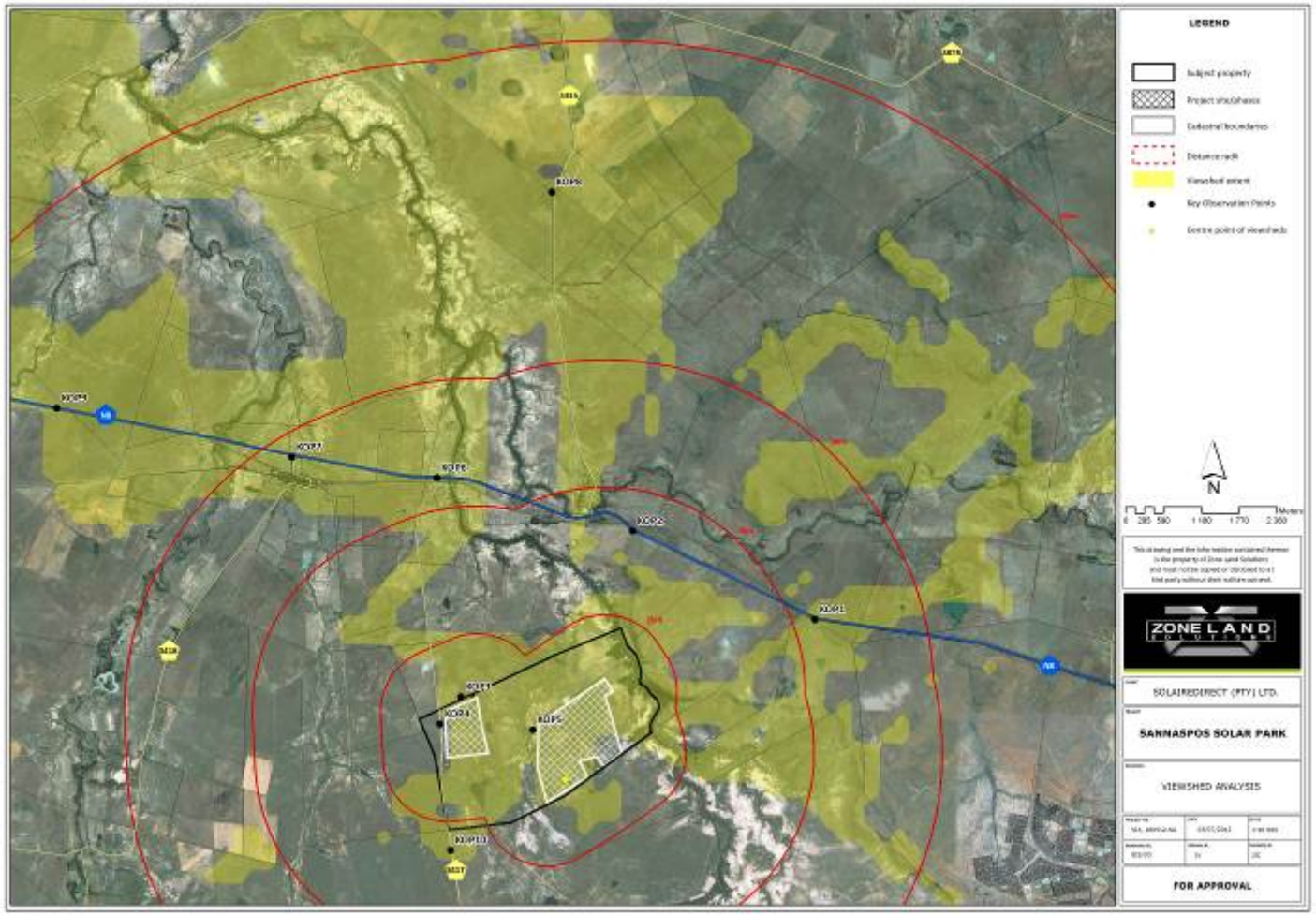

Figure 5.3: Potential visual exposure of the proposed Sannaspos PV facility (Zone Land Solutions, 2012)

5. Impacts on the social environment

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. The proposed project could assist with decreasing South Africa's dependency on coal generated electricity thereby strengthening the electricity grid in an "environmentally friendly" way. On a regional scale it could possibly result in positive changes in the quality of lives of many individuals currently living without an efficient and satisfactory electricity supply. On a national scale, the proposed project could fit in with the government's aim to develop renewable energy (including solar PV) projects in South Africa.

Issue	Nature of Impact	Extent of Impact
Employment opportunities	A PV facility usually does not require large numbers of employees during its operational lifespan and limited maintenance. The limited number of individuals to be employed during the operational phase of the project would be responsible for maintenance of the solar energy facility (e.g. cleaning of panels / security personnel). Maintenance of the local gravel roads could furthermore result in more jobs created, although possibly only on a temporary scale. The limited daily movement of workers to and from the site is thus not expected to have any marked impacts on the social environment. 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. During the operational phase, local procurement for general materials, goods and services (e.g. catering and security) could materialise	Local - Regional
Safety and security impacts on the site and surrounds.	The presence of the solar energy facility could prompt criminals to enter the site or surrounding properties through the site. Indirectly, possible illegal poaching of game and animals / general theft could occur. However, the facility will be fenced and the use of security measures to limit / prevent significant safety / security impacts.	Local
Contribution of clean energy.	On a national scale the project is anticipated to have positive environmental impacts through the "greener" technology that will be used (no use of fossil fuels / no noise / no emissions and so forth). The proposed project could therefore assist in meeting the government's target for renewable energy while contributing to sustainable development in the country.	National

Gaps in knowledge & recommendations for further study

The Social Impact Assessment study will be conducted during the EIA Phase including:

» A further literature review
» Public consultation sessions and fieldwork
» An analysis of the social data collected

» Impact assessment (rating) and providing mitigation measures

CONCLUSIONS CHAPTER 6

SolaireDirect Southern Africa (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility of up to 75MW, as well as associated infrastructure on a site located approximately 45 km east of Bloemfontein in the Free State Province. The project is referred to as the Sannaspos Phase 1 Solar PV Facility. A larger site has been identified for consideration within an Environmental Impact Assessment (EIA). A larger site has been identified for consideration within an Environmental Impact Assessment (EIA). The project facility is proposed on Portion 0 of Farm 1808 Besemkop and Portion 0 of Farm 2962 Lejwe which falls within the Mangaung Metropolitan Municipality. The identified site has existing road access (S417) via the N8 to Bloemfontein and then a gravel road to the proposed site. The larger extent of the farm portion covers an area of approximately 600 hectares. On the basis of the findings of the Scoping Study, the facility can be appropriately placed within the larger site taking environmental and any other identified constraints into consideration.

The Final Scoping Report for the proposed Sannaspos phase 1 PV Facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

This Final Scoping Report is aimed at detailing the nature and extent of this facility, 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 the project proponent, specialist consultants, and a consultation process with key stakeholders (including relevant government authorities) 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 Final Scoping Report are the result of on-site inspections, desk-top evaluations of impacts identified by specialists, and the parallel process of public participation. The public consultation process is extensive and 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 solar energy facility 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 PV Solar Energy Facility (Relevant to Phase 1)

A broader study area of approximately 600 ha is being considered within which the facility is to be constructed, although the actual development footprint of the proposed facility would be smaller in extent (approx. 150 ha for 75MW). Therefore, the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid any identified environmental sensitivities.

The facility is proposed to accommodate up to 75 MW in total with PV panels (3.5 m height) and associated infrastructural requirements which will include:

» PV panels (up to 3.5m in height) and mounting structures (either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels);
» Cabling between the project components, to be lain underground where practical;
» Internal access roads and fencing;
» Construction of a 132kV substation and power line on the site linking the solar park to the existing Sannaspos Substation located adjacent to the site; and
» Workshop area for maintenance storage, and offices.

The main issues identified through this scoping study associated with the proposed solar energy facility are summarised in Table 6.1.

Table 6.1: Summary of significance of the potential impacts associated with the proposed PV solar energy facility development (relevant to both development and operational phases)

Construction / Decommissioning Impacts	**Extent**
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of habitat for threatened / protected plants	L
Loss of protected trees	L
Impacts on watercourses and drainage areas	L
Establishment and spread of declared weeds and alien invader plants	L
Loss/Contamination of topsoil and usable soil	S
Soil loss/ erosion / degradation	L
Loss/destruction of heritage resources and Destruction of Burial Grounds & Grave	L
Discovery/destruction of unknown fossil deposits	L
Potential visual impact on sensitive Receptors in Middle- and Background represent mostly users of the road network	L
Visual impact on the intrinsic value and sense of place	L
Job creation and skills development of local people during construction (positive impact)	L-R
Economic spin-offs to local community.	L
Training and skills development opportunities for local communities and businesses	L-R
Safety and security risks to site and surrounds	L
Temporary disruptions in the daily living and movement patterns to neighbouring landowners	L
Operational Impacts	**Extent**
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/S
Destruction of Burial Grounds & Grave	L
Soil erosion	L
Loss of medium agricultural potential land on the site.	L
Visual impacts (intrusion, negative viewer perceptions, artificial lighting and reflection of PV Panels)	L
Employment opportunities	L-R
Safety and security impacts on the site and neighbouring land.	L
Contribution of clean energy	N

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

As can be seen from Table 6.1, the majority of potential impacts identified to be associated with the construction of the solar energy facility 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 national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa and helping to meet the aims of Mangaung Local Municipality Integrated Development Plan (2010-2011)). No environmental fatal flaws have been identified to be associated with the project at this stage in the project. However, no go areas such as areas of high agricultural potential land, pans and drainage lines have been identified. These areas of potential environmental sensitivity on the site were identified through the scoping phase. These areas of sensitivity are illustrated in the sensitivity map (refer to **Figure 6.1**).

The sensitivity map is a rough scale estimate of sensitivity on the site identified at a desk-top level. These areas will be subject to survey and ground-truthing during the EIA phase of the project. This map provides 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 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 considered in the EIA phase.

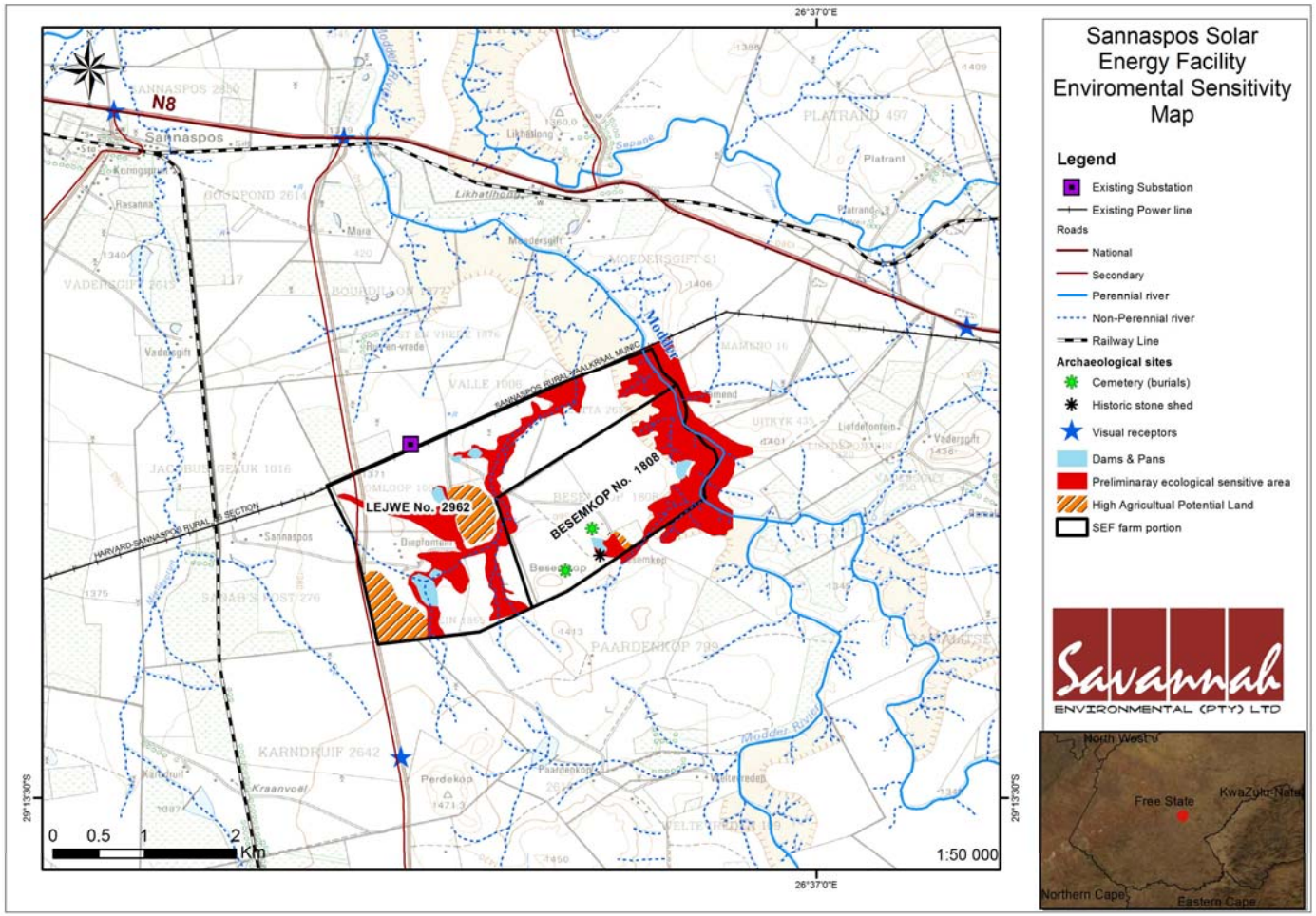

Figure 6.1: Desktop Environmental Sensitivity Map for the proposed Sannaspos PV Solar Energy Facility.

The potentially sensitive areas/environmental features/issues that have been identified (as shown in **Figure 6.1**) for further study include:

» **Ecologically sensitive areas (terrestrial) that occur on the site:**
The study site falls within the Central Free State Grassland as described by Mucina and Rutherford (2006) towards the west and north west of the study area, but beyond it, are patches of Highveld Alluvial Vegetation and Bloemfontein Dry Grasslands, the latter listed as a vulnerable ecosystem.

» **Non-perennial streams / drainage lines within the site:**
The site is in a semi-arid region. There are unlikely to be any wetlands on site, but there are number of non-perennial streams / drainage lines that occur on the site. According to the National Water Act, dry stream beds and drainage areas (including non-perennial streams) are classified as wetlands or water resources. Drainage lines / non-perennial streams do provide habitat for a number of plant / animal species in the study area, including those with a restricted distribution or species with an elevated conservation status. Drainage lines (water resources) represent particularly vital natural corridors as they function both as wildlife habitat, providing resources needed for survival, reproduction and movement, and as biological corridors, providing for movement between habitat patches. The drainage lines shown in the desktop sensitivity map have been mapped as linear features only. The actual extent will be mapped from aerial imagery and field work during the next phase of the assessment. Higher order drainage lines are more important to map correctly; the main drainage lines are more sensitive and therefore more important to protect than the ephemeral ones.

» **Heritage Sites within the study area**
The sensitivity map also highlights two cemeteries and a stone shed which are deemed to be of high significance from a heritage perspective and graded as level 3 (local significance)

From a social (security issues), visual (visibility of the facility), reflection of panels (glint/ glare), health and safety (operation risks such as fire due to presence of infrastructure) and economic (job creation although limited) perspective, impacts could occur on people in close proximity to the PV facility. The EIA will consider the potential impacts and whether these are significant or not for known homesteads / farm houses and small farming settlements on / around the site.

» **Agricultural potential of current irrigation areas**
The sensitivity map highlights areas of high agricultural potential. The agricultural potential of the bulk of the site is low-medium due to current land

use. However this will be investigated and confirmed with a site visit and soil survey

This preliminary sensitivity analysis of the site should be considered by SolaireDirect in understanding which area of the site would be least impacted by the development of a PV solar energy facility in order to inform the preliminary infrastructure layouts for consideration within the EIA phase. Through the EIA phase more detailed studies will be conducted, and further sensitive areas will be marked, more accurately and in more detail than in this Final Scoping Report.

6.2. Evaluation of the Potential Issues with Associated Infrastructure - Invertors, Construction of a Substation and Internal Access Roads

In order to connect the solar energy facility to the power grid, invertors will be used, which will connect to the existing substation which is located on the site. Inverters will be installed to facilitate the connection between the solar energy facility and the Sannaspos 132/22kV substation (which is located on the site). A new 132/22kV substation will be constructed, and will include transformer bays and associated switching facilities, and this will be defined through engagement with Eskom.

Potential issues identified to be associated with the construction of power lines, internal access roads and invertors include impacts on flora, fauna and ecological processes, and potential impacts on heritage sites and visual impacts. The potential impacts associated the associated infrastructure will be considered in detail within the EIA phase. Recommendations regarding a preferred location for this infrastructure and appropriate mitigation measures (if required) will be made. Other infrastructure such as the internal substation location, internal access roads and the maintenance facility will also be considered in the EIA phase based on the preliminary layout to be provided by SolaireDirect.

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

This Final Scoping Report includes a detailed description of the nature and extent of the proposed PV solar energy facility with details regarding the Scoping Phase, as well as the issues identified and evaluated through the Scoping Phase (to date). This chapter provides the context for a Plan of Study for the EIA.

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 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 proposed project.
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed solar energy facility and associated infrastructure.
» 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 all phases of the project 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 FS DETEA) has been undertaken and will continue throughout the EIA process. On-going consultation and input from DEA and FS DETEA will include the following:

» Submission of a Final Scoping Report following a 30-day public review period of the 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 with DEA and FS DETEA in order to discuss the findings and conclusions of the EIA Report.

7.3. Consideration of Alternatives

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

» **The 'do nothing' alternative:** SolairDirect does not establish the proposed PV Solar Energy Facility on Portion 0 of Farm 2962 Lejwe.
» **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/s.
» **Alternative technology:** for use in the establishment of the proposed facility. The facility is proposed to accommodate up to 75 MW which will be comprised of tracking technology.

7.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

Based on the findings of the Final Scoping Study, all issues were identified as requiring further investigation within the EIA.

Table 7.1: Summary of the issues which require further investigation within the EIA phase and activities to be undertaken in order to assess the significance of these potential impacts for Phase 1 of the Sannaspos PV project.

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Ecology	As part of the EIA process, a field survey of the vegetation will be undertaken, preferably between mid-November to April, and results will include: » A phytosociological classification of the vegetation found on the study area according to a TWINSPAN analysis of survey data » 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 » A map of all plant communities within the boundaries of the study area » A description of the sensitivity of each plant community, based on sensitivity criteria; the main aspects of an ecosystem that need to be incorporated in a sensitivity analysis, however, include the following: ∗ Describing the nature and number of species present, taking into consideration their conservation value as well as the probability of such species to survive or re-establish itself following disturbances of various magnitudes ∗ Identifying the species or habitat features that are 'key ecosystem providers' and characterising their functional relationships (Kremen 2005) ∗ Determining the aspects of community structure that influence function, especially aspects influencing stability or rapid decline of communities (Kremen 2005) ∗ Assessing key environmental factors that influence the provision of services (Kremen 2005) ∗ Gaining knowledge about the spatio-temporal scales over which these aspects operate (Kremen 2005) » A full assessment of impacts according to the Environmental Impact Assessment methodology to assists in the evaluation of the overall effect of a proposed activity on the environment. This includes an assessment of the significant direct, indirect, and cumulative impacts. The significance of environmental impacts is to be assessed by means of the criteria of extent (scale), duration, magnitude (severity), probability (certainty) and direction (negative, neutral or positive).	Marianne Strohbach – Savannah Environmental

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Heritage	A heritage specialist will conduct a heritage study including: » A Phase I Heritage Impact Assessment (HIA) (in accordance of Section 38 of the NHRA) will be undertaken to determine the presence of any heritage resources that may occur in the development area. » During this study, sites of archaeological, historical or places of cultural interest will be located, identified, recorded, photographed and described. » The levels of significance of recorded heritage resources will be determined and mitigation proposed should any significant sites be impacted upon. » The mitigation of heritage resources is referred to as Phase II studies and, depending on the type of resource, may include in depth studies before the impact may take place, or alternatively, that a resource must be avoided and protected. » A specialist report detailing the heritage issues and potential impacts will be provided.	Nkosinathi Tomose of Zone Land Solutions
Soils and agricultural potential Study	The soils specialist study will include: » A detailed site visit will have to be conducted as part of the EIA level investigation and the following parameters should be investigated: * Soil distribution (classification) on the site; * Extent of degradation due to current land use (such as overgrazing); * Erosion status and erodibility of the soils on the site; and * Mitigation measures to arrest current impacts and manage future impacts associated with the development. » Comparatively assess any feasible alternatives (if any); » Provide mitigating measures to input into the Environmental Management Programme (EMP).	Chris Viljoen – Viljoen & Associates
Social	The social study will include: 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. The Guidelines are based on accepted international best practice guidelines, including the Guidelines and Principles for Social Impact Assessment (Inter-organizational Committee on Guidelines and Principles for Social Impact Assessment, 1994). The approach will include:	Tony Barbour - Tony Barbour Consulting

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	» Review of existing project information, including the Planning and Scoping 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 Final Social Impact Assessment (SIA) Report, including identification of mitigation/optimisation and management measures to be implemented; and Finalisation of the SIA Report.	
Visual	The construction of the proposed Sannaspos Solar Park will have a defined visual impact on its surroundings. In order to successfully determine the exact extent of this impact, the anticipated impact will be assessed during the EIA phase. In this regard, the proposed Plan of Study for EIA is as follows: » Determine the distance/proximity of the respective observers from the proposed facility The distance between the observer and the observed activity is an important determinant of the magnitude of the visual impact. This is due to the visual impact of an activity diminishing as the distance between the viewer and the activity increases. Viewsheds are categorised into three broad categories of significance, namely: *Foreground*: The foreground is defined as the area within 1km from the observer within which details such as colour, texture, styles, forms and structure can be recognised. Objects in this zone are highly visible unless obscured by other landscape features, existing structures or vegetation. *Middle ground*: The middle ground is the area between 1km and 3km from the observer where the type of detail which is clearly visible in the foreground becomes indistinguishable. Objects in the middle ground can be classified as visible to moderately visible, unless obscured by other elements within the landscape. *Background*: the background stretches from approximately 3km onwards. Background views are only distinguishable by colour and lines, while structures, textures, styles and forms are	Jacques Louis Volschenk - Zone Land Solutions

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	often not visible. » Determine the nature of the respective observation points Each observation point will be categorised according to its location and significance. Differentiation is made between tourist-related corridors, including linear geographical areas visible to users of a route or vantage points and residential areas (including farmsteads and townscapes). The visual impact considered acceptable is dependent on the type of receptors. Visual rating between high (e.g. residential areas, nature reserves and scenic routes or trails), moderate (e.g. sporting or recreational areas, or places of work), or low sensitivity (e.g. industrial, mining or degraded areas) will be allocated to each observation point. » Determine the Visual Absorption Capacity of the environment Visual absorption capacity (VAC) refers to the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed activity. The VAC is primarily a function of the vegetation and will vary depending on the nature/density of the vegetation growth. The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases. The potential of the landscape to conceal the proposed activity will therefore be assessed in the EIA phase. A rating of high (effective screening by topography and vegetation), moderate (partial screening) and low (little screening) will be allocated to each observation point. » Determine the Visual Exposure	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	Visual exposure is defined as the relative visibility of a project or feature in the landscape. This is often also referred to as the zone of visual influence which is an area subject to the direct visual influence of a particular project. Exposure or visual impact tends to diminish exponentially with distance. A high (dominant or clearly visible), moderate (recognisable to the viewer) or low exposure (not particularly visible to the viewer) rating will be allocated to each observation point during the EIA phase. » Determine the visual intrusion of the proposed activity in the landscape The potential of the activity to fit into the surrounding environment is a very important determinant. The visual intrusion relates to the context of the proposed activity while maintaining the integrity of the landscape. A rating of high (noticeable change), moderate (partially fits into the surroundings) or low (blends in well with the surroundings) will be allocated to each observation point during the EIA phase. In addition to the above, the cumulative visual impact of the proposed activity in the landscape should also be determined during the EIA phase. This phase should also be supplemented by appropriate mitigation measures to be employed to lessen the potential visual impact of the proposed activity on the respective observers.	

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 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** 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**
- Copies of specialist reports

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 meeting and key stakeholder workshop will be held during this public review period.

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).

» One-on-one consultation meetings (for example with directly affected and surrounding landowners).
» 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 Final 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 meeting and key stakeholder workshop 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[4]
Finalisation of Scoping Report & submission to DEA	September 2012
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	October 2012
Undertake specialist studies and public participation process	October - 2012
Make Final EIA Report and Final EMP available to the public, stakeholders and authorities	November 2012
Finalisation of EIA Report	December 2012
Submit Final EIA Report to DEA for review and decision-making	December 2012

[4] Indicative dates only

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