

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS  
DRAFT SCOPING REPORT

PROPOSED KGABALATSANE SOLAR  
ENERGY FACILITY NORTH-EAST OF BRITS  
IN THE NORTH WEST PROVINCE.

(DEA Ref No: 14/12/16/3/3/2/510)

DRAFT SCOPING REPORT  
June 2013

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## PROJECT DETAILS

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<b>DEA Reference No.</b>	:	14/12/16/3/3/2/510
<b>Title</b>	:	Environmental Impact Assessment Process Draft Scoping Report: Proposed Kgabalatsane Solar Energy Facility north-east of Brits in the North West Province
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<b>Client</b>	:	Built Environment Africa Energy Services (Pty) Ltd
<b>Report Status</b>	:	Draft Scoping Report for public review
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**When used as a reference this report should be cited as:** Savannah Environmental (2013) Draft Scoping Report: Proposed Kgabalatsane Solar Energy Facility north-east of Brits in the North West Province.

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## PURPOSE OF THE DRAFT SCOPING REPORT

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with a export capacity of up to 50MW, as well as associated infrastructure on a site located approximately 18 km north-east of Brits in the North West Province.. Based on a pre-feasibility analysis, site identification and environmental screening process undertaken by Built Environment Africa Energy Services (Pty) Ltd, a favourable area has been identified for consideration and evaluation through an Environmental Impact Assessment (EIA).

The proposed development requires a development area of approximately 100 ha. The proposed facility is envisaged to have a maximum export capacity of 50 MW to be achieved through several arrays of PV panels and the following associated infrastructure:

- »
- » Photovoltaic (PV) panels
- » Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » Mounting structures to be 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.
- » Workshop area for maintenance, storage, and offices.

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

- » **Chapter 1** provides background to the project and the environmental impact assessment
- » **Chapter 2** provides an overview of the project, describes solar energy as a power option and describes the activities associated with the project (project scope)
- » **Chapter 3** outlines the process followed during the Scoping phase of the project
- » **Chapter 4** describes the existing biophysical and socio-economic environment
- » **Chapter 5** provides an evaluation of the potential issues associated with the proposed project
- » **Chapter 6** presents the conclusions of the scoping study
- » **Chapter 7** describes the Plan of Study for EIA

- » **Chapter 8** contains a list references for the scoping report and specialist reports

The Scoping Phase of the EIA process identifies potential issues associated with the proposed project, and defines the extent of the studies required within the EIA Phase. The EIA Phase will address those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts.

The release of a draft Scoping Report provides stakeholders with an opportunity to verify that the issues they have raised to date have been captured and adequately considered within the study. The Final Scoping Report will incorporate all issues and responses prior to submission to the National Department of Environmental Affairs (DEA), the decision-making authority for the project.

### **PUBLIC REVIEW OF THE DRAFT SCOPING REPORT**

The Draft Scoping Report has been made available for public review at the following public places in the project area from **26 June – 26 July 2013**:

- » Kgabalatsane Community Hall
- » Madibeng Local Municipality
- » [www.savannahSA.com](http://www.savannahSA.com)

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

Please submit your comments to
<b>Gabriele of Savannah Environmental</b> PO Box 148, Sunninghill, 2157 Tel: 011 234 6621 Fax: 086 684 0547 Email: <a href="mailto:gabriele@savannahsa.com">gabriele@savannahsa.com</a>
The due date for comments on the Draft Scoping Report is <b>26 July 2013</b>

### **PUBLIC MEETING**

In order to facilitate comments on the draft Scoping report and provide feedback of the findings of the studies undertaken, a public meeting will be held. All interested and affected parties are invited to attend a public meeting to be held as follows:

- » Date: 02 July 2013
- » Time: 18:00

- » Venue: Kgabalatsane Community Hall

## SUMMARY

### Background and Project Overview

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with an export capacity of up to 50MW on a site located approximately 18 km north-east of Brits in the North West Province.

In September 2012, Built Environment Africa Energy Services (Pty) Ltd assessed and received environmental authorisations for two (2) 10MW facilities on the same property 9Syferfontein 430 (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491). However, the Department of Energy revised tariff caps for generation projects that would be effective for Round 3 of the Renewable Energy Independent Power Producer Programme (REIPPP) and set the tariff for solar PV projects at R 1,40 per kilo-watt hour. In this regard, Built Environment Africa Energy Services (Pty) Ltd has remodelled the authorised Kgabalatsane Phase 1 (10MW) and Phase 2 (10MW) (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491 respectively) facilities, and has determined that the projects are not viable at this tariff. However, the modelling shows that a larger project would be viable. In order to achieve a larger project, the applicant submitted an application for a single phased 50MW facility on the Farm Syferfontein 430. Built Environment

Africa Energy Services (Pty) Ltd has submitted the amendment application forms to the Department to lapse both the environmental authorisations for Phase 1 DEA refer No.: 14/12/16/3/3/1/492 and Phase 2 DEA refer No.: 14/12/16/3/3/1/491.

The Kgabalatsane Solar Energy Facility is proposed to be located on the farm Syferfontein 430 which is south of the Odi Aerodrome, 2km south of Kgabalatsane settlement and 3km west of the township of Garankuwa in the North-West Province. An area of approximately 100 ha is being considered for the facility is to be constructed. The proposed facility is envisaged to have a maximum export capacity of 50 MW to be achieved through several arrays of PV panels and the following associated infrastructure:

- » Photovoltaic (PV) panels
- » Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels.



- » Cabling between the project components, to be laid underground where practical.
- » Internal access roads and fencing.
- » Workshop area for maintenance, storage, and offices.

This Draft 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 that included both 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.

### Environmental Impact Assessment

In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GN R543 (Regulations 26-35) and R545, a Scoping Study and EIA are required to be undertaken for this proposed project.

The scoping phase for the proposed project forms part of the EIA process and has been undertaken in accordance with the EIA Regulations. This **Draft Scoping Report** aimed to identify and describe potential

environmental impacts associated with the proposed project and to define the extent of the specialist studies required within the EIA process. This was achieved through an evaluation of the proposed project involving specialists (with expertise relevant to the nature of the project and the study area), the project proponent, as well as a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs).

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

### Evaluation of the Proposed Project

The main issues identified through this scoping study associated with the proposed solar energy facility are summarised in Table 1 and 2 below.

As can be seen from this table, 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; and visual impacts which would extend beyond the site boundaries), while operational phase impacts range

from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa; and visual impacts which would extend beyond the site boundaries

**Table 6.1:** Summary of potential impacts associated with the construction of the proposed Kgalalatsane PV solar energy facility development

Vegetation and listed plant species	L
Spread of declared weeds and alien invasive species	L
Re-establishment of natural vegetation	L
Faunal Impacts	L
Impacts on Critical Biodiversity Areas and Loss of Landscape Connectivity	L
Loss of arable land	L
Interference with agricultural important infrastructure, i.e. (i.e. silos, irrigation lines, pivot points, channels and feeding structures, etc.) or any conservation works (i.e. contour banks, waterways, etc.)	L
Soil degradation due to contamination	L
Soil erosion due to increased and concentrated storm water run-off	L
Soil erosion due to trampling by vehicles and equipment, as well as construction activities	L
Siltation of watercourses and other natural resources downstream as a result of improper storm water management and soil erosion due to increased and concentrated water run-off	R
Dust production	L
Loss or destruction of Archaeological sites	L
Historical (Including middens, structural remains and cultural landscape)	L
Burials and Cemeteries (Graves and informal cemeteries can be expected anywhere on the landscape.)	L
Palaeontological	L
Visual impacts	R
Temporary job creation during construction phase.	L-R
Economic spin-offs to local community.	L
Influx of people into the study areas including members of the construction crews and job seekers	L
Skills development	L-R
Security issues	L
Disturbance of surrounding landowners	L

**Table 6.2:** Summary of potential impacts associated with the operation of the proposed Kgabalatsane PV solar energy facility development

Operational Impacts	Extent
Re-establishment of natural vegetation	L
Spread of declared weeds and alien invasive species	L-R
Re-colonisation of habitats	L
Long term loss of arable land	L
Soil erosion	L
The visibility of the facility to, and potential visual impact on, observers travelling along major roads in the area (predominantly the major secondary roads) and impact on the larger built-up centres or populated places.	L
The potential visual impact of the construction of ancillary infrastructure	L-R
The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.	L
The visual absorption capacity of the natural vegetation (if applicable).	L
Employment opportunities	L-R
Contribution of clean energy	N

**Table 6.3:** Summary of potential impacts associated with the Power Line associated infrastructures for the Kgabalatsane PV solar energy facility development

Operational Impacts	Extent
Negative impact on vegetation and soil structure during construction of the power line and associated access roads.	L
Disturbance (intrusion impacts) to residents / farmers living in close proximity to where the power line is being constructed.	L
Ecology degradation	L
Operational impact: Bird mortality due to the power line collisions and electrocutions	L-R

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

As can be seen from the table above, 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 regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa).

Areas of potential environmental sensitivity were identified through the scoping phase. These include areas within the site that has two areas classified as High Sensitivity for ecology: a large area in the west on deep sands, which does not appear to have been cultivated and a small area in the north east which has a high density of trees, and the visibility within a 2km radius of the facility of the proposed development site. The proposed property has been cultivated in the past.

The site lies within a Critical Biodiversity Area (CBA) and the development is not considered compatible with the desired land use or the goal of biodiversity maintenance within the CBA. The CBA is present on account of the fact the Marikana Thornveld vegetation type is classified as Vulnerable by the National List of the Threatened Ecosystems. However, as the site appears to have been impacted in the past the actual biodiversity value of the site is likely to be low and the development of the site would not significantly impact the ecological functioning of the CBA or result in the further loss transformation of the Marikana Thornveld vegetation type. The extent of degradation and residual ecological value of the area will need to be evaluated during the EIA phase to gauge the potential impact on the CBA status of the area.

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

» **Vegetation**

The majority of the site appears to have been cultivated in the past and is classified as being of Medium-Low sensitivity. There is a small area which is recently cultivated and which is classified as Low sensitivity. There are two areas classified as High Sensitivity which should be avoided, i.e.: a large area in the west on deep sands, which does not appear to have been cultivated and a small area in the north east which has a high density of trees. The sensitivity of these areas as well as the rest of the site will need to be validated in the field and the different plant communities present at the site identified and described. At this stage, based on the available information, there do not appear to be any issues present which might prevent the development from proceeding.

The site lies within a Critical Biodiversity Area (CBA) and the development is not considered compatible with the desired land use or the goal of biodiversity maintenance within the CBA. The impacted nature of the site and the proximity of the site to the Odi airport is likely to ensure that this impact is not of high significance.

The other sensitive environmental features that have not been mapped include:

» **Visual**

The theoretical visibility within a 2km radius of the facility includes mainly vacant land and sections of the Kgabalatsane residential area (to the north) and the *informal* residential area located east of the site.

Visibility between the 2-4km radii includes sections of Kgabalatsane and Rebokala, and sections of the local road connecting these towns. The built-up nature of these areas and the occurrence of built structures and associated visual clutter are expected to virtually nullify the potential visual exposure, or at the very least restrict it to the outlying areas of these towns

» **Agricultural Potential**

If the development proceeds, there will be no soil available to cultivate. The soils of most of the site have a moderate to high potential, but there is little or no current agriculture being practiced anywhere in the vicinity. Although the placement of infrastructure would mean that the site would not be useable for arable agriculture, it is possible that grazing of livestock between the solar panels would be possible. At the end of the project life, it is anticipated that removal of the structures (and foundations) would enable the land to be returned to more or less a natural state following rehabilitation, with little impact, especially given the inherent stability of the soils occurring.

» **Heritage:**

There is a low – medium likelihood of finding Middle Stone Age artefacts scattered over the study area; these sites are mostly out of context and of low - medium archaeological significance.

This preliminary sensitivity analysis of the site should be considered by Built Environment Africa Energy Services (Pty) Ltd 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 Draft Scoping Report.

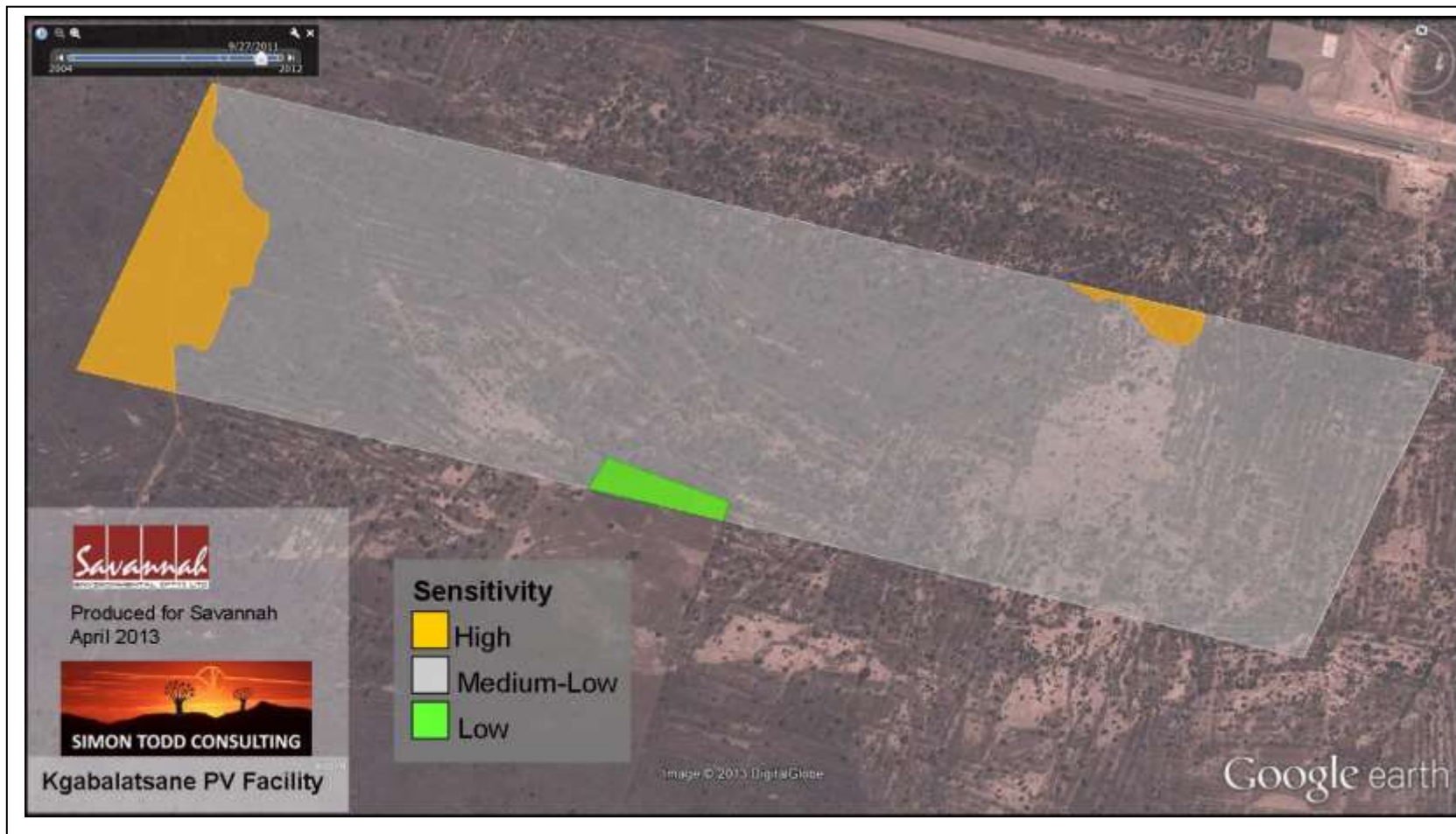


Figure 1 Sensitivity map for the proposed Kgabalatsane Solar Energy Facility



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## DEFINITIONS AND TERMINOLOGY

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

**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/>)

**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.

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

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

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

**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.

**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/>)

**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/>).

**Wise Use (*sensu* Convention on Wetlands):** Defined in Handbook 1 (citing the third meeting of the Conference of Contracting Parties (Regina, Canada, 27 May to 5 June 1987) as "the wise use of wetlands is their sustainable utilisation for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".(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/>)

## ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CSIR	Council for Scientific and Industrial Research
CO <sub>2</sub>	Carbon dioxide
D	Diameter of the rotor blades
DEDEA	Free State Department of Economic Development, Tourism and Environmental Affairs
DEAT	National Department of Environmental Affairs and Tourism
DEA	National Department of Environmental Affairs
DME	Department of Minerals and Energy
DOT	Department of Transport
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
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 <sup>2</sup>	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
m <sup>2</sup>	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NGOs	Non-Governmental Organisations
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
SIA	Social Impact Assessment



## INTRODUCTION

## CHAPTER 1

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with an export capacity of up to 50MW on a site located approximately 18 km north-east of Brits in the North West Province.

In September 2012, Built Environment Africa Energy Services (Pty) Ltd assessed and received environmental authorisations for two (2) 10MW facilities on the same property 9 Syferfontein 430 (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491). However, the Department of Energy revised tariff caps for generation projects that would be effective for Round 3 of the Renewable Energy Independent Power Producer Programme (REIPPP) and set the tariff cap for solar PV projects at R 1,40 per kilo-watt hour. In this regard, Built Environment Africa Energy Services (Pty) Ltd has remodelled the authorised Kgabalatsane Phase 1 (10MW) and Phase 2 (10MW) (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491 respectively) facilities, and has determined that the projects are not viable at this tariff. However, the modelling shows that a larger project would be viable. In order to achieve a larger project, the applicant submitted an application for a single phased 50MW facility on the Farm Syferfontein 430. Built Environment Africa Energy Services (Pty) Ltd has submitted the amendment application forms to the Department to lapse both the environmental authorisations for Phase 1 DEA refer No.: 14/12/16/3/3/1/492 and Phase 2 DEA refer No.: 14/12/16/3/3/1/491. This Draft Scoping Report would assess the 50MW facility which also includes the 2X10MW facility.

The Kgabalatsane Solar Energy Facility is proposed to be located on the farm Syferfontein 430 which is south of the Odi Aerodrome, 2km south of Kgabalatsane settlement and 3km west of the township of Garankuwa in the North-West Province (refer to Figure 1.1). The proposed facility is located approximately 18 km north-east of Brits in the North West Province.

The solar energy facility is proposed to accommodate several arrays of fixed **photovoltaic (PV) panels** and associated infrastructure as described in Section 1.1 below. The project location was selected for the construction of a PV facility for the following reasons:

- » A study of available local irradiation shows that the proposed site is uniformly irradiated by the sun

- » Proximity to existing electrical infrastructure. The study area is vacant and is easily accessible via the ODI aerodrome (currently being used as a drag racing strip).
- » A new on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be 16km. Alternatively, the power would be excavated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » The site is relatively flat as preferred for the installation of PV panels. Therefore, no major earthworks would be required for the construction of the facility. This also contributes to a shorter construction period.

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

### 1.1. Project Components

The 50MW Kgalalatsane Solar Energy Facility is proposed to be established on the farm Syferfontein 430. The co-ordinates of the centre point of the proposed site are 25° 33' 08.04" S 27° 55' 59.52" E. This property falls within the Madibeng Local Municipality. There is an unnamed tarred road located to the north of the site that leads to the ODI aerodrome from the township of Kgalalatsane which will be used to access the site. The proposed area where the PV facility will be established covers an area of approximately 100 hectares in extent within a portion of the broader farm. The development footprint is estimated to be approximately 2 hectares for each block of 1 MW.

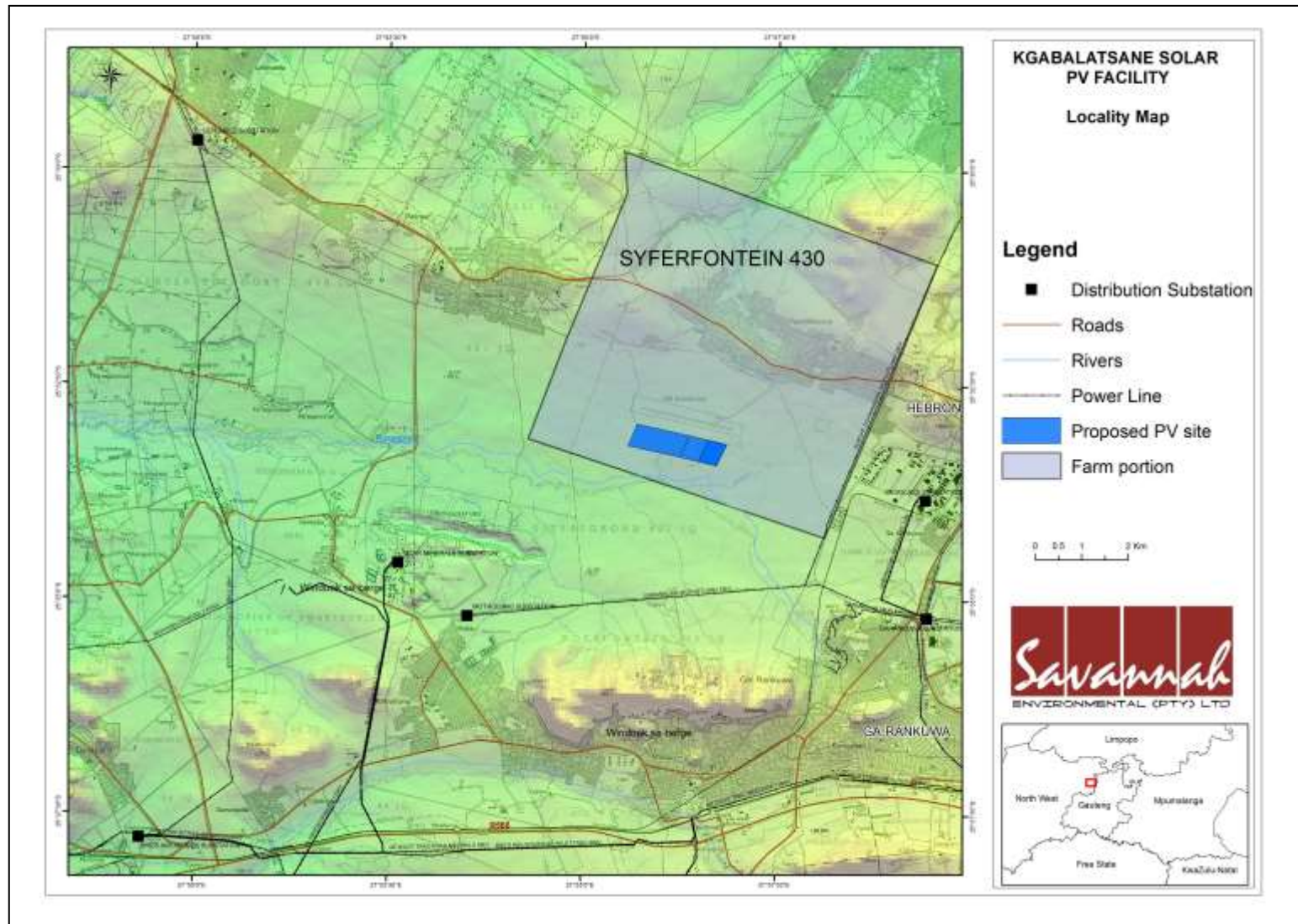
The proposed facility is envisaged to make use of **photovoltaic (PV)** technology with a maximum total export capacity of **50 MW** and will include the following infrastructure:

- » **Photovoltaic (PV) panels**
- » Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » Mounting structures to be 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.

- » 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.

The scope of the proposed **Kgabalatsane 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.



**Figure 1.1:** Locality Map showing the proposed **Kgabalatsane Solar Energy Facility (50MW)** to be located on farm Syferfontein.

## 1.2. 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 the continuing exploitation of non-renewable resources. South Africa currently depends on fossil fuels for the supply of approximately 90% of its primary energy needs. With economic development over the next several decades resulting in an ever increasing demand for energy, there is some uncertainty as to the availability of economically extractable coal reserves for future use. Furthermore, several of South Africa's power stations are nearing the end of their economic life, require refurbishment, or have been recently returned to service (re-commissioned) at great expense (i.e. the Camden, Komati, and Grootvlei Power Stations).

This, together with the current electricity imbalances in South Africa highlight the significant role that renewable energy can play in terms of power supplementation. Given that renewables can generally be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses. At present, South Africa is some way off from exploiting the diverse gains from renewable energy and from achieving a considerable market share in the industry.

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 renewables 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, Built Environment Africa Energy Services (Pty) Ltd proposes the establishment of the **Kgabalatsane Solar Energy Facility** project to add new capacity to the national electricity grid. Should the project be selected as a preferred bidder in terms of the Department of Energy's Renewable Energy Independent Power Producer Programme (REIPPP), Built Environment Africa Energy Services (Pty) Ltd 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, Built Environment Africa Energy Services (Pty) Ltd 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.

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

The proposed 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 North West Department of Economic Development, Environment, Conservation and Tourism will act as a commenting authority. An application for authorisation has been accepted by DEA under application reference number 14/12/16/3/3/2/510.

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. Built Environment Africa Energy Services (Pty) Ltd appointed Savannah Environmental as the independent Environmental consulting company 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 as amended in December 2010, the following 'listed activities' are triggered by the proposed solar energy facility:

<b>Indicate the number and date of the relevant notice:</b>	<b>Activity No (s) (in terms of the relevant notice) :</b>	<b>Describe each listed activity as per project description</b>
545, 18 June 2010 as amended	1	<p>The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more</p> <p><b><i>The PV facility is proposed to have a generating capacity of up to 50MW</i></b></p>
545, June 2010 as amended	15	<p>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:</p> <ul style="list-style-type: none"> <li>(i) Linear development activities.</li> <li>(ii) Agriculture or afforestation where activity 16 in this schedule will apply.</li> </ul> <p><b><i>The development footprint would be greater than 20ha.</i></b></p>
544, 18 June 2010 as amended	10	<p>The construction of facilities or infrastructure for the transmission and distribution of electricity –</p> <ul style="list-style-type: none"> <li>i. Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV; or</li> <li>ii. Inside urban areas or industrial complexes with a capacity of 275kV or more.</li> </ul> <p><b><i>Underground cabling between the PV facility and the on-site substation will have a capacity of 33kV</i></b></p>
GN 544, 18 June 2010	11 (iii); (x); (xi)	<p>The construction of:</p> <ul style="list-style-type: none"> <li>(iii) bridges;</li> <li>(x) buildings exceeding 50 square metres in size; or</li> <li>(xi) infrastructure or structures covering 50 square metres or more</li> </ul> <p>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p> <p><b><i>There may be drainage lines on the development site affected by the proposed development. The applicability of this activity will be confirmed</i></b></p>

Indicate the number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Describe each listed activity as per project description
		<b><i>through the EIA process.</i></b>
GN 544, 18 June 2010	13	<p>The construction of facilities or infrastructure for the storage, or for the storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.</p> <p><b><i>The PV facility may require the storage of dangerous goods. The applicability of this activity will be confirmed through the EIA process.</i></b></p>
GN 544, 18 June 2010 as amended	18 (i)	<p>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:</p> <p>(i) a watercourse;</p> <p><b><i>There may be drainage lines on the development site affected by the proposed development. The applicability of this activity will be confirmed through the EIA process.</i></b></p>
The following listed activities from GN 546 may be applicable, but will be confirmed through the EIA process		
GN 546, 18 June 2010	4(a)ii	The construction of a road wider than 4 metres with a reserve less than 13,5 metres
GN 546, 18 June 2010	10(ii)	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.
GN546	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
GN 546, 18 June 2010	16(iii)& (iv)	The construction of (iii) buildings with a footprint exceeding 10 square metres in size or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
GN546	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.



Therefore, a Scoping and an EIA process 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 Draft Scoping Report documents the evaluation of the potential environmental impacts of the proposed solar facility and forms part of the EIA process. 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).

#### 1.4. The Environmental Assessment Practitioners

Savannah Environmental was contracted by Built Environment Africa Energy Services (Pty) Ltd as the independent consultant to undertake the Scoping and EIA process for the proposed project. Neither Savannah Environmental nor any its specialist sub-consultants on this project are subsidiaries of or are affiliated to Built Environment Africa Energy Services (Pty) Ltd. 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 team from Savannah Environmental includes:

- » **Jo-Anne Thomas** is a registered Professional Natural Scientist and holds a Master of Science degree. She has 15 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
  
- » **Umeshree Naicker** - holds an Honours Bachelor of Science degree in Environmental Management and has 5 years' experience in environmental management and has undertaken EIAs for other proposed solar energy facilities in South Africa. She is currently completing her Masters in Environmental Science.

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 – Simon Todd (Simon Todd Consulting)
- » Geology, soils, and erosion and agricultural potential – Garry Patterson (ARC-Institute for Soil, Climate & Water)
- » Palaeontology: Marion Bamford
- » Heritage– Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC)
- » Visual – Lourens Du Plessis (MetroGIS)
- » Social – Tony Barbour Environmental Consultancy

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

## SCOPE OF THE PROPOSED PROJECT

## CHAPTER 2

The following chapter provides an overview of the proposed 50MW Kgabalatsane 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.

The Kgabalatsane Solar Energy Facility is proposed to be established on the farm Syferfontein 430. In September 2012, Built Environment Africa Energy Services (Pty) Ltd assessed and received environmental authorisations for two (2) 10MW facilities on the same property 9Syferfontein 430 (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491). However, the Department of Energy revised tariff caps for generation projects that would be effective for Round 3 of the Renewable Energy Independent Power Producer Programme (REIPPP) and set the tariff for solar PV projects at R 1,40 per kilo-watt hour. In this regard, Built Environment Africa Energy Services (Pty) Ltd has remodelled the authorised Kgabalatsane Phase 1 (10MW) and Phase 2 (10MW) (DEA refer No.: 14/12/16/3/3/1/492 and DEA refer No.: 14/12/16/3/3/1/491 respectively) facilities, and has determined that the projects are not viable at this tariff. However, the modelling shows that a larger project would be viable. In order to achieve a larger project, the applicant submitted an application for a single phased 50MW facility on the Farm Syferfontein 430. Built Environment Africa Energy Services (Pty) Ltd has submitted the amendment application forms to the Department to lapse both the environmental authorisations for Phase 1 DEA refer No.: 14/12/16/3/3/1/492 and Phase 2 DEA refer No.: 14/12/16/3/3/1/491.

The facility is proposed to accommodate an installed export capacity up to 50MW and will include the following infrastructure:

- » Photovoltaic (**PV**) panels with an installed capacity of up to 50 MW
- » Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » Mounting structures to be 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.
- » Workshop area for maintenance, storage, and offices.

**Table 2.1:** Project infrastructure

Component	Description
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Component	Description
Location of the site	Syferfontein 430
Centre co-ordinates of development site	25° 33' 08.04" S 27° 55' 59.52" E
Municipal Jurisdiction	Madibeng Local Municipality
Extent of the proposed development	100 ha
Extent of broader site	100 ha
Generating capacity	50MW export capacity
Proposed technology	Photovoltaic panels (fixed)
Associated infrastructure	<ul style="list-style-type: none"> <li>» Photovoltaic (PV) panels with an installed capacity of up to 50 MW</li> <li>» Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be evacuated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.</li> <li>» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels.</li> <li>» Cabling between the project components, to be lain underground where practical.</li> <li>» Internal access roads and fencing.</li> <li>» Workshop area for maintenance, storage, and offices.</li> </ul>
Water requirements	<ul style="list-style-type: none"> <li>» Construction:</li> <li>» Operation:</li> </ul>

**Table 2.2:** Dimensions of typical structures required for the PV Facility

Infrastructure	Dimensions/ Details
Technology	Static panels
Construction lay down area (temporary)	100Ha
Number of panels	213,120
Height of panels	2m
On-site substation	Yes
Transformer	Height of the PV box (inverter +transformer):2m <ul style="list-style-type: none"> <li>• Length 3m</li> <li>• Width 2m</li> <li>• Height 2m</li> </ul>
Other Infrastructures	<ul style="list-style-type: none"> <li>• Maintenance building: 16m2</li> <li>• Warehouse: 16m2</li> </ul>

	<ul style="list-style-type: none"><li>• Fence height: 3m</li></ul>
Internal Access Roads	Width: 1,8m Will keep to existing roads as far as possible

## 2.1. Project Alternatives

In accordance with the requirements of the EIA Regulations<sup>1</sup>, alternatives are required to be considered within the EIA process, and may refer to any of the following:

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

### 2.1. Site Alternatives

Due to the nature of the development (i.e. a renewable energy facility), the location of the project is largely dependent on technical factors such as solar irradiation (i.e. the fuel source), climatic conditions, extent and topography of the site and available grid connection. The proposed site was identified by the proposed developer as being technically feasible. No feasible site alternatives within the broader area were identified for this specific project by the project developer.

The following characteristics were considered in determining the feasibility of the proposed site:

#### **Site extent**

Approximately 100 ha would be required for a facility of up to 50MW. The proposed site which is approximately 100 ha in extent will therefore be sufficient for the installation of the proposed facility.

#### **Land availability and Site access**

The land is available for lease by the developer. There is an unnamed tarred road located to the north of the site that leads to the ODI aerodrome from the township of Kgabalatsane. This access road will be used to access the site. No alternative access routes have been identified or are required.

#### **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

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<sup>1</sup> GNR543 27(e) calls for the applicant to identify feasible and reasonable alternatives for the proposed activity.

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 located flat terrain.

### ***Grid Connection***

The electricity generated at the proposed facility is to be evacuated to the Garankuwa substation via a new 132kV overhead power line. It has been confirmed with Eskom that this substation has sufficient capacity to accept the 50MW electricity generated by this proposed facility.

## **2.2. Layout Design Alternatives**

The proposed area where the PV facility will be established covers an area of approximately 100 hectares in extent within a portion of the broader farm. The development footprint is currently estimated to be approximately 2 hectares for each block of 1 MW.

### ***2.2.3 Technology Alternatives***

As it is the intention of Built Environment Africa Energy Services to develop renewable energy projects as part of the DoE's REIPPP, only renewable energy technologies are being considered for this project. Solar energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability (i.e. solar irradiation). Solar PV was determined as the most suitable option for the proposed site as large volumes of water are not needed for power generation purposes compared to concentrated solar power technology (CSP). CSP technology was initially being considered as an option for the site. However, it was confirmed through the initial technical feasibility investigations that insufficient water is available in the study area for this technology.

Very few technological options exist 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 on the environment are very similar. The construction, operation and

decommissioning activities associated with the facility will also be the same irrespective of the technology chosen. There are a number of different solar PV technologies, i.e.:

- » Fixed / static PV panels;
- » Tracking PV panels (with solar panels that rotate to follow the sun's movement); and
- » Concentrated PV Plants (CPV technology).

Only fixed PV is being considered for the proposed Kgalabatsane PV Facility due to limited area available for the facility.

### **2.3. The 'Do-Nothing' Alternative**

The 'do-nothing' alternative is the option of not constructing the proposed Kgalabatsane Solar Energy Facility. Should this alternative be selected then there will be 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. The location of the site in relation to the approved solar facilities suggests that a loss of agricultural land has already occurred and centralising this impact would serve to limit loss of agricultural resources elsewhere.

At a broader scale, the benefits of additional capacity to the electricity grid (approximately 50MW) and those associated with the introduction of renewable energy would not be realised. Although the facility is only proposed to contribute 50 MW to the grid capacity, this would assist in augmenting 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 sources will strengthen energy security through the development of a diverse energy portfolio in South Africa.

### ***Pollution reduction***

The release 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 9<sup>th</sup> 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.

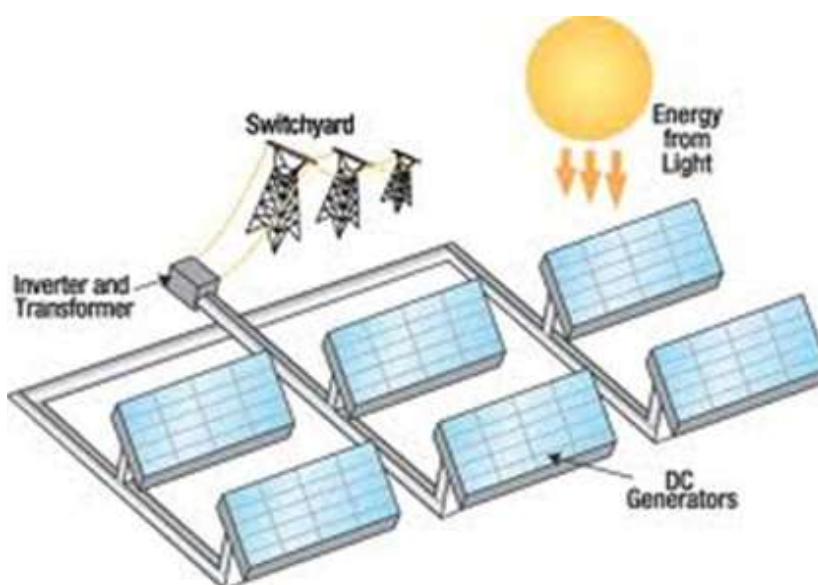
### ***Protecting the natural foundations of life for future generations***

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.

## **2.4. Photovoltaic (PV) Solar Energy Facility and the Generation of Electricity**

Solar PV facilities 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, 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. 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>)

To produce 50 MW of power, the proposed facility will require numerous cells arranged in multiples/arrays which will be fixed to a support structure (refer to Figure 2.3). The support structure will be set at an angle so as to receive the maximum amount of solar radiation.



**Figure 2.3:** PV panels installed (RustMo1 PV Solar Facility)

The height of the PV arrays is expected to be up to 2 m. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

## **2.5. 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.

### **2.6.1 Conduct Surveys**

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

### **2.6.2 Establishment of Access Roads to the Site**

There is an unnamed tarred road located to the north of the site that leads to the ODI aerodrome from the township of Kgabalatsane. This access road will be used to access the site during construction and operation. Within the site itself, access will be required

to the individual facility components for construction purposes (and later limited access for maintenance). 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.

### **2.6.3 Undertake Site Preparation**

Site preparation activities will include clearance of vegetation at the footprint of certain components (i.e. inverters and transformer position) and the establishment of the internal access roads. The PV panels will be sited a certain distance away from each other (to avoid shading). The vegetation between the panels will not be cleared and will be mechanically maintained. Clearing activities, where required, will involve the stripping of topsoil which will need to be stockpiled and/or spread on site.

### **2.6.4 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) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)<sup>2</sup> 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.

### **2.6.5 Establishment of Laydown Areas on Site**

Laydown and storage areas will be required for the typical construction equipment which will be required on site. These will be located within the development footprint area.

### **2.6.6 Erect PV Cells and Construct Substation & Invertors**

The construction phase of the proposed facility would entail the erection of solar panels, where the support structure will be buried into the ground. The usual method of fixing these panels is through galvanised steel square profiled tubing (approximately 80 mm), rammed into the ground to a depth of approximately 1600 to 2000mm. This upright

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<sup>2</sup> A permit will be required for the transportation of these abnormal loads on public roads.

pole will protrude approximately 1000 mm above the ground, to which the PV panel frames will be affixed. The frames will carry one or more PV panel/s. The highest point of the PV panels once mounted will be approximately 2.0 m from ground level facing the north. In addition, a perimeter fence of approximately 3 meters in height will be constructed and surveillance cameras that will be used to monitor the site will be mounted along the perimeter fence at strategic locations at a height of approximately 2.5 meters



**Figure 2.5:** Frame, structural details (Courtesy of Igeam, 2011)



**Figure 2.6** Mounting of the frame for the PV panels (Courtesy of Igeam, 2011)

Inverters will be installed to facilitate the connection between the solar energy facility and the Eskom electricity grid via a new 132kV power line to the Garankuwa substation. The position of the inverters within the footprint of the broader site will be informed by the final positioning of the PV components.

The construction of a substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level

terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

### **2.6.7 Establishment of Ancillary Infrastructure**

Ancillary infrastructure will include a short turn-in overhead 132kV power line feeding into the Eskom electricity network via an existing power line located on the site, workshop, storage areas as well as a temporary contractor's equipment camp.

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

### **2.6.9 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 operational phase must be closed and rehabilitated.

## **2.6. 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. Thereafter the power will be evacuated from the on-site substation to the Eskom existing overhead power line to feed into the grid via the new 132kV power line into the Garankuwa substation.

The PV panels will need to be cleaned on a regular basis, as dust accumulation reduces their efficiency. Water to be sourced from the municipality will be used for this purpose.

It is anticipated that a 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.

## **2.7. Decommissioning Phase**

The solar energy facility is expected to have a lifespan of more than 20 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.

### ***2.7.1. Site Preparation***

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

### ***2.7.2. Disassemble and Replace Existing Components***

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

## 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

The Scoping Phase for the proposed Kgalatsane Solar Energy Facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010 as amended in December 2010, 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). This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

### 3.2. 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 December 2010, 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 a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of Government Notice No R543 of 2010).
- » Undertaking of independent specialist studies in accordance with Regulation 32 of Government Notice No R543 of 2010.
- » Preparation of a Draft Scoping Report and Plan of Study for EIA in accordance with the requirements of the Regulation 28 Government Notice No R543 of 2010.

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 North West Province, the North West Department of Economic Development, Environment, Conservation and Tourism will act as a commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping process. This consultation has included submission of an application for authorisation to DEA, with a copy submitted to North West Department of Economic Development, Environment, Conservation and Tourism. Authorisation to continue with the Scoping Phase of the project was granted as this application was accepted by DEA under the reference number 14/12/16/3/3/2/510 allocated to the project.

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 government departments including SAHRA, Department of Agriculture and Land Reform, SANRAL
- » Provincial and local government departments (including DEA; North West Department of Economic Development, Environment, Conservation and Tourism, SAHRA; Department of Water Affairs; Department of Agriculture and Land Reform; SANRAL, etc.)
- » Government Structures (including the Provincial Roads Authority, municipal planning departments, etc.)
- » Madibeng Local Municipality and Bojanala Platinum District 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 Britspos on 26 April 2013.

Site advertisements were placed on the site (fence and/boundaries) and in public places in accordance with the requirements of the EIA Regulations. The site notices were placed at the following venues on the 25 April 2013;

- Kgabalatsane community hall
- Entrance to the site ( using the Aerodrome road access)
- Local shop – JKS Thihe General Dealer
- Entrance of Madibeng Town office

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 and tenants
- » Organs of State having jurisdiction in respect of any aspect of the activity, including:
  - \* North West - Agriculture and Rural Development
  - \* North West - Public Works, Roads and Transport
  - \* North West - Water Affairs
  - \* South African Heritage Resources Agency (provincial and national)
  - \* SANRAL
  - \* Local Municipality
  - \* District Municipality
  - \* Eskom
  - \* 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 to I&APs to have their concerns and comments captured after the release of the Draft Scoping Report for public review, as follows:

- » **Public meeting** in the study area
- » **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 draft 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:

<b>Specialist</b>	<b>Area of Expertise</b>	<b>Refer Appendix</b>
Simon Todd of Simon Todd Consulting	Ecology, flora and fauna	Appendix F
Garry Patterson of ARC ISWC	Soils and Agricultural potential	Appendix G
Lourens du Plessis of MetroGIS	Visual	Appendix H
Jaco van der Walt	Heritage	Appendix I
Tony Barbour of Tony Barbour Environmental Consultancy	Social	Appendix J
Marion Bamford of the University of Witwatersrand	Palaeontology	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 – J.

### **3.2.7. Public Review of Draft Scoping Report and Feedback Meeting**

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from 26 June 2013 – 26 July 2013 at the following locations:

- » Kgabalatsane Community Hall
- » Madibeng Local Municipality
- » [www.savannahSA.com](http://www.savannahSA.com)

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

- » Date: 02 July 2013
- » Time: 18:00
- » Venue: Kgabalatsane Community Hall

The public review process and details of the public meeting were advertised in local newspapers. In addition, all registered I&APs were notified of the availability of the report and public meeting by letter. Flyers were distributed to the local community by Mr Thabane Ntshole on 25 June 2013 (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 Draft 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. Solar energy is considered under the White Paper for Renewable Energy and the Department undertakes research in this regard. This department is the controlling authority in terms of the Electricity 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.

- » *South African National Roads Agency Limited (SANRAL)*: This department is responsible for all National road 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 Forestry and Fishery (DAFF)*: This Department is 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.

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

- » *North West Department of Economic Development, Environment, Conservation and Tourism*. This department is the commenting authority for this project.
- » *Department of Transport and Public Works*: This Department is responsible for roads within the North West Province, and for the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » *The Department of Agriculture*: This Department is responsible for all matters which affect agricultural land.
- » *Department of Water Affairs*: This Department is responsible for evaluating and issuing licenses pertaining to water use.

At Local Level the local and municipal authorities are the principal regulatory authorities responsible for planning, land use, and the environment, i.e. Madibeng Local Municipality (LM), and the Bojanala Platinum District Municipality (BPDM).

- » The Madibeng Local Municipality is located within the Bojanala Platinum District Municipality of the North West Province.
- » 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.
- » 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.

### **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 Draft Scoping Report:

- » National Environmental Management Act (Act No 107 of 1998)

- » EIA Regulations, published under Chapter 5 of the NEMA (GNR R545, GNR 546 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)
- » 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 Kgabalatsane Solar Energy Facility EIA

Legislation	Applicable Sections
<b>National Legislation</b>	
Constitution of the Republic of South Africa (Act No 108 of 1996)	<ul style="list-style-type: none"> <li>» Bill of Rights (S2)</li> <li>» Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being</li> <li>» Rights to freedom of movement and residence (S22)</li> <li>» Property rights (S25)</li> <li>» Access to information (S32)</li> <li>» Right to just administrative action (S33)</li> </ul>
National Environmental Management Act (Act No 107 of 1998)	<ul style="list-style-type: none"> <li>» 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</li> <li>» NEMA EIA Regulations (GN R385, 386 &amp; 387 of 21 April 2006) (published in terms of Chapter 5), with effect from 3 July 2006</li> <li>» 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)</li> <li>» 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 &amp; rectify pollution or degradation of the environment</li> <li>» Procedures to be followed in the event of an emergency</li> </ul>

Legislation	Applicable Sections
	incident which may impact on the environment (S30)
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)	<ul style="list-style-type: none"> <li>» Stipulates assessment criteria and categories of heritage resources according to their significance (S7)</li> <li>» Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35)</li> <li>» Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36)</li> <li>» 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)</li> <li>» 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)</li> </ul>
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	<ul style="list-style-type: none"> <li>» Provides for the MEC/Minister to list ecosystems which are threatened and in need of protection (S52) – none have as yet been published</li> <li>» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) - none have as yet been published</li> <li>» A list of threatened &amp; protected species has been published in terms of S 56(1) - Government Gazette 29657.</li> <li>» 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).</li> <li>» This act also regulates alien and invader species.</li> <li>» 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.</li> </ul>
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<ul style="list-style-type: none"> <li>» Measures in respect of dust control (S32) – no regulations promulgated as yet</li> <li>» Measures to control noise (S34) - no regulations promulgated as yet</li> </ul>
Conservation of Agricultural Resources Act (Act No 43 of 1983)	<ul style="list-style-type: none"> <li>» Prohibition of the spreading of weeds (S5)</li> <li>» Classification of categories of weeds &amp; invader plants (Regulation 15 of GN R1048) &amp; restrictions in terms of where these species may occur</li> <li>» Requirement &amp; methods to implement control measures</li> </ul>



Legislation	Applicable Sections
	for alien and invasive plant species (Regulation 15E of GN R1048)
National Water Act (Act No 36 of 1998)	<ul style="list-style-type: none"> <li>» National Government is the public trustee of the Nation's water resources (S3)</li> <li>» 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.</li> <li>» Duty of Care to prevent and remedy the effects of pollution to water resources (S19)</li> <li>» Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20)</li> <li>» Definition of water use and requirement for water use licenses for certain activities (S21)</li> <li>» Requirements for registration of water use (S26 and S34)</li> <li>» Definition of offences in terms of the Act (S151)</li> </ul>
National Environmental Management: Waste Act (Act No 59 of 2008)	<ul style="list-style-type: none"> <li>» 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.</li> <li>» The Act provides listed activities requiring a waste license</li> </ul>
National Forests Act (Act No 84 of 1998)	<ul style="list-style-type: none"> <li>» 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'.</li> <li>» Forests: The Act prohibits the destruction of indigenous trees in any natural forest without a licence.</li> </ul>
<b>Guideline Documents</b>	
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	<ul style="list-style-type: none"> <li>» 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</li> </ul>
<b>Policies and White Papers</b>	
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	<ul style="list-style-type: none"> <li>» Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by this white Paper.</li> </ul>

<b>Legislation</b>	<b>Applicable Sections</b>
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.

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## DESCRIPTION OF THE RECEIVING ENVIRONMENT

## CHAPTER 4

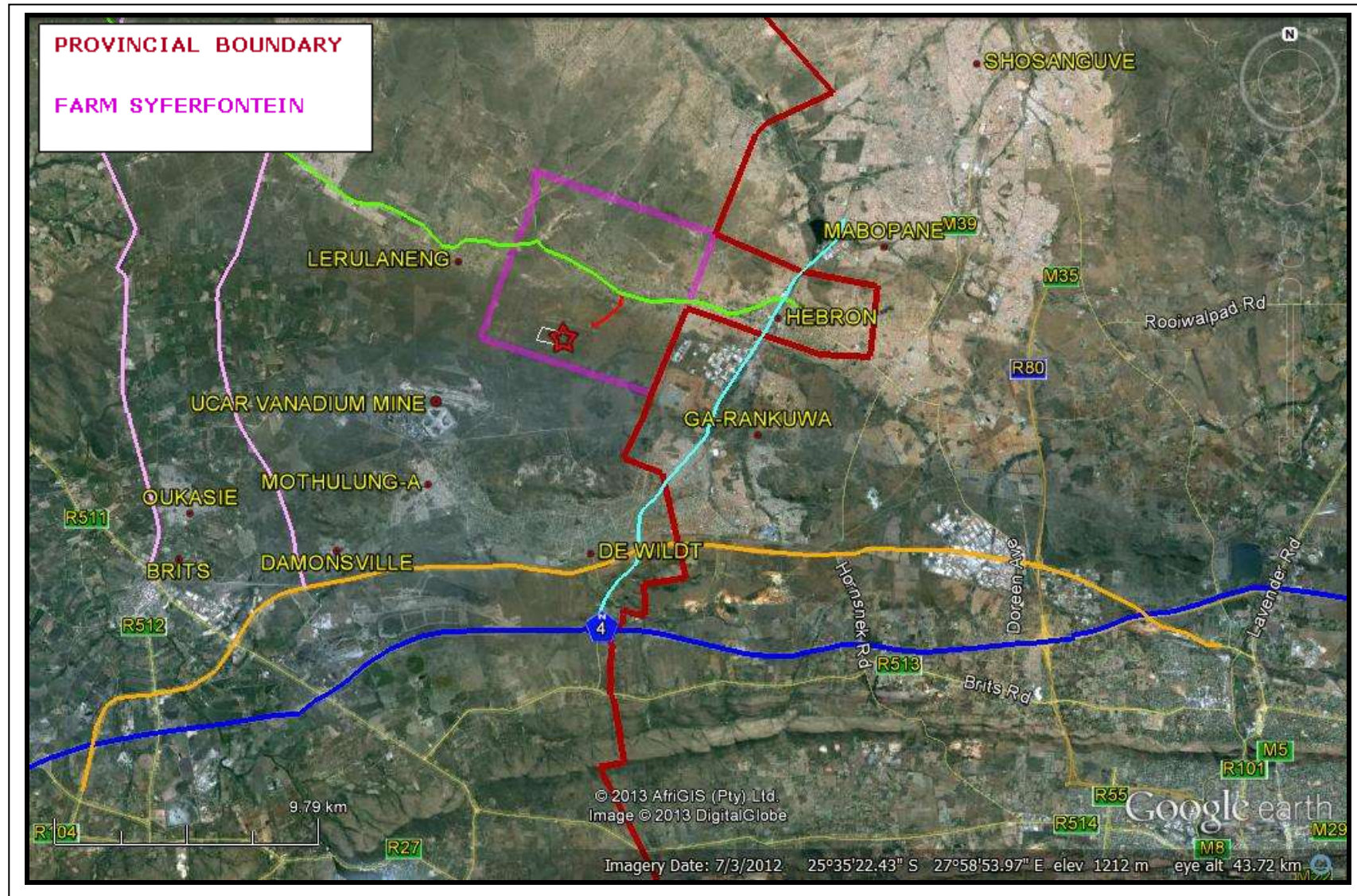
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This section of the Draft Scoping Report provides a description of the environment that may be affected by the proposed **Kgabalatsane Solar Energy Facility**. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is situated. Features of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from 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 project site is located in the Madibeng Local Municipality (Ward 10) in the North West Province. The site is located ~ 15 km north-east of the town of Brits in the North West Province (NWP). The town of Brits is the administrative seat of the Madibeng LM. Pretoria (City of Tshwane) is located ~30 km to the south-east of the site. The N4 and R566, both located to the south of the site, provide the main road links between Pretoria and Brits. The Madibeng LM economy is based on mining (platinum, vanadium), agriculture (including irrigated citrus around Brits area) and manufacturing. No significant tourism activities are associated with the study area.

The site is located on land owned by the BaKwena BaMogopa Tribal Authority. The east-west aligned N4 constitutes the key road link in the study area. The N4 forms part of the Walvis Bay – Maputo road corridor. The N4 is located ~10 km to the south of the proposed site, and provides links to Pretoria and the N1 in the east, and the towns of Rustenburg and Mahikeng (provincial seat) in the west. The R566 is aligned parallel to the north of the N4, and provides a more direct link between Brits and Pretoria North.



**Figure 4.1:** Road network in relation to proposed Kgalabatsane Solar Energy Facility site

## **4.2 Climatic Conditions**

Climate data was obtained from the national Land Type Survey (Koch, 1987). The area has warm, moist summers with cool, dry winters. On average, 85% of the annual average rainfall of 619.0 mm falls in the growing season (October to March). Frost, often severe, occurs in winter. The extreme maximum temperature recorded is 29.8°C and the extreme minimum -1.8°C.

## **4.3. Access and Transport Routes in the region**

The road access to the proposed site is via a gravel road to the Odi aerodrome off the western extension of the tarred M20 (unnamed on Google Earth). The road traverses the southern portion of Kgabalatsane settlement, and provides a direct link to the village of Lerulaneng to the west, and to the densely populated townships of Ga-Rankuwa, Mabopane and Soshonguve to the east.

## **4.4. Biophysical Characteristics of the Study Area**

### **4.3.1 Topography**

The site is approximately 102.73 ha in extent, and lies between 1 160 and 1 180 metres above sea level. The terrain falls gently to the south, with slopes of between 2% and 4%.

### **4.3.2 Geology**

The geology of the study area consists mainly of ferrogabbro, ferrodiorite and diorite of the Upper zone and gabbro, norite and anorthosite of the Main and Lower zones of the Bushveld Complex; along with quartzite, hornfels and shale of the Pretoria Group (Geological Survey, 1986).

### **4.3.3 Soil Types**

Soils are mostly vertic melanic clays with some dystrophic or mesotrophic plinthis catenas and freely drained, deep soils. The land types present are mainly Ea, Ba and Ae.

Two distinct soil map units were identified, but with more or less similar characteristics. A description of the most important soil characteristics of each unit, such as the dominant soil form and family, soil depth, topsoil texture and underlying material.

In general, the soils are all reddish in colour, with a weak to moderate grade of structure. The texture is medium to heavy, with clay content between 30% and 50%.

They are mostly moderately deep, although depths of up to 1 200mm can be encountered.

Soil depths range from 400 mm to 1 200 mm. The area has not been previously cultivated, and the natural vegetation consists of natural grass, shrubs and trees. The Hutton soil form was dominant in the area, with Shortlands comprising the subdominant portions. Both solid and cracked, weathered rock underlie the soils of the survey area.

#### **4.3.4 Agricultural Potential**

The general agricultural potential of each map unit, and the main limiting factors, are given in Table 4.1 below.

**Table 4.1:** Agricultural Potential

<b>Agricultural Potential</b>	<b>Map unit</b>	<b>Area (ha)</b>	<b>Limitations</b>
Moderate to high	Hu	48.69	Occasional shallow soil depth with some rockiness
Low to moderate	Sd	11.88	Generally shallow soil depth with some rockiness
Low to moderate to high	Hu/Sd	42.16	Occasional shallow soil depth with some rockiness combined with generally deep soils.
<b>Total</b>		<b>102.73</b>	

The depth variation across the study area was such that it was not possible to map out areas where slightly deeper or shallower soils occur. The only delineation that could be made was between the generally shallower, slightly more structured, higher clay Shortlands soils (map unit Sd) on the one hand and the somewhat deeper, less structured, less clayey Hutton soils (map unit Hu) on the other.

Both units (Hu and Sd) have a potential for vegetable and other crops that are not sensitive to depth limitations. But the Hu unit also has portions with deeper soil areas which may be used for the cultivation of crops with a deep rooting system such as maize.

#### **4.3.5 Hydrology**

No drainage lines are evident on the site from the desk-top studies undertaken. The presence of drainage lines will however be further investigated in the EIA phase.

### **4.5. Land use of the Study Area**

The study area land use context may be described as peri-urban, located on the interface between largely rural Madibeng to the west, and urban Tshwane directly to the east. The sprawling urban area of Ga-Rankuwa is located directly to the east and south-east, and Soshanguve and Mabopane further to the north east. The central portion of Syferfontein is comprised of the Kgabalatsane residential area, located ~1.8 km to the north of the proposed solar energy facility site. Lerulaneng settlement to the west of Kgabalatsane is located ~2.8 km north-west of the proposed site. Informal housing also appears to be located in the south-eastern portion of the broader farm of Syferfontein, ~1.8 km to the east of the proposed development site.

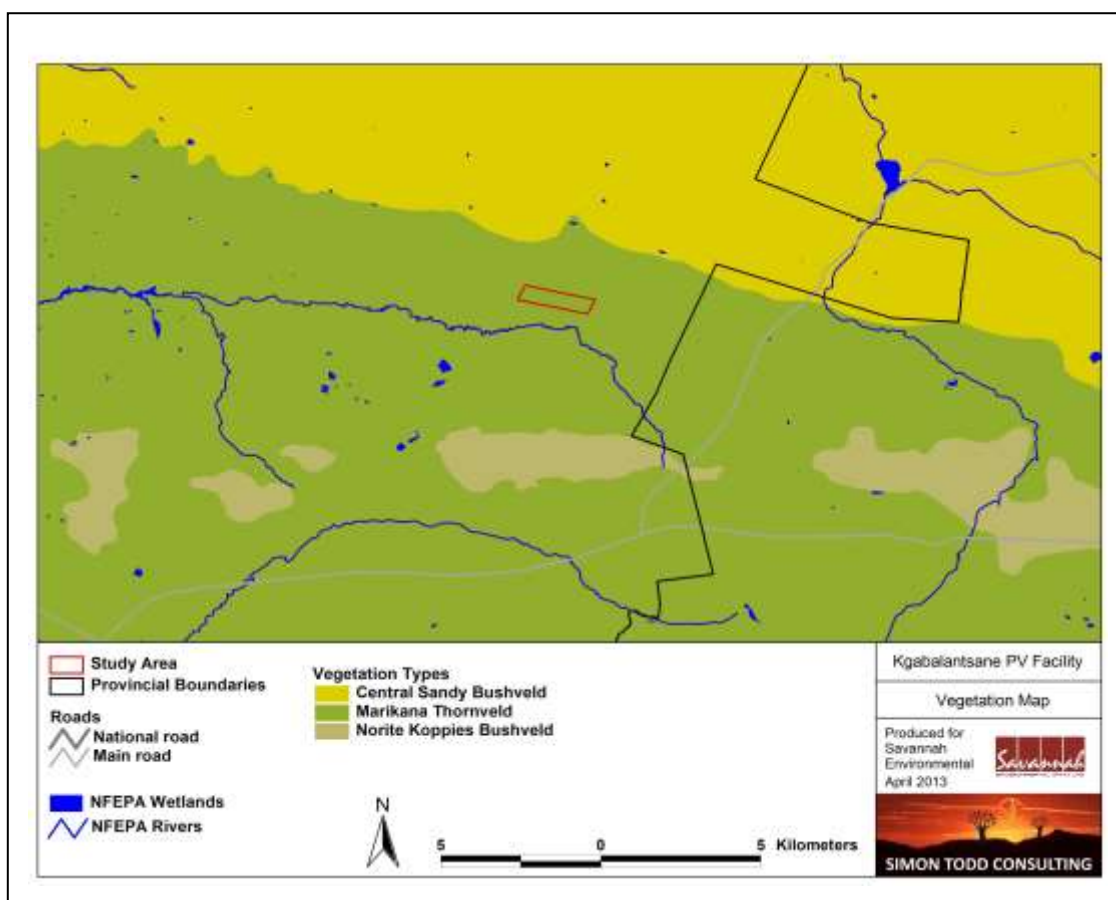
## 4.6. Ecological Profile

### 4.6.1. Vegetation

The site falls entirely within the Marikana Thornveld vegetation type. This vegetation type occurs in the North-West and Gauteng provinces, from the Rustenburg area in the west, through Marikana and Brits to Pretoria in the east, at an elevation of 1050-1450m. The vegetation forms an open *Acacia karoo* woodland occurring in valleys and slightly undulating plains as well as some lowland hills, Shrubs are more common along drainage lines, on termitaria, rocky outcrops and other fire-protected habitats.

Important taxa include trees such as *Acacia burkei*, *Acacia caffra*, *A.gerrardii*, *A.karoo*, *Combretum molle*, *Rhus lancea*, *Zizyphus mucronata*, *Acacia nilotica*, *A.tortillis*, *Celtis africana*, *Dombeya rotundifolia*, *Pappea capensis*, *Peltophorum africanum* and *Terminalia sericea*; tall shrubs such as *Euclea crispa*, *Olea europea* subsp. *africana*, *Rhus pyroides*, *Dispyros lycioides*, *Ehrtia rigida*, *Euclea undulata*, *Grewia flava*, *Pavetta gardeniifolia*; low shrubs such as *Asparagus cooperi*, *Rhychosia nitens*, *Indigofera zeyheri*, *Justicia flava*; climbers including *Clematis brachiata*, *Helinus integrifolius*, *Petarrhinum insipidum*, *Cyphostemma cirrhosum*; graminoids such as *Elionurus muticus*, *Eragrostis lehmanniana*, *Setaria sphacelata*, *Themeda triadra*, *Aristida scabrivalvis*, *Fingerhuthia africana*, *Heteropogon contortus*, *Hyperthelia dissoluta*, *Melinis nerviglumis*, *Pogonarthria squarrosa*; herbs such as *Hermannia depressa*, *Ipomoea obscura*, *Barleria macrostegia*, *Dianthus mooiensis*, *Ipomoea oblongata*, *Vernonia oligocephala*; geophytes such as *Ledebouria revoluta*, *Ornithogalum tenuifolium* and *Sanseveria aethiopica*.

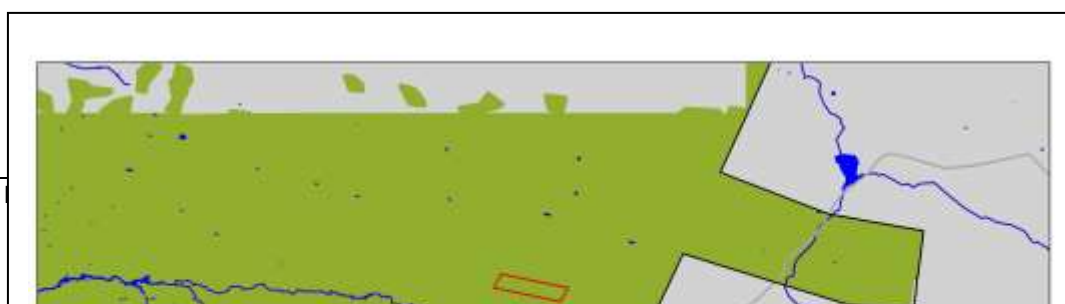
Marikana Thornveld has been significantly impacted by agriculture and urbanisation, with an estimated 48% having been lost. Less than 1% of the target of 19% is conserved, indicating that this vegetation type is poorly represented within conservation areas. There are no known endemic species to this vegetation type, which is not surprising given its relatively limited total extent of 2 528km<sup>2</sup>. Although Mucina and Rutherford (2006) list this vegetation as Endangered, the status of the vegetation type was reduced to Vulnerable under the National List of Threatened Ecosystems (2011). Given the relatively highly impacted nature of Marikana Thornveld, further transformation and loss of intact vegetation is undesirable



**Figure 4.2:** Broad-scale overview of the vegetation in and around the Kgalabantsane PV Facility site. The vegetation map is an extract of the national vegetation map as produced by Mucina & Rutherford (2006), and also includes rivers delineated by the National Freshwater Ecosystem Priority Areas assessment (Nel et al. 2011).

#### **4.6.2. Critical Biodiversity Areas**

The site falls within the planning domain of the North-West Province Biodiversity Conservation Assessment (Skowno & Desmet 2008), which maps Critical Biodiversity Areas (CBAs) and Ecological Support Areas within the North West Province. The proposed development site lies within a Tier 2 Critical Biodiversity Area. The area has been classified as a CBA on account of the conservation status of Marikana Thornveld, rather than the known presence of significant biodiversity within the site or significant ecological gradient or process operating across the area. Further transformation of areas classified as CBAs is highly undesirable, but the potential significance of this impact within the current context depends to a large extent on the condition and ecological status of the vegetation within the site.





**Figure 4.3:** Extract of the Critical Biodiversity Areas map for the North-West Province (Skowno & Desmet 2008), illustrating the position of the study area within the Tier 2 CBA.

#### **4.6.2. Red List Animal Species**

##### ***Mammals***

In the past the study area would have been home to a wide range of large herbivores as well as carnivores. However, the majority of these are now confined to conservation areas and no longer occur in the area. Nevertheless, at least 50 mammals potentially occur at the site, including four listed species.

Listed species which may occur at the site include the Brown hyaena (NT), Honey badger (IUCN LC, SA RDB EN), Serval (NT) and South African hedgehog (SA RDB NT). None of the listed species were observed during the previous studies at the site and although these species may occur at the site, their presence is not highly likely as they do not occur in highly degraded or disturbed habitat.

Table 1. The International Union for Conservation of Nature IUCN Red List Categories for fauna and flora. Species which fall within the categories in red and orange below, are of conservation concern.

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IUCN Red List Category

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Critically Endangered (CR)

Endangered (EN)

Vulnerable (VU)

Near Threatened (NT)

Critically Rare

Rare

Declining

Data Deficient - Insufficient Information (DDD)

Data Deficient - Taxonomically Problematic (DDT)

Least Concern

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### **Reptiles**

According to the SARCA database, 43 reptile species are known from the quarter degree square 2527DB, indicating that the reptile diversity at the site is likely to be of moderate diversity.

As there are no rocky outcrops within the study area, species associated with this habitat are not likely to be present, which would significantly reduce the total number of reptile species likely to be present. Only one listed species is known from the area, i.e. the Striped Harlequin Snake which is listed as LR/NT.

### **Amphibians**

A total of 15 amphibians are known from the quarter degree square 2527DB. The majority of these are widespread species and there are no narrow endemic species known from the area. Only one listed species is known from the area, the Giant Bullfrog which is listed as Near Threatened. As there are no perennial water bodies within the development area, it is not likely that the abundance of amphibians within the site is very high and there are no areas that appear to be specifically important for amphibians.

## **4.7 Social Characteristics of the Study Area and Surrounds**

### **4.7.1 Population**

The MLM population has increased significantly in the decade between the two Censuses in 2001 and 2011, namely by 129 803 people. Household sizes decreased slightly, by 0.5 per household, partially contributing to the increase of 64 799 households in the MLM over the period. The skew towards males over females has increased by 8.5%.

**Table 2: Overview of key demographic indicators for the Madibeng LM**

ASPECT	2001	2011	CHANGE (%)
Population	347 578	477 381	+3.7% p.a.

ASPECT	2001	2011	CHANGE (%)
<b>Households</b>	95 924	160 723	-
<b>Household size (average)</b>	3.4	2.9	- 0.5
<b>% Female headed households</b>	35.3	30.3	- 5
<b>Sex Ratio (males per 100 females)</b>	105.2	113.7	+ 8.5
<b>Dependency ratio per 100 (15-64)</b>	49.6	44.4	- 5.2
<b>% Population &lt;15 years</b>	26.3	25.7	- 0.6
<b>% Population 15-64</b>	68.8	69.2	+ 0.4
<b>% Population 65+</b>	4.9	5.1	+ 0.2
<b>Unemployment rate (official) - % of economically active population</b>	41.9	30.4	- 11.5
<b>Youth unemployment rate (official) - % of economically active population 15-34</b>	52.9	38.2	- 14.7
<b>No schooling - % of population 20+</b>	15.6	7.8	- 7.8
<b>Higher Education - % of population 20+</b>	5.6	7.7	+ 2.1
<b>Matric - % of population 20+</b>	20.4	27.3	+ 6.9

*Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet*

Changes with regard to socio-economic development indicators such as female headed households (-5%), dependency ratios (-5.2%), unemployment (-11.5%), youth unemployment (-14.7%) and education are all positive. Virtually 70% of the MLM population is of economically active age.

#### **4.7.2 Education levels**

There are two hundred and eighteen (218) schools located within the MLM jurisdiction. The areas of the highest need with regards to educational facilities are concentrated within the village areas, where the average number of pupils per classroom for all schools is between 35 and 46 per classroom. The pupil: teacher ratio for the secondary schools is 1:35, which is below the national norm of <1: 40. The problem with regards to secondary schools would rather appear to be the distribution of the facilities (distances and travelling times to schools) and high school drop-out rates (MLM IDP 2011-2016; Index, 2012).

In addition, two major university campuses are located in Ga-Rankuwa, namely the University of Limpopo Ga-Rankuwa campus (formerly known as the Medical University of South Africa), and a campus of the Tshwane University of Technology ([www.en.wikipedia.org/wiki/Ga-Rankuwa](http://www.en.wikipedia.org/wiki/Ga-Rankuwa)).

#### **4.7.3 Health Care**

The main public hospitals in the MLM are Brits Hospital and Odi Community Hospital in Mabopane. The former Brits Clinic, former Brits Municipality clinics and former Odi clinics were integrated into the Madibeng Sub – District. The Madibeng Health District is thus made out of 22 clinics, of which four are earmarked for being developed into health centres, they include Jericho, Bapong, Letlhabile and Mothutlong. There are five Primary Health Care Mobile Units and one Dental Unit serving 197 points on a monthly basis (Index, 2012).

In addition, the second largest hospital in Africa, Dr George Mukhari Hospital (formerly known as Ga-Rankuwa Hospital) is located in Ga-Rankuwa. The hospital also serves as a teaching hospital as it shares its facilities with the University of Limpopo Ga-Rankuwa campus (formerly known as the Medical University of South Africa), which produces the largest number of new medical doctors in South Africa ([www.en.wikipedia.org/wiki/Ga-Rankuwa](http://www.en.wikipedia.org/wiki/Ga-Rankuwa)).

The MLM still experiences diseases and conditions such as malnutrition which are associated with impoverished, underdeveloped socio-economic conditions. This is more prevalent in rural and farming areas. On average, 167 children and 273 adults are admitted to a protein energy malnutrition scheme per quarter. A normal nurse's patient ratio is 1:38 but with the present situation the ratio is 1.54, resulting in prolonged patient waiting period at facilities (MLM IDP 2011-2016).

### ***HIV/ AIDS***

The MLM is characterized by a very high HIV/AIDS prevalence rate - 45.5% (compare to NWP: 26.7%). This can be attributed to a number of factors such as higher proportions of migrant workers (miners and farmers), high rates of poverty, unemployment and teenage pregnancies. There has been a growth in truck movement that move across municipal boundaries, which may pose its own problems. The epidemic is primarily in the economically active population (age 18 – 39), placing a disproportionate burden on an age group with critical social economic roles.

## **4.8 Heritage**

### **4.8.1 Stone Age**

The Stone Age archaeology of southern Africa is divided into three categories, namely: the Early Stone Age, Middle Stone Age and the Late Stone Age. These Stone Age industries are well documented throughout the southern Africa regions (i.e. in countries that form the political geography of SADC).

#### **Early Stone Age**

Hominids began to make stone tools about 2.6 million years ago. Known as the Oldowan industry, most of the earliest tools were rough cobble cores and simple flakes. The flakes were used for such activities as skinning and cutting meat from scavenged animals. These early artefacts are difficult to recognize and stratified deposits are mainly been found in rock shelters such as the Sterkfontein Caves (Kuman, 1998); there are no shelters in the study area and it is unlikely to find stratified deposits in the study area although some isolated finds can occur.

No Acheulian sites are on record near the project area, but isolated finds are possible. However, isolated finds have little value. Therefore, the project is unlikely to disturb a significant site. The presence and significance of finds can be determined by a field investigation.

### **Middle Stone Age**

By the beginning of the Middle Stone Age (MSA), tool kits included prepared cores, parallel-sided blades and triangular points hafted to make spears (Volman, 1984). MSA people had become accomplished hunters by this time, especially of large grazing animals such as wildebeest, hartebeest and eland.

Isolated MSA artefacts especially in erosion dongas are expected but it is not anticipate that these finds will have conservation value.

### **Late Stone Age**

The southern Africa LSA is known to span a period from 30 k.y.a. By the beginning of the Later Stone Age (LSA), human behaviour was undoubtedly modern. Uniquely human traits, such as rock art and purposeful burials with ornaments, became a regular practice. These people were the ancestors of the San (or Bushmen).

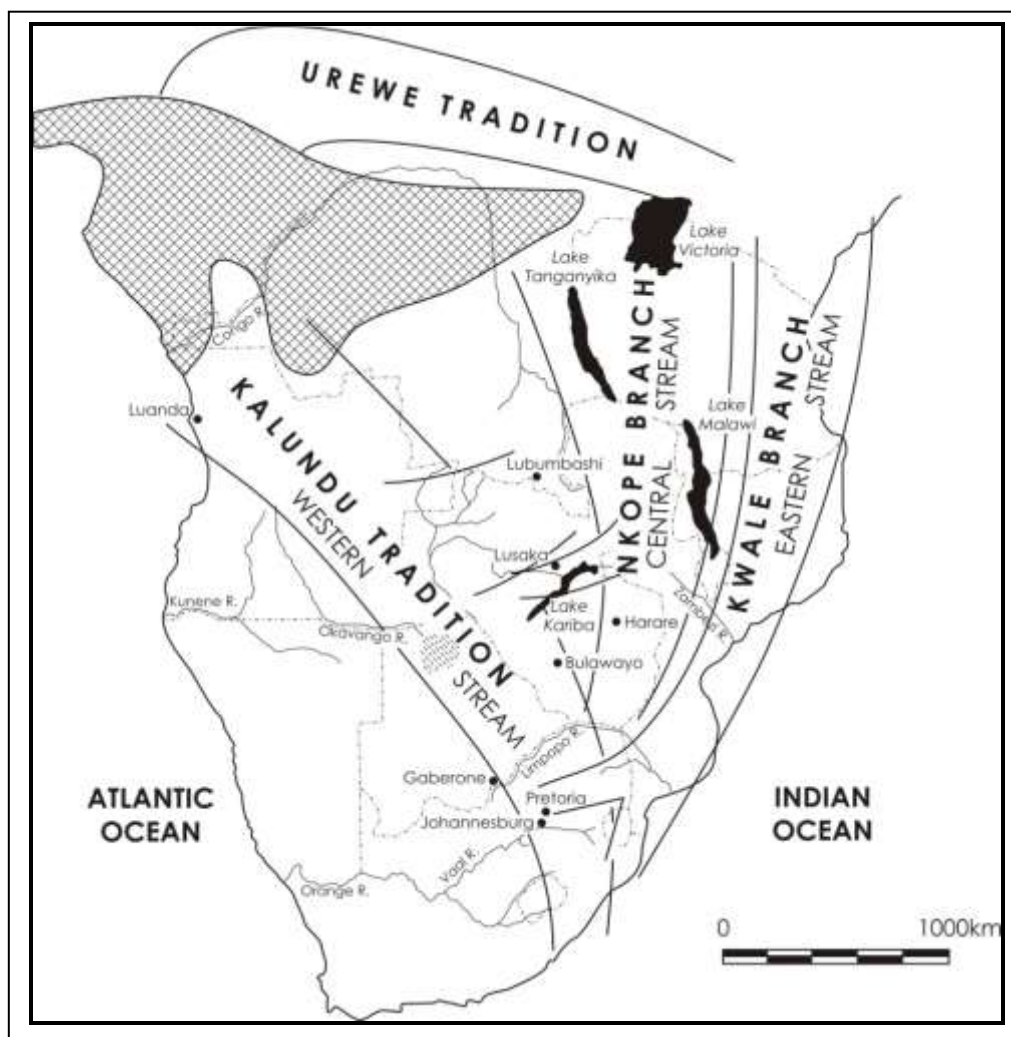
Sites in the open are usually poorly preserved and therefore have less value than sites in caves or rock shelters. Since there are no caves in the study area no LSA sites of significance is expected.

#### **4.8.2. Iron Age**

The Iron Age as a whole represents the spread of Bantu speaking people and includes both the pre-Historic and Historic periods. It can be divided into three distinct periods:

- » The Early Iron Age: Most of the first millennium AD.
- » The Middle Iron Age: 10th to 13th centuries AD
- » The Late Iron Age: 14th century to colonial period.

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living.



**Figure 4.4:** Movement of Bantu speaking farmers (Huffman 2007)

### **Early Iron Age**

Sites belonging to the Early Iron Age consisting of *Happy Rest* and *Mzonjani facies* have been recorded close to the project area. Happy Rest and Mzonjani pottery form part of two traditions (Kalundu and Urewe) that represent the spread of mixed farmers into southern Africa during the Early Iron Age. This find is important as it provides evidence for early interaction between these groups. Later, by the 8<sup>th</sup> and 9<sup>th</sup> centuries, the two merged to form a new facies, *Doornkop*.

### **Middle Iron Age**

No sites dating to this period are on record close to the study area.

### **Late Iron Age**

For the area in question the history and archaeology of the Sotho Tswana are of interest. The ceramic sequence for the Sotho Tswana is referred to as Moloko and consists of different facies with origins in either the Icon facies or a different branch associated with Nguni speakers. Several sites belonging to the Madikwe and Olifantspoort facies (from Icon) have been recorded close to the project area. These sites date to between AD 1500 and 1700 and predate stone walling ascribed to Sotho-Tswana speakers.

What is of interest here is the Swartkoppies mountain range that extends into the southern part of the study area this area is renowned for its LIA stone walled settlements. Following the classification system used for Makau these sites belong to Mike Taylor's (1979) group 2, particularly group 2a. These sites date to between AD 1650 and AD 1840.

Sotho Tswana stonewalled sites with Uitkomst pottery have been found close to the study area and dates to the seventeenth to nineteenth centuries.

#### **4.8.3. Colonial and Industrial 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. Noupoot is one of the interior towns that were established by the European settlers of Dutch descent – the Afrikaans communities after the Trek from the then Cape Colony to avoid British Administration. Various monuments, statues and memorials associated with this period are found across the Northern Cape Province. The same is true with architectural structures resembling different styles and vernacular found in some of the still standing farmsteads and town buildings. Events also associated with colonial archaeology are two South African Wars commonly known as the Anglo-Boer Wars – the First South African War (1860s) and the Second South African War (late 1890s to early 1900s). The 19th Century Industrial Revolution is also closely linked to these wars and visa-versa.

#### **Archaeological finds**

Several stone walled settlements are known from the literature occurring in the wider region: Medunsa S25° 36' 27.5451" E; 28° 01' 35.8124'S; Makau S25° 36' 9.1419" E; 27° 54' 47.2624"S; Zambok Zyn Kraal S25° 35' 42.1251" E 28° 01' 17.5626"S.

## SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED KGALABATSANE 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 the PV solar energy facility are similar and include, among others:

- » Potential impacts on fauna, flora and ecology.
- » Potential impacts on agricultural potential of the site.
- » Potential impacts on soils (erosion, contamination etc.) and geology.
- » Potential impacts on heritage resources.
- » Potential social impacts (positive and negative).

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

- » Potential long term loss of endangered / red list / protected species (flora and fauna).
- » Potential loss of arable land.
- » Potential soil loss for 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 associated with the decommissioning phase are expected to be similar to those associated with construction and are therefore not repeated. 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 **potential sensitive environments** and **receptors** that may be impacted on by the proposed facility and the **types of impacts** (i.e. direct, indirect and cumulative<sup>3</sup>) 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.

## **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 footprint for the solar components (i.e. PV panels), on-site substation and associated infrastructure (i.e. internal access roads and overhead power line). .

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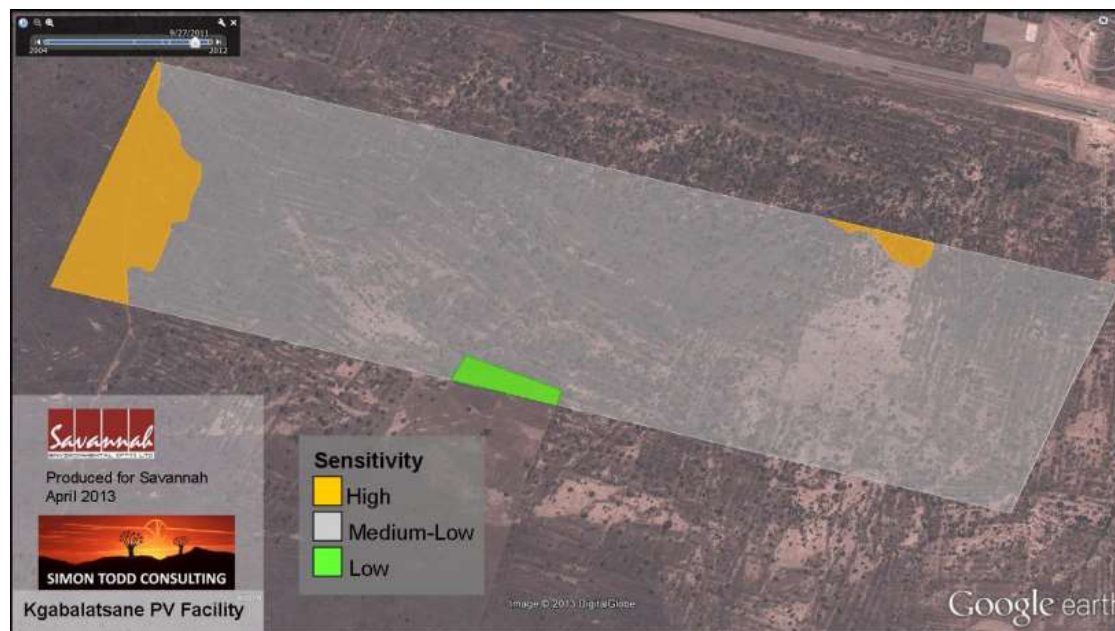
<sup>3</sup> The cumulative impacts are expected to be associated with the scale of the project and any existing impacts affecting the study area. Cumulative effects can only be assessed once the detailed layouts are known. They will then be considered in the detailed specialist studies to be undertaken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

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

<b>Impacts on Fauna, Flora and Ecology</b>
<p>Potential impacts on the ecological features on the site include:</p> <ul style="list-style-type: none"><li>» <b>Vegetation and protected plant species:</b> It is highly likely that some listed plant species occur within the site and there is a probability that these would be affected by the development.</li><li>» <b>Degradation of ecosystems:</b> The large amount of disturbance created during construction will leave the site vulnerable to alien plant invasion and soil erosion.</li><li>» <b>Direct Faunal impacts:</b> Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed.</li><li>» <b>Critical Biodiversity Areas and Loss of Landscape Connectivity:</b> The site lies within a Critical Biodiversity Area and the development is not compatible with the desired landuse options for CBAs. If the site had not been disturbed in the past and contained significant biodiversity or occurred within an area that is likely to be important for broad-scale landscape connectivity, then this would raise a potential red flag for the development. However the site appears to have been heavily impacted in the past and the proximity of the site to the Odi airport also suggests that the area is subject to frequent disturbance and is not likely to be of local or regional significance in terms of landscape connectivity.</li><li>» Following construction the natural vegetation should gradually begin to recolonise the denuded areas. Although naturally occurring indigenous species will re-establish, invasive weedy species will also colonise the area and may threaten the re-establishment of the natural vegetation. The rate at which the indigenous species re-establish will differ amongst the species and will depend on the extent of the initial disturbance and the amount and types of seeds present in the seed bank. An active re-vegetation plan should be implemented to assist the return of the natural indigenous species.</li><li>» Disturbance during the construction phase will provide declared weeds and alien invader plant species an opportunity to establish on the disturbed/denuded areas. Monitoring and control of these species during the construction and operational phase of the proposed solar facility is critical. The construction of the panel foundations and associated infrastructure will lead to the disturbance and/or a direct loss of faunal habitat.</li><li>» Return of the natural vegetation/habitats on denuded areas could create habitats that can be re-colonised by some faunal components. Natural habitats left between constructed areas could provide habitats for recolonisation by fauna.</li></ul>

### Site Sensitivity Assessment

The draft sensitivity map for the Kgabalatsane Solar Energy Facility site is illustrated below in **Figure 5.1**. The majority of the site appears to have been cultivated in the past and is classified as Medium-Low sensitivity. There is a small area which is recently cultivated and which is classified as Low sensitivity. There are two areas classified as High Sensitivity, a large area in the west on deep sands, which does not appear to have been cultivated and a small area in the north east which has a high density of trees. The sensitivity of these areas as well as the rest of the site will need to be validated in the field and the different plant communities present at the site identified and described. At this point, based on the available information, there do not appear to be any large obstacles present which might prevent the development from going forward.



**Figure 5.1.** Ecological sensitivity map of the Kgabalatsane Solar Energy Facility development area.

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Vegetation and listed plant species	Site preparation and construction will result in a lot of disturbance which would impact indigenous vegetation and possibly listed species as well. For some species translocation may be a viable option, but if large numbers of protected trees such as Marula occur at the site, this would potentially be a significant issue	Local (low to moderate)	None identified at this stage
Spread of declared weeds and alien invasive species	Invasion of the natural plant communities within the site would be undesirable and would impact diversity of fauna and flora as well as affect ecosystem processes. Similarly, erosion would also impact biodiversity through topsoil loss as well as through siltation of drainage lines and water bodies.	Local (Moderate to low)	None
Re-establishment of natural vegetation	Construction phase disturbed and/or destroyed natural vegetation which has to re-establish on the denuded/disturbed areas	Local	None
Faunal Impacts	Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.	Local ( low signifance)	None identified at this stage
Impacts on Critical Biodiversity Areas and Loss of Landscape Connectivity	The presence and operation of the facility will result in the long-term loss of habitat within an area classified as a Critical Biodiversity Area. This would further impact a listed vegetation type as well as result in landscape fragmentation and the loss of landscape connectivity for fauna and flora.	Local ( high)	None identified at this stage

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

It is recommended that:

- » A site survey be conducted at the appropriate time of the year (i. e late summer) in order to assess the current state of the vegetation that will be lost and/or disturbed and the implication thereof.
- » Sensitive areas must be identified and mitigation measures put in place.

- » Potential weedy species in the area be identified and the accompanying risks assessed.
- » Faunal habitats be assessed on the site.
- » Sensitive faunal species and habitats must be identified and mitigation measures put in place.

**Impacts on Soils, Geology, Agricultural Potential and Land-Use**

The soil depth variation across the study area was such that it was not possible to map out areas where slightly deeper or shallower soils occur. The only delineation that could be made was between the generally shallower, slightly more structured, higher clay Shortlands soils (map unit Sd) on the one hand and the somewhat deeper, less structured, less clayey Hutton soils (map unit Hu) on the other.

Both units (Hu and Sd) have a potential for vegetable and other crops that are not sensitive to the depth limitations. The Hu unit also has portions with deeper soil areas which may be used for the cultivation of crops with a deep rooting system such as maize. The agricultural potential of the site is considered medium. The soils of most of the site have a moderate to high potential, but there is little or no current agriculture being practiced anywhere in the vicinity.

The identified potential impacts are the following (with the potential significance in brackets):

- » Soil degradation due to contamination by diesel, oil, petrol and other contaminants used during the construction phase by vehicles and equipment (Low to High, depending on the magnitude and nature of a spillage of contaminants)
- » Soil erosion due to increased and concentrated storm water run-off (Medium, if not properly managed)
- » Construction and positioning of the concrete foundations of the solar arrays
- » Positioning and construction of underground cabling between the solar arrays
- » Construction and positioning of the on-site substation
- » Construction and positioning of overhead power lines
- » Construction and positioning of internal access roads
- » Construction and positioning of a workshop, office, maintenance and storage areas

Contamination of the soil and other resources by oil, petrol, diesel and other contaminants by the vehicles and equipment on the site

Issue	Nature of Impact	Extent of Impact	No-Go Areas
Loss of arable land	Improper placement of the solar panels or other infrastructure within the existing lands	Local	None identified at this stage.
Soil degradation due to contamination	Spillages of oil, diesel, petrol or other contaminants by the vehicles and equipment, may lead to soil	Local	None identified at this stage

	degradation due to contamination. Contamination of the soil may also take place in proposed maintenance and storage sites		
Soil erosion due to increased and concentrated storm water run-off	Heavy rainstorms do occur in the area. Depending on the placement of the solar arrays and other infrastructure, as well as the erodibility of the soils and the slopes on the site, run-off of storm water may be increased and concentrated, with both direct and secondary effects on the soil, vegetation and other resources downstream.	Local	None identified at this stage
Soil erosion due to trampling by vehicles and equipment, as well as construction activities	Improper placement, construction, maintenance and use of access roads and construction sites by vehicles and equipment, may lead to the degradation of the soil surface and result in soil erosion (both wind and water erosion).	Local	None identified at this stage
Siltation of watercourses and other natural resources downstream as a result of improper storm water management and soil erosion due to increased and concentrated water run-off	Improper placement and maintenance of infrastructure, as well as poor storm water management, may lead to water erosion and siltation of water courses downstream.	Regional	None identified at this stage
Dust production	Improper construction, maintenance and use of access roads and construction sites by vehicles and equipment, may lead to dust production.	Local	None identified at this stage
<p><b>Gaps in knowledge &amp; recommendations for further study</b></p> <p>» Potentially significant impacts to be assessed during the EIA phase: Due diligence should be observed in terms of the proper placement of solar panels and other infrastructure, as well as the slopes and erodibility of the soils present on the site. Consideration should be given to the proper placement of roads and other infrastructure, taking into account the sensitivity of the soils to wind and water erosion and the slopes present on the site. Consideration should also be given to storm water management next to roads and construction sites, as this may cause secondary effects, i.e. soil erosion.</p> <p>Significant impacts to be assessed during the EIA phase: Consideration should be given to the proper placement of the solar arrays and other</p>			

infrastructure.

<b>Heritage Impacts</b>			
<p>Based on the current information obtained for the area at a desktop level it is anticipated that any sites that occur within the proposed development area will be graded as Generally Protected B. Any sites in the study area that was not picked up during the scoping study should be mitigatable and no red flags are identified. However if any grave sites occur the area of a sensitive nature and of high social value, these sites should rather be avoided. Impacts on heritage sites during construction relate to the destruction or disturbance of such sites as a result of construction activities.</p>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No Go Areas</b>
Loss or destruction of Archaeological sites	The construction phase of the project could directly impact on surface and subsurface archaeological sites.	Local ( Low to Medium)	None
Historical (Including middens, structural remains and cultural landscape)	The construction of the project can directly impact on both the visual context and sense of place of historical sites. There are few structures identified in the study area.	Local ( Low)	None.
Burials and Cemeteries (Graves and informal cemeteries can be expected anywhere on the landscape)	The construction and operation of the proposed project could directly impact on marked and unmarked graves.	Local ( Low to medium)	None.
Impacts on Palaeontology	Construction activities such as clearing for roads or PV panels and shallow excavations may lead to damage or loss of fossils.	Local	There are no "No Go Areas" identified at this stage.
<b>Gaps in knowledge &amp; recommendations for further study:</b>			
<p>The following assumptions and limitations exist in terms of the present study:</p>			

- » A Phase 1 Archaeological Impact Assessment will be undertaken in line with the NHRA.
- » The current study is a Heritage Scoping study and not heritage impacts or impact evaluations took place. As such, a historical and archival desktop study as well as a preliminary field survey were undertaken to identify tangible heritage resources located in and around the proposed area of development. No archival maps that can potential yield more information about the site were identified – as such this limits us some information about the documented historical events of the area. No semi-formal discussions took place with the farm owners or potential Interested and Affected parties were undertaken as part of this study- therefore there was no heritage based Social Consultation Process.
- » A qualified palaeontologist undertakes ground reconnaissance prior commencement of the development.
- » Fossiliferous mudstones exposed during construction are reported to a qualified palaeontologist and the South African Heritage Resources Agency (SAHRA).

**Visual Impacts**

The identified site for the proposed facility is situated approximately 18km by road north-east of Brits and 30km north-west of Pretoria on the farm Syferfontein. The area in question, generally referred to as Ga-Rankuwa, historically formed part of the former Bophuthatswana homeland.

The proposed site is located in an area that has a distinct rural and natural character, with very limited infrastructure development in the immediate surrounds. The disused Odi Aerodrome or airstrip is located north of the proposed site and is the only evidence of built infrastructure in close proximity of the site. The access road to this airstrip will also function as the access road to the solar project.

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. Construction periods are often characterised by an increase in construction vehicles and personnel and their associated impacts such as dust clouds, noise, potential pollution, safety considerations, etc.

Issue	Nature of Impact	Extent of Impact	No Go Areas
Visual impacts	Potential visual impact of the construction period on visual receptors within the 2km to 8 km radius which includes the site itself, the sections of Kgabalatsane and Rebokala, and sections of the local road connecting these towns. Visibility subsides drastically beyond a 4km radius with only limited exposure expected to the south and south-west of the site. This exposure is limited, in large, to the higher lying north-facing	Local	None identified at this stage



	slopes of the Swart Koppies.		
<p><b><u>Gaps in knowledge &amp; recommendations for further study:</u></b></p> <p>» 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.</p>			

<p><b>Impacts on the social environment</b></p> <p>The main negative impacts on the social environment 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.</p> <p>Potential social impacts during construction include:</p> <ul style="list-style-type: none"> <li>» Job creation (positive impact) – limited opportunities</li> <li>» Economic spin-offs to local community (positive impact)</li> <li>» Safety and security risks to farmer’s property and livestock (negative impact) due to influx of job seekers to the area</li> <li>» Construction traffic (negative impact)</li> </ul> <p>These impacts are discussed below.</p>			
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. It is 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.	Local - Regional	None identified at this stage
Economic spin-offs to local community.	Due to construction activities, the small workforce will need accommodation and supplies. Other economic spin-offs include Local procurement of general construction materials and goods (e.g. cement, sand / stone etc.).	Local	None identified at this stage
Influx of people into the study areas including	An increase in people movement could increase the safety and security risk and fire risk in the area. Furthermore, the influx of job seekers to the	Local	None identified at this stage

members of the construction crews and job seekers.	construction site could lead to some negative impacts (i.e. conflict between individuals seeking work). An inflow of workers and the associated construction activities (vehicle movement, noise, dust) could result in temporary intrusion impacts.		
Skills development	Potential opportunities for skills development and training during the construction phase would result in long-term benefits for those involved. If proper enhancement measures are implemented the positive impacts in this regard could be increased.	Local - Regional	None 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	Temporary disruptions in the daily living and movement patterns of neighbouring private property owners could be foreseen, although it is anticipated that the negative impacts associated with this aspect would be minimal and could be successfully mitigated.	Local	None identified at this stage

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

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

- » A comprehensive literature review and analysis would be undertaken in order to acquire further demographic and socio-economic information with regards to the receiving environment and to build on the initial profiling of the local population’s socio-economic characteristics.
- » A site visit would be undertaken in order to gather additional primary data by means of consultation with the stakeholders and affected parties.
- » If available, the social impact assessment team will study and analyse the information gathered by the biophysical studies (e.g. information related to technical, environmental, economic and demographic aspects and land-use changes, impact on other facilities, services, and so forth) done in parallel with the public participation process and social studies. This would assist the social team to assess the impact of the proposed development on the direct (surrounding communities) and indirect (regional) environment.
- » The following variables would also be assessed:
  - \* Population impacts;
  - \* Community/institutional arrangements;

- \* Conflicts between local residents and newcomers;
  - \* Individual and Family level impacts;
  - \* Community infrastructure needs; and
  - \* Intrusion impacts.
- » Prepare a specialist report detailing the potential social impacts.
  - » Assess these potential impacts using a weighting system that assigns a value to the categories (extent, duration, magnitude, probability) and arrives at a total which depicts the significance of the particular impact.

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

<b>Impacts on Fauna, Flora and Ecology</b>			
<p>Following construction the natural vegetation should gradually begin to recolonise the denuded areas. Although naturally occurring indigenous species will re-establish, invasive weedy species will also likely colonise the area and may threaten the re-establishment of the natural vegetation. The rate at which the indigenous species re-establish will differ amongst the species and will depend on the extent of the initial disturbance and the amount and types of seeds present in the seed bank. An active revegetation plan should be implemented to assist the return of the natural indigenous species.</p> <p>Disturbance during the construction phase will provide declared weeds and alien invader plant species an opportunity to establish on the disturbed/denuded areas. Monitoring and control of these species during the construction and operational phase of the proposed solar facility is critical.</p> <p>Return of the natural vegetation/habitats on denuded areas could create habitats that can be re-colonised by some faunal species.</p>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>'No go' Areas</b>
Re-establishment of natural vegetation	Natural vegetation disturbed and/or destroyed during the construction phase has to re-establish on the denuded/disturbed areas	Local	None
Spread of declared weeds and alien invasive species	The spread and establishment of declared weed and alien invader species during operation should be monitored and controlled.	Local/regional	None
Re-colonisation of habitats	Re-colonisation of suitable habitats by fauna following the construction phase	Local	None
<b>Gaps in knowledge &amp; recommendations for further study</b>			
<p>It is recommended that:</p> <ul style="list-style-type: none"> <li>» At the appropriate time of the year (i. e late summer) a site survey should be conducted in order to assess the current state of the vegetation that will be lost and/or disturbed and potential for revegetation investigated.</li> <li>» The site survey should identify potential alien and invasive species in the area and assess the accompanying risks.</li> <li>» Faunal habitats be assessed on the site</li> <li>» Sensitive areas and faunal species must be identified and, where necessary, mitigation measures put in place.</li> <li>» Sensitive areas be identified and mitigation measures put in place to prevent/limit damage to the drainage system.</li> </ul>			

**Impacts on Soils, Geology, and Agricultural Potential**

During the operation of the solar energy facility, exposed areas / soil 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 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).

The depth variation across the study area was such that it was not possible to map out areas where slightly deeper or shallower soils occur. The only delineation that could be made was between the generally shallower, slightly more structured, higher clay Shortlands soils (map unit Sd) on the one hand and the somewhat deeper, less structured, less clayey Hutton soils (map unit Hu) on the other.

All the units (Hu, Sd and Hu/Sd) have a potential for vegetable and other crops that are not sensitive to the depth limitations. But the Hu and Hu/Sd units also have portions with deeper soil areas which may be used for the cultivation of crops with a deep rooting system such as maize.

Issue	Issue	Extent	No go' Areas
Soil erosion	Accelerated loss of topsoil through rainfall or artificially concentrated run-off may occur.	Local	None identified at this stage
Long term loss of arable land	Loss of arable land. 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	None identified at this stage

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

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

Conduct a site visit to confirm the physical and geological information used in this report and to collect visual information pertaining to the soil types and their geotechnical engineering properties;

Assess the present state of erosion, identify critical areas in terms of erosion and identify these areas;

Prepare a specialist report detailing the environmental issues and potential impacts pertaining to soil degradation and erosion;

Assess the potential direct and indirect impacts using a weighting system that assigns a value to the categories (extent, duration, magnitude, probability) and arrives at a total which depicts the significance of the particular impact;

Assess the contribution of the proposed activity in the cumulative impact of the development in the area;  
Comparatively assess any feasible alternatives (if any);  
Provide mitigating measures to input into the Environmental Management Programme (EMP).

### Visual Impacts

The desk-top scoping study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed facility. A detailed Digital Terrain Model (DTM) for the study area was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

The result of the preliminary viewshed analyses for the proposed facility is shown on the map below (**Figure 5.2**). The initial viewshed analyses were undertaken from a number of vantage points within the proposed development area at an offset of 2m above average ground level. This was done in order to determine the general visual exposure (visibility) of the area under investigation, simulating the maximum height of the proposed structures (PV panels) associated with the facility. The viewshed analyses will be refined once a preliminary and/or final layout of the facility is completed and will be regenerated for the actual position of the infrastructure on the site, and per structure position (and actual proposed technology) during the EIA phase of the project.

The viewshed analyses do not include the effect of vegetation cover or existing structures on the exposure of the proposed facility, therefore signifying a worst-case scenario. It is expected that the vegetation types (*woodland* and *thicket and bushland*) within the study area and in close proximity to the facility, will reduce the visual exposure considerably.

The preliminary viewshed analyses indicated that the proposed facility would have relatively contained core area of potential visibility (i.e. within a 4-5km radius of the site). This area of exposure is generally restricted to the farm earmarked for the development itself, and predominantly vacant rural/natural land. This is due to the constrained vertical dimensions of the proposed solar technology (PV), the undulating nature of the topography and the location of hills to the south (Swart Koppies) of the proposed facility.

Theoretical visibility within a 2km radius of the facility includes mainly vacant land and sections of the Kgabalatsane residential area (to the north) and the *informal* residential area located east of the site.

Visibility between the 2-4km radii includes sections of Kgabalatsane and Rebokala, and sections of the local road connecting these towns. The built-up nature of these areas and the occurrence of built structures and associated visual clutter are expected to virtually nullify the potential visual exposure,

or at the very least restrict it to the outlying areas of these towns.

Visibility subsides drastically beyond a 4km radius with only limited exposure expected to the south and south-west of the site. This exposure is limited, in large, to the higher lying north-facing slopes of the Swart Koppies. Once again, exposure indicated within this zone that falls within built-up areas is expected to be negligible.

Visibility beyond 8km from the proposed development is expected to be negligible and highly unlikely due to the distance between the object (development) and the observer.

It is envisaged that the structures (where visible from shorter distances) may constitute a high visual prominence, potentially resulting in a high visual impact.

Issue	Nature of Impact	Extent of Impact	No go' Areas
The visibility of the facility to, and potential visual impact on, observers travelling along major roads in the area (predominantly the major secondary roads) and impact on the larger built-up centres or populated places.	The towns of Ga-Rankuwa, Kgabalatsane, Rabokala, Makau, etc.), as well as the expanding settlement located west of the Ga-Rankuwa industrial area.	Local	None identified at this stage.
The potential visual impact of the construction of ancillary infrastructure	The substation at the facility, associated power line and access roads on observers in close proximity of the facility.	Local	None identified at this stage.
The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.	Visual receptors within (but not restricted to) an 2-4 km buffer zone from the facility may be impacted by the lighting by the facility at night.	Local	None identified at this stage.
The visual absorption capacity of the natural vegetation (if applicable).	It is expected that the vegetation types (woodland and thicket and bushland) within the study area and in close proximity to the facility, will reduce the visual exposure considerably	Local	None identified at this stage.

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

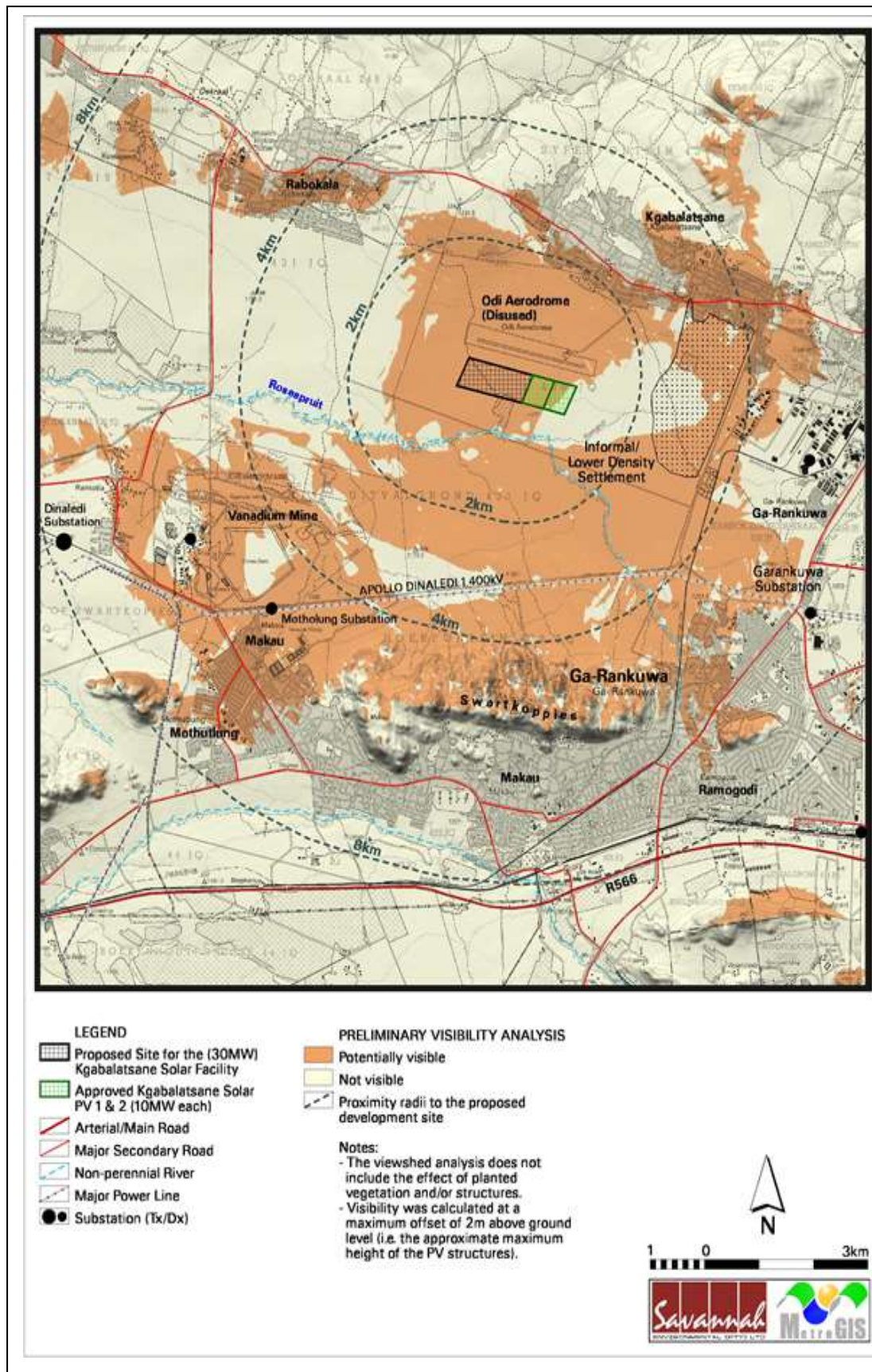
The above-mentioned anticipated visual impacts need to be assessed in greater detail during the EIA phase of the project.

It is recommended that:

- » The severity of the potential visual impact be assessed in further detail in the EIA phase.
- » Additional spatial analyses must be undertaken in order to create a visual impact index that will further aid in determining potential visual impact.
- » Specific spatial criteria need to be applied to the visual exposure of the proposed facility in order to successfully determine visual impact and ultimately the significance of the visual impact.
- » Specific mitigation measures be proposed to lessen any potential visual impact (with specific mention to the height contours).
- » Ground truthing of the GIS-generated viewshed be undertaken to determine/confirm actual visual impact.







**Figure 5.2:** Map indicating the potential visual exposure of the proposed facility.

<b>Impacts on the social environment</b>			
<p>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 a concentrated zone of solar development in the Noupport area, and would also assist in meeting the government’s target for renewable energy.</p>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No go’ Areas</b>
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	None identified at this stage
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	None identified at this stage
<b>Gaps in knowledge &amp; recommendations for further study</b>			
<p>The Social Impact Assessment study will be conducted during the EIA Phase including:</p>			

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

**Table 5.3: Evaluation of potential impacts associated with the Power Line associated with Kgabalatsane Solar Energy Facility**

<b>Impacts of the Power line</b>			
<ul style="list-style-type: none"> <li>» Built Environment Africa Energy Services (Pty) Ltd is considering the construction of a new on-site substation to evacuate the power from the facility into the Eskom grid. Proposed on-site substation will evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. The power line is linear infrastructure with impacts largely restricted to the tower footprints. Potential impacts include:                             <ul style="list-style-type: none"> <li>» During construction: disturbance to soil, vegetation and nearby residents due to excavations for the support structure for the 132kV power line.</li> <li>» During operation of the solar energy facility, the power line could cause bird mortality (electrocution / collision) with the power line, and could result in visual impacts on the surrounding area.</li> </ul> </li> </ul>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>'No go' areas</b>
Negative impact on vegetation and soil structure during construction of the power line and associated access roads.	Pylon construction and cable laying will result in a lot of disturbance which would impact indigenous vegetation and possibly listed species as well. With mitigation, the development footprint would be very low and it is not likely that a large number of plants would be affected.	Local	None at this stage
Disturbance (intrusion impacts) to residents / farmers living in close proximity to where the power line is being constructed.	Construction noise due to vehicles / staff constructing the power line may disturb residents / landowners.	Local	None at this stage
Ecology degradation	Disturbance along the power line corridor during construction would leave the affected areas vulnerable	Local	None at this stage

	to alien species invasion as well as soil erosion.		
Operational impact: Bird mortality due to the power line collisions and electrocutions	The presence of the power line will pose a collision and electrocution risk to susceptible bird species, including several species of conservation concern such as Kori Bustard, Lesser Kestrel, Bald Ibis, Cape Vulture, Ludwig's Bustard, Martial Eagle and African Grass-Owl	Local – Regional	None at this stage
<p><b><u>Gaps in knowledge &amp; recommendations for further study:</u></b></p> <ul style="list-style-type: none"> <li>» Specialist study will consider the impact of the power line on the different environmental elements.</li> <li>» The impact of the power line is dependent on the grid connection point which is to be agreed with Eskom.</li> </ul>			

**Table 5.4: Evaluation of potential Cumulative impacts associated with the Kgabalatsane Solar Energy Facility and other proposed projects**

**Approach to Cumulative Effects Assessment**

Cumulative impacts, in relation to an activity, refer to the impact of an activity that in-itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. For cumulative effects analysis to help the decision-maker and inform interested parties, it must be limited to effects that can be evaluated meaningfully (DEAT, 2004). Boundaries must be set so analysts are not attempting to measure effects on everything. Therefore, the cumulative impacts associated with the proposed Kgabalatsane Solar Energy Facility have been viewed from this perspectives within this report:

» Cumulative impacts associated with the scale of the project,

Cumulative effects are commonly understood as the impacts which combine from different projects and which result in significant change, which is larger than the sum of all the impacts (DEAT, 2004). The complicating factor is that the projects that need to be considered are from past, present and reasonably foreseeable future development. Cumulative effects can be characterised according to the pathway they follow. One pathway could be the persistent additions from one process. Another pathway could be the compounding effect from one or more processes. Cumulative effects can therefore occur when impacts are:

- \* additive (incremental);
- \* interactive;
- \* sequential; or
- \* synergistic.

Canter and Sadler (1997) describe a three step process for addressing cumulative effects in an EIA:

- \* delineating potential sources of cumulative change (i.e. GIS to map the relevant wind energy facilities in close proximity to one another.
- \* identifying the pathways of possible change (direct impacts)
- \* indirect, non-linear or synergistic processes; and
- \* Classification of resultant cumulative changes

**Potential Cumulative Impacts**

The potential **cumulative impacts** associated with the Kgabalatsane Solar Energy Facility at a site level are expected to be associated with the scale of

the project (i.e. 50MW in total export capacity and 100 hectares in total extent). The potential direct cumulative impacts associated with the project are expected to be associated predominantly with the potential ecology impact, and potential impacts on visual and social in the surrounding area. These cumulative effects can only be assessed once a preliminary layout is available, and will be considered in the detailed specialist studies to be undertaken in the EIA phase. At this stage, there are no known energy facilities near the Kgabalatsane Solar Facility.

- » *Ecology* –Although a solar energy facility generally results in permanent disturbance of 10% - 20% of a development site, any impacts on natural vegetation in this area are considered significant. However, it must be noted that this impact can be effectively avoided through the placement of infrastructure outside of natural vegetation and sensitive habitats.
- » *Visual impacts* –The most significant impact associated with the solar energy facility project and associated infrastructure is the visual impact imposed in this region.
- » *Social* – The development of the solar energy facility within the study area will have a cumulative impact on several existing issues within the area, predominately associated with the potential influx of workers and job seekers. With the increased population density, this may lead to a cumulative impact on housing requirements, services (i.e. water, electricity and sanitation), health issues, safety and security. New informal townships are unlikely to have the required infrastructure and services. With the existing rural settlements in the area this will have a cumulative impact on the environment and on human health (specifically in terms of sanitation services). The main social impact, however, will be in terms of visual impacts and associated impacts on sense of place.
- » *Positive impacts* - Cumulative positive impacts are, however, also anticipated. The development of renewable energy facility will have a positive impact at a national and international level through the generation of “green energy” which would lessen South Africa’s dependency on coal generated energy and the impact of such energy sources on the biophysical environment. The proposed project would fit in with the government’s aim to implement renewable energy projects as part of the country’s energy generation mix over the next 20 years, as detailed in the Integrated Resource Plan (IRP).

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

- » Each specialist study within the EIA Phase of the project will consider and assess the cumulative impacts associated with each aspect of the environment.

## CONCLUSIONS

## CHAPTER 6

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with an export capacity of up to 50MW on a site located approximately 18 km north-east of Brits in the North West Province. The project is known as the **Kgabalatsane Solar Energy Facility**.

The Draft Scoping Report for the proposed Kgabalatsane PV Solar Energy Facility has been prepared 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 Draft 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 Draft 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 Solar Energy Facility**

The Kgabalatsane Solar Energy Facility and associated infrastructure is proposed on a portion of the farm Syferfontein 430 which is located approximately 18 km north-east of Brits in the North West Province. The site for development covers an area of approximately 100 hectares.

The facility is proposed to have an export capacity of up to 50MW. The facility will comprise the following infrastructure:

- » Photovoltaic **(PV) panels**
- » Proposed on-site substation to evacuate the power from the facility via a new 132kV power line into the Garankuwa substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be evacuated via the new onsite substation via a loop in loop out to the existing power line which is approximately 3km from the onsite substation.
- » Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels.
- » Cabling between the project components, to be laid underground where practical.
- » Internal access roads and fencing.
- » 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 Tables 6.1, 6.2 and 6.3.



**Table 6.1:** Summary of potential impacts associated with the construction of the proposed Kgabalatsane PV solar energy facility development

<b>Construction / Decommissioning Impacts</b>	<b>Extent</b>
Vegetation and listed plant species	L
Spread of declared weeds and alien invasive species	L
Re-establishment of natural vegetation	L
Faunal Impacts	L
Impacts on Critical Biodiversity Areas and Loss of Landscape Connectivity	L
Loss of arable land	L
Interference with agricultural important infrastructure, i.e. (i.e. silos, irrigation lines, pivot points, channels and feeding structures, etc.) or any conservation works (i.e. contour banks, waterways, etc.)	L
Soil degradation due to contamination	L
Soil erosion due to increased and concentrated storm water run-off	L
Soil erosion due to trampling by vehicles and equipment, as well as construction activities	L
Siltation of watercourses and other natural resources downstream as a result of improper storm water management and soil erosion due to increased and concentrated water run-off	R
Dust production	L
Loss or destruction of Archaeological sites	L
Historical (Including middens, structural remains and cultural landscape)	L
Burials and Cemeteries (Graves and informal cemeteries can be expected anywhere on the landscape.)	L
Palaeontological	L
Visual impacts	R
Temporary job creation during construction phase.	L-R
Economic spin-offs to local community.	L
Influx of people into the study areas including members of the construction crews and job seekers	L
Skills development	L-R
Security issues	L
Disturbance of surrounding landowners	L

**Table 6.2:** Summary of potential impacts associated with the operation of the proposed Kgabalatsane PV solar energy facility development

Operational Impacts	Extent
Re-establishment of natural vegetation	L
Spread of declared weeds and alien invasive species	L-R
Re-colonisation of habitats	L
Long term loss of arable land	L
Soil erosion	L
The visibility of the facility to, and potential visual impact on, observers travelling along major roads in the area (predominantly the major secondary roads) and impact on the larger built-up centres or populated places.	L
The potential visual impact of the construction of ancillary infrastructure	L-R
The potential visual impact of operational, safety and security lighting of the facility at night on observers residing in close proximity of the facility.	L
The visual absorption capacity of the natural vegetation (if applicable).	L
Employment opportunities	L-R
Contribution of clean energy	N

**Table 6.3:** Summary of potential impacts associated with the Power Line associated infrastructures for the Kgabalatsane PV solar energy facility development

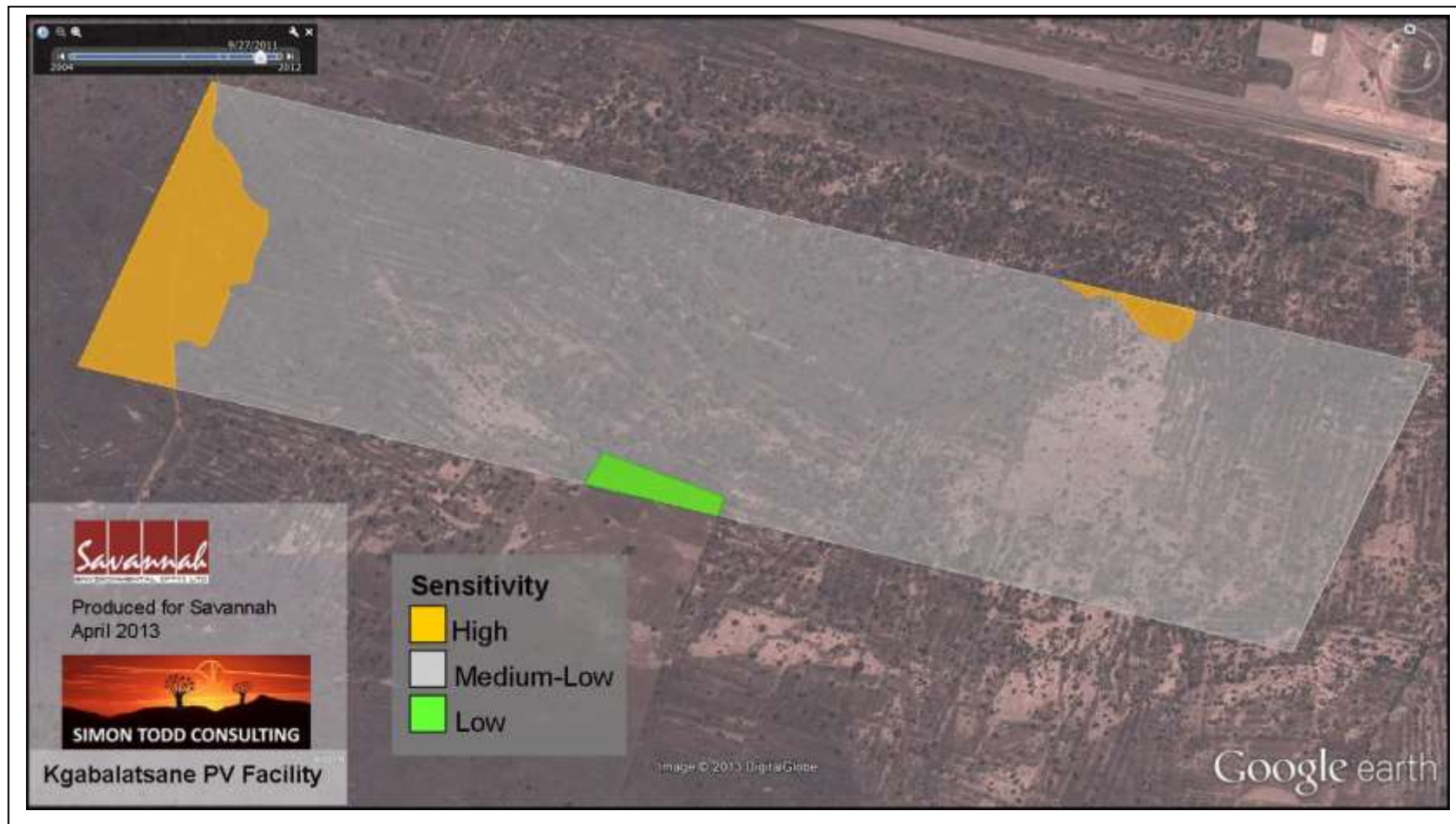
Operational Impacts	Extent
Negative impact on vegetation and soil structure during construction of the power line and associated access roads.	L
Disturbance (intrusion impacts) to residents / farmers living in close proximity to where the power line is being constructed.	L
Ecology degradation	L
Operational impact: Bird mortality due to the power line collisions and electrocutions	L-R

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

As can be seen from the table above, 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 regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa).

Areas of potential environmental sensitivity were identified through the scoping phase. These include areas within the site that has two areas classified as High Sensitivity for ecology: a large area in the west on deep sands, which does not appear to have been cultivated and a small area in the north east which has a high density of trees, and the visibility within a 2km radius of the facility of the proposed development site. The proposed property has been cultivated in the past.

The site lies within a Critical Biodiversity Area (CBA) and the development is not considered compatible with the desired land use or the goal of biodiversity maintenance within the CBA. The CBA is present on account of the fact the Marikana Thornveld vegetation type is classified as Vulnerable by the National List of the Threatened Ecosystems. However, as the site appears to have been impacted in the past the actual biodiversity value of the site is likely to be low and the development of the site would not significantly impact the ecological functioning of the CBA or result in the further loss transformation of the Marikana Thornveld vegetation type. The extent of degradation and residual ecological value of the area will need to be evaluated during the EIA phase to gauge the potential impact on the CBA status of the area.



**Figure 6.1:** Desktop Environmental Sensitivity Map of the proposed Kgabalatsane Solar Energy Facility for ecology sensitivity areas.

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

» **Vegetation**

The majority of the site appears to have been cultivated in the past and is classified as being of Medium-Low sensitivity. There is a small area which is recently cultivated and which is classified as Low sensitivity. There are two areas classified as High Sensitivity which should be avoided, i.e.: a large area in the west on deep sands, which does not appear to have been cultivated and a small area in the north east which has a high density of trees. The sensitivity of these areas as well as the rest of the site will need to be validated in the field and the different plant communities present at the site identified and described. At this stage, based on the available information, there do not appear to be any issues present which might prevent the development from proceeding.

The site lies within a Critical Biodiversity Area (CBA) and the development is not considered compatible with the desired land use or the goal of biodiversity maintenance within the CBA. The impacted nature of the site and the proximity of the site to the Odi airport is likely to ensure that this impact is not of high significance.

The other sensitive environmental features that have not been mapped include:

» **Visual**

The theoretical visibility within a 2km radius of the facility includes mainly vacant land and sections of the Kgabalatsane residential area (to the north) and the *informal* residential area located east of the site.

Visibility between the 2-4km radii includes sections of Kgabalatsane and Rebokala, and sections of the local road connecting these towns. The built-up nature of these areas and the occurrence of built structures and associated visual clutter are expected to virtually nullify the potential visual exposure, or at the very least restrict it to the outlying areas of these towns

» **Agricultural Potential**

If the development proceeds, there will be no soil available to cultivate. The soils of most of the site have a moderate to high potential, but there is little or no current agriculture being practiced anywhere in the vicinity. Although the placement of infrastructure would mean that the site would not be useable for arable agriculture, it is possible that grazing of livestock between the solar panels would be possible. At the end of the project life, it is anticipated that removal of the structures (and foundations) would enable the land to be returned to more or less a natural state

following rehabilitation, with little impact, especially given the inherent stability of the soils occurring.

» **Heritage:**

There is a low – medium likelihood of finding Middle Stone Age artefacts scattered over the study area; these sites are mostly out of context and of low - medium archaeological significance.

This preliminary sensitivity analysis of the site should be considered by Built Environment Africa Energy Services (Pty) Ltd 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 Draft Scoping Report.

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 does not represent no-go areas but rather 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.

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

In order to connect the Kgalabatsane solar energy facility to the power grid, a new on-site substation to evacuate the power from the facility via a 132kV power line into the Eskom grid is proposed. This power line is approximately 16km in length.

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

## **PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT**

## **CHAPTER 7**

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This Draft Scoping Report includes a detailed description of the nature and extent of the proposed Kgabalatsane solar energy facility with details regarding the Scoping Study undertaken, as well as the issues identified and evaluated through the Scoping Study (to date). This provides the context for a Plan of Study for Environmental Impact Assessment (EIA), which is outlined within this chapter of the report.

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

### **7.1. Aims of the EIA Phase**

The EIA Phase will aim to achieve the following:

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

### **7.2. Authority Consultation**

Consultation with the regulating authorities (i.e. DEA and North West Department of Economic Development, Environment, Conservation and Tourism) has been undertaken and will continue throughout the EIA process. On-going consultation and input from DEA

North West Department of Economic Development, Environment, Conservation and Tourism will include the following:

- » Submission of a Final Scoping Report following a 30-day public review period of this draft scoping report (and consideration of comments received).
- » Submission of a Final EIA Report following a 30-day public review period of the draft EIA Report.
- » A consultation meeting and site visit with DEA and North West Department of Economic Development, Environment, Conservation and Tourism 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:** Kgalabatsane Solar Energy (Pty) Ltd does not establish the proposed PV Solar Energy Facility on the farm Syferfontein 430.
- » **Layout/design alternatives:** in terms of the design of the facility, particularly the layout of the PV panels and corridors/servitudes for associated infrastructure such as the access roads and power line.
- » **Alternative technology combinations:** The facility is proposed to consist of Photovoltaic **(PV) panels** with an export capacity of up to 50MW. CSP technology was initially considered as an option for the site. However, it was confirmed through the initial technical feasibility investigations that insufficient water is available in the study area for this technology.

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

A summary of the issues which require further investigation within the EIA phase for the Kgalabatsane PV facility, as well as the proposed activities to be undertaken in order to assess the significance of these potential impacts is provided within Table 7.1. The specialists involved in the EIA Phase are also reflected in Table 7.1. These specialist studies will consider the site proposed for the development of the Kgalabatsane PV facility and all associated infrastructure (including alternatives with regards to design, layout and technology), as well as the alternative alignments of the proposed power line and access roads.



**Table 7.1:** Issues requiring further investigation during the EIA Phase and activities to be undertaken in order to assess the significance of these potential impacts

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Ecology, flora and fauna	<p>The current study is restricted to a desktop assessment and fieldwork during the EIA phase will be an important activity required to validate and refine the findings of this report. This will include the following studies and activities:</p> <ul style="list-style-type: none"> <li>» Ground-truth and refine the ecological sensitivity map of the site. Particular attention will be paid to areas that do not appear to have been impacted in the past and which may serve as reservoirs and source areas for biodiversity within the landscape.</li> <li>» Identify and map the presence of any unique and special habitats at the site such as drainage lines.</li> <li>» Locate, identify and map the location of significant populations of species of conservation concern, so that the final development footprint can be adjusted so as to avoid and reduce the impact on such species.</li> <li>» Evaluate the likely presence of listed faunal species at the site and identify associated habitats that should be avoided to prevent impact to such species.</li> <li>» Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.</li> <li>» Assess the impacts identified in above in light of the site-specific findings and the final layout to be provided by the developer.</li> </ul>	Simon Todd of Simon Todd Consulting
Soils and Agricultural Potential	<p>The following on-site assessments will be done during the EIA phase to verify the soils and land-use on the site:</p> <ul style="list-style-type: none"> <li>» Land capability, current land-use and degradation status of the agricultural resources (i.e. soil and vegetation)</li> <li>» Soils, with special reference to sensitivity to erosion and factors contributing to erosion (i.e. slopes, etc.)</li> <li>» Climate</li> <li>»</li> </ul>	Garry Paterson of ARC ISCW
Heritage Impacts	In order to comply with the requirements of the National Heritage Resources Act (Act 25 of 1999),	Jaco van der Walt of

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>a Phase 1 Archaeological Impact Assessment must be undertaken. During this study, sites of archaeological, historical or places of cultural interest within the development area must be located, identified, recorded, photographed and described. During this study the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met.</p>	<p>Heritage Contracts and Archaeological Consulting CC</p>
<p>Palaeontology Impacts</p>	<p>Any mining, construction or servitude operations for this site would not impact on the fossil record of South Africa.</p> <p>No further studies are required.</p>	<p>Marion Bamford</p>
<p>Visual Impacts</p>	<p><b>Determine Visual Distance/Observer Proximity to the facility</b></p> <p>In order to refine the visual exposure of the facility on surrounding areas / receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the PV facility and associated infrastructure.</p> <p>Proximity radii for the proposed development site are created in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structures in relation to their environment.</p> <p>MetroGIS determined the proximity radii based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure). MetroGIS developed this methodology in the absence of any known and/or acceptable standards for South African solar energy facilities.</p> <p>The proximity radii (calculated from the boundary lines of the PV facility) are as follows:</p> <ul style="list-style-type: none"> <li>○ 0 – 2km. Short distance view where the facility would dominate the frame of vision and constitute a very high visual prominence.</li> <li>○ 2 - 4km. Medium distance view where the structures would be easily and comfortably</li> </ul>	<p>Lourens du Plessis of MetroGIS</p>

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>visible and constitute a high visual prominence.</p> <ul style="list-style-type: none"> <li>○ 4 - 8km. Longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.</li> <li>○ Greater than 8km. Very long distance view of the facility where the facility could potentially still be visible, though not as easily recognisable. This zone constitutes a low visual prominence for the facility.</li> </ul> <p>The following activities will be undertaken as part of the visual impact assessment:</p> <p><b>Determine Viewer Incidence/Viewer Perception</b></p> <p>The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all the observers, then the visual impact would be positive.</p> <p>It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure.</p> <p>It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.</p> <p><b>Determine the Visual Absorption Capacity of the landscape</b></p> <p>This is the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed facility. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation</p>	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	<p>will have a low VAC.</p> <p>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. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.</p> <p>The VAC also generally increases with distance, where discernable detail in visual characteristics of both environment and structure decreases.</p> <p>The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate the potential visual absorption capacity (VAC) of the region. It is therefore necessary to determine the VAC by means of the interpretation of the natural visual characteristics, supplemented with field observations.</p> <p><b>Determine the Visual Impact Index</b></p> <p>The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact.</p> <p>The above exercise should be undertaken for the core solar energy facility as well as the ancillary infrastructure, as these structures (e.g. the substation and power line) are envisaged to have varying levels of visual impact at a more localised scale.</p> <p>The site-specific issues (as mentioned earlier in the report) 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, as well as suggested mitigation measures.</p>	

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Social Impacts	<p>The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs adopted by DEA&amp;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:</p> <ul style="list-style-type: none"> <li>» Review of existing project information, including the Planning and Scoping Documents;</li> <li>» Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);</li> <li>» 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.;</li> <li>» Identification and assessment of the key social issues and opportunities;</li> <li>» Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimization and management measures to be implemented.</li> <li>» Finalisation of SIA Report.</li> </ul> <p>Tasks to be undertaken within the SIA will include:</p> <ul style="list-style-type: none"> <li>» Identification of key interested and affected parties, specifically landowners.</li> <li>» Meetings and interviews with interested and affected parties.</li> <li>» Identification and assessment of key social issues based on feedback from key interested and affected parties.</li> <li>» Recommendations regarding mitigation/optimisation and management measures to be implemented as part of the EMP.</li> </ul>	Tony Barbour of Tony Barbour Consulting

## 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**.
- » Specialist reports as supporting appendices to the report.

The Draft EIA Report will be made available for a 30-day public review period. The comments received from I&APs will be captured within a Comments and Response Report, which will be included within the Final EIA Report, for submission to the authorities for decision-making.

## 7.6. Public Participation Process

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



- » Focus group or public meetings (pre-arranged and stakeholders invited to attend).
- » 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 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.

### 7.7. 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.

<b>Key Milestone Activities</b>	<b>Proposed timeframe<sup>4</sup></b>
Public review period for Draft Scoping Report	June 2013-July 2013
Finalisation of Scoping Report & submission to DEA	August 2013
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	September 2013
Undertake specialist studies and public participation process	September - October 2013
Make Draft EIA Report and Draft EMP available to the public, stakeholders and authorities	November 2013
Finalisation of EIA Report	December 2013
Submit Final EIA Report to DEA for review and decision-making	December 2013 – March 2014

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<sup>4</sup> Indicative dates only