ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT ENVIRONMENTAL IMPACT REPORT

PROPOSED KGABALATSANE SOLAR ENERGY FACILITY, NORTH WEST PROVINCE
DEA Ref. No: 14/12/16/3/3/2/510

DRAFT FOR PUBLIC REVIEW
28 May 2014 -27 June 2014

Prepared for:

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PROJECT DETAILS

DEA Reference No.	:	14/12/16/3/3/2/510
Title	:	Environmental Impact Assessment Process Draft Environmental Impact Assessment Report: Proposed Kgabalatsane Solar Energy Facility, North West Province
Authors	:	Savannah Environmental (Pty) Ltd Umeshree Naicker Jo-Anne Thomas
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Client	:	Built Environment Africa Energy Services (Pty) Ltd
Report Status	:	Draft Environmental Impact Assessment Report for public review
Review Period	:	28 May 2014 - 27 June 2014

When used as a reference this report should be cited as: Savannah Environmental (2014) Draft Environmental Management Programme: Proposed Kgabalatsane Solar Energy Facility, North West Province for Built Environment Africa Energy Services (Pty) Ltd.

PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with an export capacity of up to 55MW, as well as associated infrastructure on a site located approximately 18 km north-east of Brits in the North West Province. 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 the Kgabalatsane settlement and 3km west of the township of Garankuwa within the Madibeng Local Municipality, in the North West Province.

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

The Draft EIA Report consists of eight sections:

Chapter 1: Provides background to the proposed facility and the environmental impact assessment.

Chapter 2: Provides a description of the proposed project and infrastructure.

Chapter 3: Provides an overview of the regulatory and legal context for electricity generation projects and the EIA process.

Chapter 4: Outlines the process that was followed during the EIA Phase, including the consultation process that was undertaken and input received from interested parties.

Chapter 5: Describes the existing biophysical and socio-economic environment.

Chapter 6: Presents the assessment of environmental impacts associated with the proposed facility and associated infrastructure.

Chapter 7: Presents the cumulative impacts of development of the proposed Kgabalatsane Solar Energy Facility.

Chapter 8: Presents the conclusions of the EIA, as well as an environmental impact statement on the proposed project.

Chapter 9: Provides a list of references and information sources used in undertaking the studies for this EIA Report.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses 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 EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of a draft EIA 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 EIA 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.

INVITATION TO COMMENT ON THE DRAFT EIA REPORT

Members of the public, local communities and stakeholders are invited to comment on the draft EIA Report which has been made available for public review and comment at the following locations **28 May 2014- 27 June 2014.**

- Kgabalatsane Community Hall
- Madibeng Local Municipality
- www.SavannahSA.com

Please submit your comments to
Gabriele Wood of Savannah Environmental (Pty) Ltd PO Box 148, Sunninghill,2157, Gauteng Tel: 011 656 3237 Fax: 086 684 0547 E-mail: gabriele@savannahsa.com
The due date for comments on the Draft EIA Report is **27 June 2014**

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

EXECUTIVE SUMMARY

Built Environment Africa Energy Services (Pty) Ltd is proposing to establish a commercial photovoltaic solar energy facility with an export capacity of up to 55MW, as well as associated infrastructure on a site located approximately 18 km north-east of Brits in the North West Province.

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 the Kgabalatsane settlement and 3km west of the township of Garankuwa within the Madibeng Local Municipality, in the North West Province (refer to Figure 1.1).
The project will be known as the Kgabalatsane Solar Energy Facility

The solar energy facility proposes to generate up to 55 MW of electricity and will be comprised of the following infrastructure:

» Photovoltaic **(PV) panels**
» An on-site substation to evacuate the power from the facility via a new 132kV overhead power line into the Garankuwa Substation. The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via a loop-in loop-out connection to the existing power line which is approximately 3km from the on-site 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 nature and extent of this facility, as well as potential environmental impacts associated with the construction and operation of a facility of this nature are explored in more detail in this Environmental Impact Assessment (EIA) Report

In summary, the following conclusions have been drawn from the specialist studies undertaken (refer to **Figure 2** for the sensitivity map):

» The only area at the site which is considered to be of higher sensitivity is along the western margin of the site where there is a less disturbed area which may also have been disturbed in the past but retains a greater degree of structural integrity that the rest of the site. Due to the Vulnerable status of Marikana Thornveld, this area should be avoided. Although there are a number of plant species of conservation concern known from the area, none of these were observed at the site and it is highly unlikely that any of these species are present. There are however a number of protected

tree species present including Marula Sclerocarya birrea. The density of these species within the site is however low and it is not likely that the development would compromise the local populations of any of these species.

» 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. Visual impacts of the solar energy facility on sensitive visual receptors within a 2km radius of the site (i.e. residents on the outskirts of Kgabalatsane and the informal settlement to the east of the site) are expected to be of moderate significance.

OVERALL CONCLUSION (IMPACT STATEMENT)

Global climate change is widely recognised as being one of the greatest environmental challenges facing the world today. How a country sources its energy plays a big part in tackling climate change. As a net off-setter of carbon, renewable energy technologies can assist in reducing carbon emissions, and can play a big part in ensuring security of energy supply, as other sources of energy are depleted or become less accessible. South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result, South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer of carbon emissions. With the aim of reducing South Africa's dependency on coal generated energy, and to address climate change concerns, the South African Government has set a target, through the Integrated Resource Plan (IRP) for electricity to develop 17.8 GW of renewables (including 8,4GW solar) within the period
2010 – 2030.

The technical viability of establishing a solar energy facility with an export capacity of 55 MW on the farm Syferfontein 430 has been established by Built Environment Africa Energy Services (Pty) Ltd. The positive implications of establishing a solar energy facility on the identified site within the North West include the following:

» The potential to harness and utilise solar energy resources within the North West Province
» The project would assist the South African government in reaching their set targets for renewable energy.
» The project would assist the South African government in the implementation of its green growth strategy and job creation targets.
» The project would assist the district and local municipalities in reducing level of unemployment

through the creation of jobs and supporting local business
» The National electricity grid in the North West Province would benefit from the additional generated power.
» Promotion of clean, renewable energy in South Africa
» Creation of local employment, business opportunities and skills development for the area.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **environmental fatal flaws i.e. high sensitive areas but do not prevent the project from proceeding with recommended mitigation**. The significance levels of the majority of identified negative impacts are high and can only be reduced by not impacting on the surrounding areas unnecessarily.

Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) included within **Appendix K**.

With reference to the information available at this planning approval stage in the project cycle, the **confidence** in the environmental assessment undertaken is regarded as **acceptable** provided all measures are taken to **protect and preserve** surrounding **vegetation**.

OVERALL RECOMMENDATION

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

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

» The draft Environmental Management Programme (EMPr) as contained within Appendix K of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed solar energy facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.

- Rehabilitate an acceptable vegetation layer according to rehabilitation recommendations of the relevant EMPr.
- The grid connection (Alternative 1 is the preferred alternative)
- All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
- Develop emergency maintenance operational plan to deal with any event of contamination, pollution, or spillages.
- Access roads to the development should follow existing tracks. Where new access routes will be necessary, suitable erosion control measures must be implemented.
- In terms of ancillary infrastructure, it is recommended that access roads and other on-site infrastructure be planned so that the clearing of vegetation is minimised.
- Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.
- An independent Environmental Control Officer (ECO) must be appointed by the project developer prior to the commencement of any authorised activities.
- Compile a comprehensive stormwater management method statement, as part of the final design of the project and implement during construction and operation.
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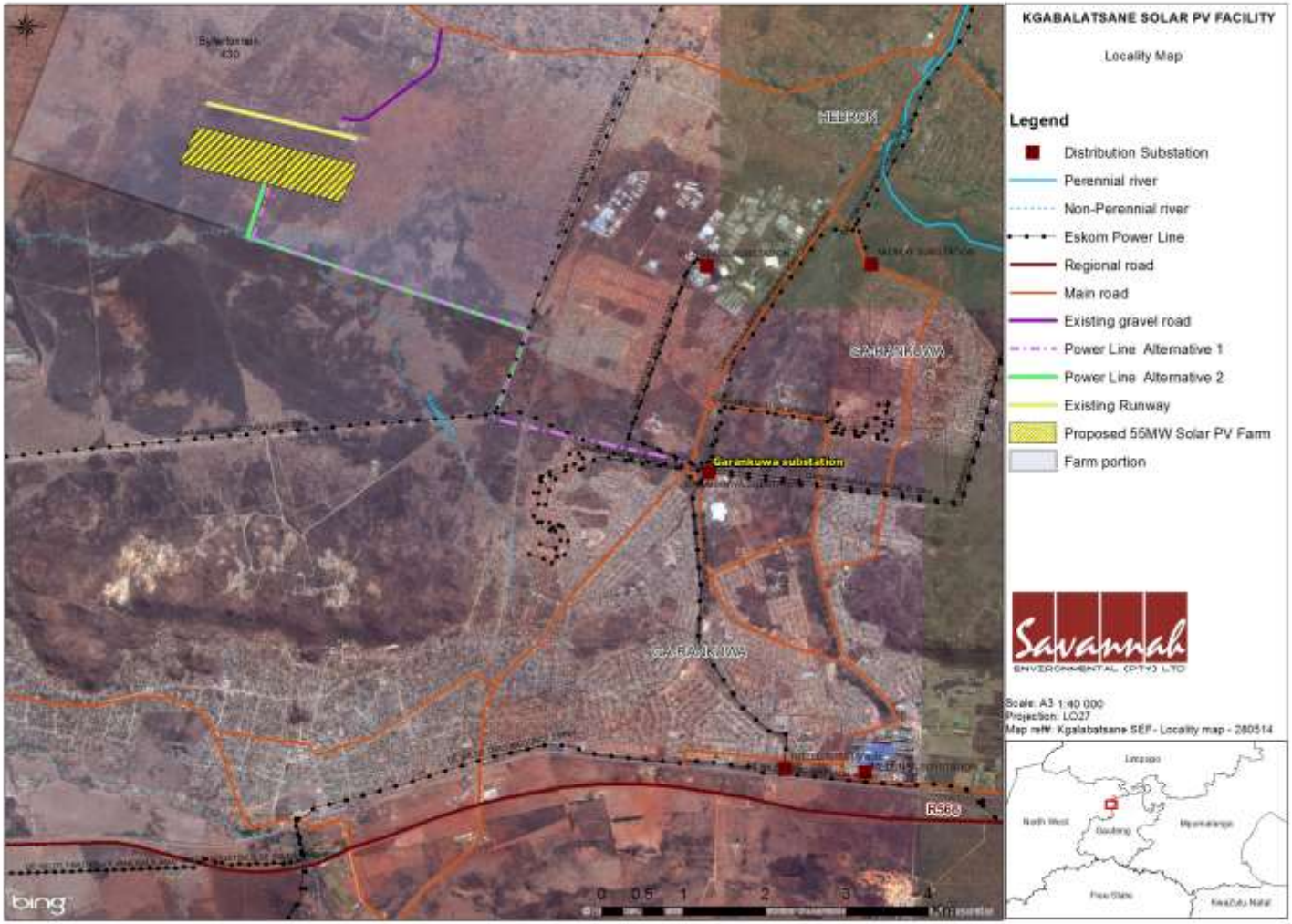

Figure 1: Locality Map of the proposed Kgabalatsane Solar Energy Facility

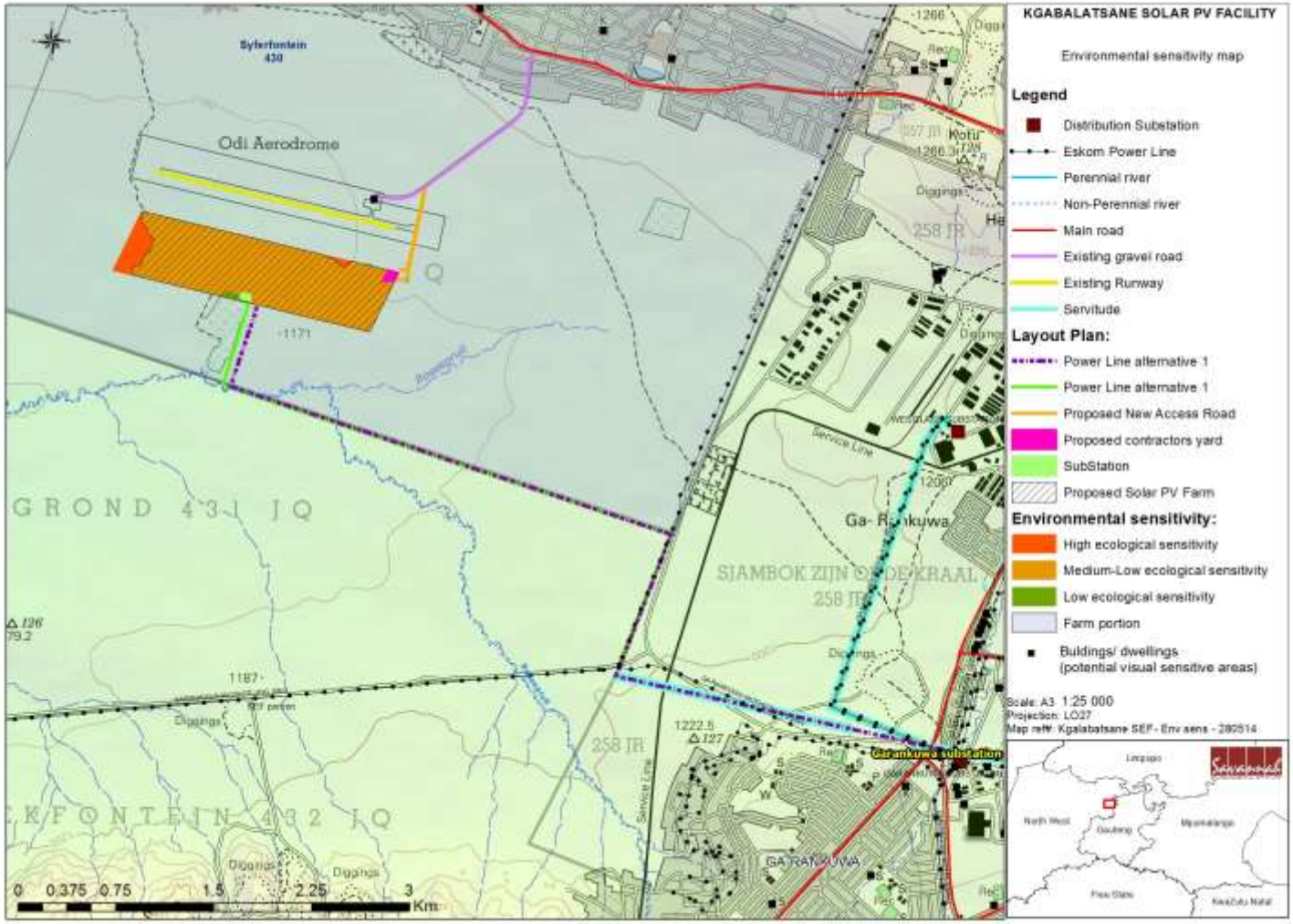

Figure 2: Environmental Sensitivity Map for the proposed Kgabalatsane Solar Energy Facility

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APPENDICES

DEFINITIONS AND TERMINOLOGY

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

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

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

Drainage line: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial, and riparian vegetation may or may not be present.

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

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

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

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

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

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

Perennial and non-perennial: Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.

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

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

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

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.

Water course: as per the National Water Act means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and

(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CO_2	Carbon dioxide
DEA	National Department of Environmental Affairs
DEADP	Department of Environment Affairs and Development Planning
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GHG	Green House Gases
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km^2	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
MAR	Mean Annual Rainfall
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NGOs	Non-Governmental Organisations
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

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 55MW, as well as associated infrastructure on a site located approximately 18 km north-east of Brits in the North West Province. 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 the Kgabalatsane settlement and 3km west of the township of Garankuwa within the Madibeng Local Municipality, in the North West Province (refer to Figure 1.1).

The proposed project development site is considered to be technically suitable and favourable by the developer for the construction of a solar PV facility from a technical perspective due to the following site characteristics:

» **Climatic conditions:** Climatic conditions determine the economic viability of a solar energy facility as it is directly dependent on the annual direct solar irradiation values for a particular area.
» **Topographic conditions:** The local site conditions are optimum for a development of this nature. For instance the site slope and aspect for the proposed site is predominantly flat. A level surface area (i.e. with a minimal gradient in the region of 1%) is preferred for the installation of PV panels.
» **Extent of the site:** Significant land area is required for the proposed development. The site is larger than the area required for development which allows for the avoidance of any identified environmental and/or technical constraints.
» **Proximity:** This site is located in close proximity to an existing electricity grid connection, which minimises the need for a long connection power line. This is preferred from an environmental and technical perspective.

The nature and extent of the Kgabalatsane Solar Energy Facility, as well as the potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this Draft EIA Report. The Draft EIA Report consists of nine chapters, which include:

Chapter 1: Provides background to the proposed facility and the environmental impact assessment.
Chapter 2: Provides a description of the proposed project and infrastructure.
Chapter 3: Provides an overview of the regulatory and legal context for electricity generation projects and the EIA process.
Chapter 4: Outlines the process which was followed during the EIA Phase, including the consultation process that was undertaken and input received from interested and affected parties.

Chapter 5: Describes the existing biophysical and socio-economic environment.

Chapter 6: Presents the assessment of environmental impacts associated with the proposed facility and associated infrastructure.

Chapter 7: Presents the cumulative impacts of development of the proposed Kgabalatsane Solar Energy Facility.

Chapter 8: Presents the conclusions of the EIA, as well as an environmental impact statement on the proposed project.

Chapter 9: Provides a list of references and information sources used in undertaking the studies for this EIA Report.

1.1. Summary of the proposed ddevelopment

The proposed facility is envisaged to make use of **photovoltaic (PV)** technology with a maximum total export capacity of **55 MW** and will include the following infrastructure:

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

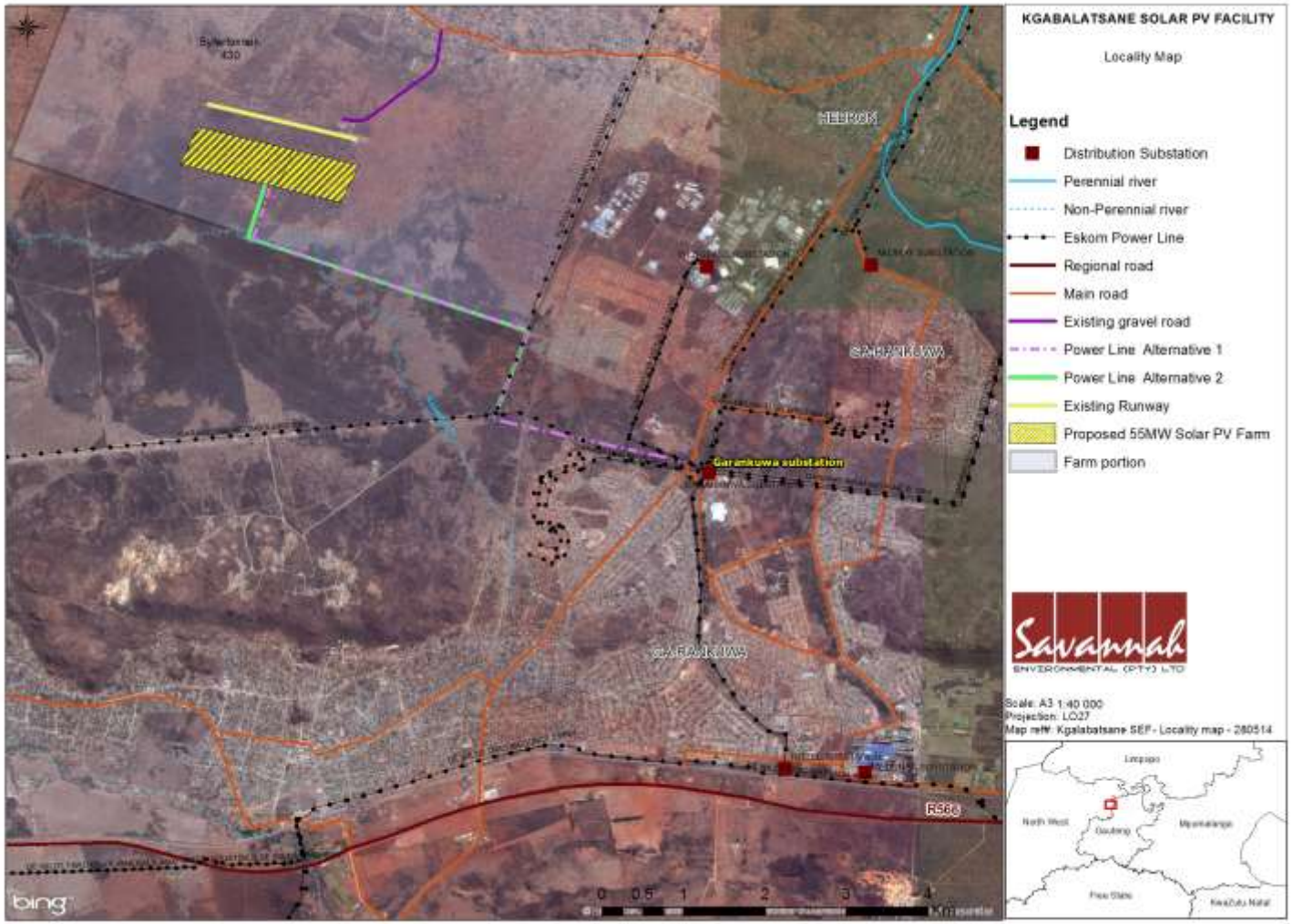


Figure 1.1: Locality map illustrating the location of the development site considered for the proposed Kgabalatsane Solar Energy Facility.

The overarching objective for the development of the Kgabalatsane 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 site-specific studies within this EIA Report in order to delineate areas of sensitivity within the broader site which will serve to inform the final 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.**

1.2. Conclusions from the Scoping Phase

The full extent of the project development site (i.e. the entire extent of the farm portion) was evaluated within the Scoping phase of the EIA process. The following sensitive environmental features were identified:

» 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.

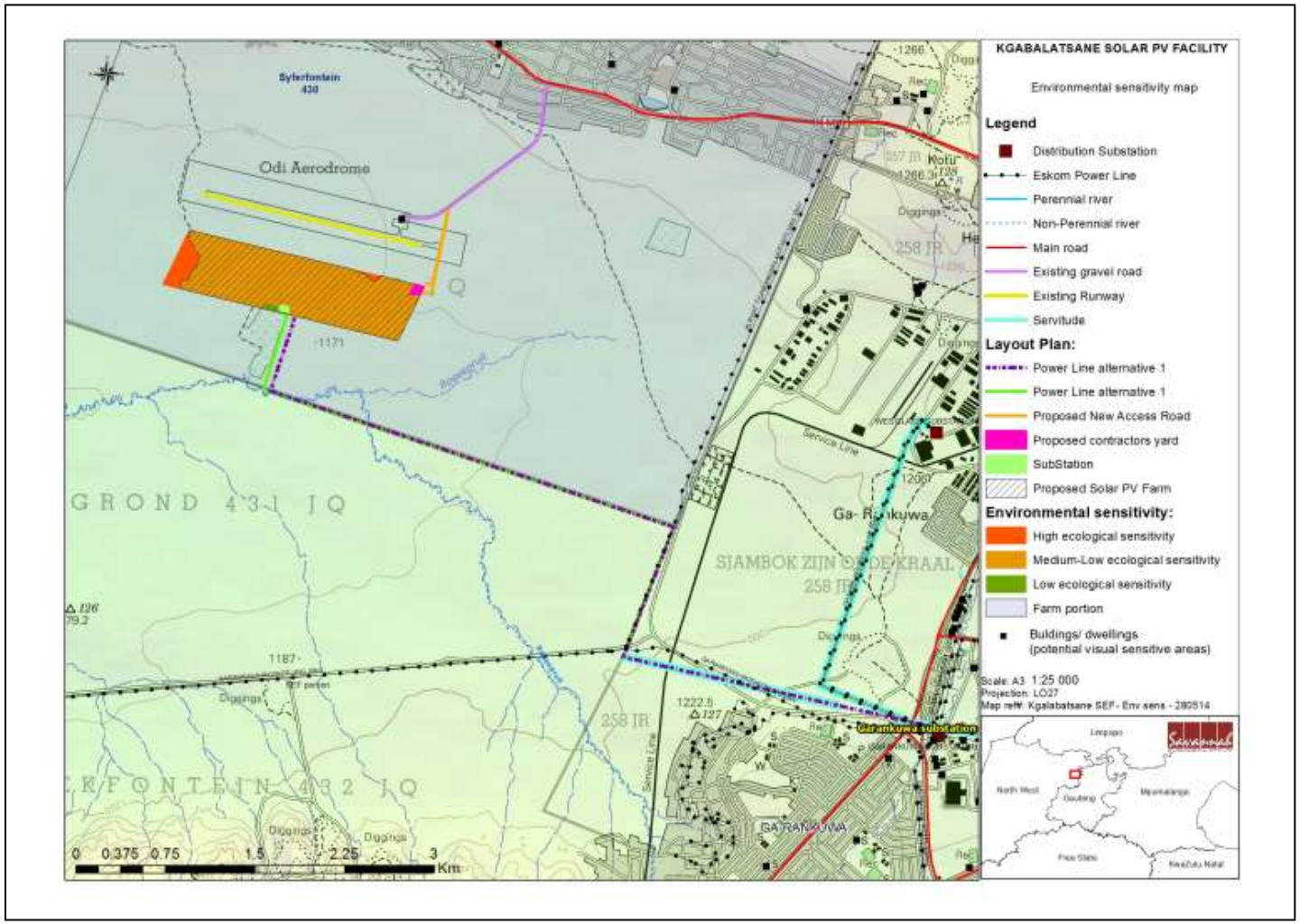


Figure 1.2: Sensitivity map for the proposed site.

Environmentally sensitive areas were identified within the farm earmarked for development of the proposed facility during the scoping phase of the EIA. It was recommended that infrastructure should be placed to avoid or minimise impacts to identified sensitive ecological areas as a mitigation measure. These areas of sensitivity relate only to the surface water areas and the presence of dolomite on the proposed site. Subsequently, the sensitive environmental features that were identified during the Scoping phase have been taken into consideration through the layout design of the solar energy facility by the developer. The proposed layout of infrastructure is discussed further in Chapter 2.

The potentially significant issues identified as being related to the construction of the Kgabalatsane Solar Energy Facility include:

» Loss of or disturbance to protected flora and fauna and associated habitats (local and site specific)
» Loss of soil and impacts on agricultural potential
» Soil erosion during construction activities
» Impacts on heritage artefacts
» Increase in traffic as a result of construction vehicles in the area
» Socio-economic impacts, both positive and negative (including job creation and business opportunities, impacts associated with construction workers in the area)

The potentially significant issues related to the **operation** of the Kgabalatsane Solar Energy Facility include:

» Visual impacts and impacts on "sense of place" on nearby residential areas and observers travelling on main roads
» Soil erosion during operation
» Generation of income for the Local Community: such as job opportunities, the REIPPP programme has a target that the applicant spend 2.1% of the company's revenue per annum on socio economic and local enterprise development initiatives. This will be for the full length of the project (minimum of 20 years). Therefore the local community may be granted the opportunity to improve their social and economic situation.
» Pressure on existing services infrastructure
» Positive socio-economic impacts as local labourers will have an opportunity to develop a skill. The local community will benefit from the increase in local enterprise opportunities.
» Generation of clean, renewable energy (positive)
» Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity

The potentially significant issues related to the decommissioning of the Kgabalatsane Solar Energy Facility will include:

» Soil erosion during decommissioning activities.
» Socio-economic impacts, both positive and negative (including job creation, nuisance impacts).

1.3. Requirement for an Environmental Impact Assessment Process

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

NEMA is the national legislation that provides for the authorisation of "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority 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 North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) will act as a commenting authority. An application for authorisation has been accepted by DEA for the proposed project under application reference number **14/12/16/3/3/2/510.**

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

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the developer with the opportunity of being fore-warned of

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

Table 1.1: Activities applied for to be authorised

Relevant Notice	Activity No.	Description of Listed Activity	Relevant Component(s) of Facility	Applicability of proposed project to listed activity
GN544, 18 June 2010	10 (i)	The construction of facilities or infrastructure for the transmission and distribution of electricity- (i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.	*The construction of a 132kV overhead power line from the solar facility to the Eskom electricity grid*	Grid connection infrastructure: There are two alternatives that have been assessed for the connection to the Eskom grid: An on-site substation to evacuate the power from the facility via a new 132kV overhead 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 loop-in loop loop-out connection to the existing power line which is approximately 3km from the on-site substation.
GN545, 18 June 2010	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.	*The PV facility will have an export capacity of up to 55MW.*	The proposed PV facility will have an export capacity 55 MW to be exported to the Eskom national grid.
GN545, 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total	*The PV facility will have a development footprint of more than 103 ha.*	The establishment of the proposed 55 MW facility will transform a portion of the farm (exceeding 20ha) from grazing to a PV facility.

Relevant Notice	Activity No.	Description of Listed Activity	Relevant Component(s) of Facility	Applicability of proposed project to listed activity
		area to be transformed is 20 hectares or more; Except where such physical alteration takes place for: (i) Linear development activities. (ii) Agriculture or afforestation where activity 16 in this schedule will apply.		
GN546, 18 June 2010	14	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, (i) All areas outside urban area	*The project will be taking place outside urban areas and 75% or more of the vegetative cover constitutes natural vegetation.*	The establishment of the proposed 55 MW facility and access roads will require the clearance of indigenous vegetation within the site.

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

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 55MW 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 has been authorised by DEA. Therefore the Draft EIA report assesses 55MW facility which also includes the 2X10MW facility.

1.4. Objectives of the EIA Process

The Scoping Phase was completed in February 2014 with the submission of a Final Scoping Report to DEA. The acceptance of scoping was received from DEA in March 2014. The scoping phase included desk-top studies and served to identify potential impacts associated with the proposed project and to define the extent of studies required within the EIA Phase. Input from the project proponent, specialists with experience in the study area and in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs) was included in the evaluation of impacts.

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

considered. The final EIA Report will incorporate all issues and responses raised during the public review phase prior to submission to DEA.

1.5. Details of the Environmental Assessment Practitioner

Savannah Environmental was contracted by Built Environment Africa Energy Services (Pty) Ltd as the independent consultant to undertake the EIA process for the proposed project. Neither Savannah Environmental nor any of its specialist sub-consultants are subsidiaries of or are affiliated to 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 consultancy which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team that has been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa and neighbouring countries. Strong competencies have been developed in project management of environmental processes, as well as strategic environmental assessment and compliance advice, and the assessment of environmental impacts, the identification of environmental management solutions and mitigation/risk minimising measures.

Savannah Environmental has developed a detailed understanding of impacts associated with the construction and operation of renewable energy facilities through their involvement in numerous EIA processes for these projects.

The Environmental Assessment Practitioners (EAPs) and public participation specialist from Savannah Environmental who are responsible for this project are:

» **Umeshree Naicker** - the principle author of this report, holds an Honours Bachelor of Science degree in Environmental Management and has 6 years experience in environmental management and has undertaken EIAs for a number of proposed solar energy facilities across South Africa.

» **Jo-Anne Thomas** is a registered Professional Natural Scientist and holds a Master of Science degree. She has 16 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

» **Gabriele Wood:** the public participation consultant for this project, hold an Honours Bachelor degree in Anthropology and has 6 years experience in Public Participation and Social consulting, including professional execution of public participation processes for a variety of projects as well as managing and co-ordinating public participation processes for Environmental Impact Assessments (EIA).

In order to adequately identify and assess potential environmental impacts associated with the proposed project, the following specialists were appointed to conduct specialist impact assessments:

» Ecology – Simon Todd of Simon Todd Consulting
» Soils and Agricultural Potential – Garry Patterson of ARC ISWC
» Heritage – Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC)
» Desktop Palaeontological Assessment – Marion Bamford of the University of Witwatersrand
» Visual – Lourens du Plessis of MetroGIS
» Social – Tony Barbour and Schalk van der Merwe (Tony Barbour Environmental Consultancy)

Refer to **Appendix A** for the curricula vitae for the EAPs from Savannah Environmental as well as the specialists.

DESCRIPTION OF THE PROPOSED PROJECT CHAPTER 2

This chapter provides an overview of the proposed Kgabalatsane Solar Energy Facility near Brits, North West Province. The project scope describes the scope of the project as well as activities proposed within the planning and design, construction, operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also describes the project alternatives considered, including the "Do-Nothing" alternative - that is the alternative of not establishing the solar energy facility on the proposed site.

2.1 Rationale for the Proposed Project

The Kgabalatsane Solar Energy Facility is proposed to be developed as a commercial power generation facility to add new capacity for generation of renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand) and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

Globally there is an increasing pressure on countries to increase their share of renewable energy generation due to concerns such as 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 in conventional power generation. 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, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP) 2010 and incorporated in the Renewable Energy Independent Power Producer Procurement (REIPPP)

Programme initiated by the DoE. The energy procured through this programme 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 target of 17,8GW of power from renewable energy amounts to ~42% of all new power generation being derived from renewable energy forms by 2030. It is the intention of Built Environment Africa Energy Services (Pty) Ltd that the proposed Kgabalatsane Solar Energy Facility will contribute towards this goal for renewable energy.

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 is proposing the establishment of the Kgabalatsane Solar Energy Facility to add new capacity to the national electricity grid through the Department of Energy's REIPPP Programme. Should the project be selected as a Preferred Bidder through this process, 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 (typically for a period of 20 – 25 years) in order to build and operate the proposed 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.

It is considered viable that long-term benefits for the community and/or society in general can be realised should the site identified prove to be acceptable from a technical and environmental perspective for the establishment of the proposed PV facility. The Kgabalatsane Solar Energy Facility has the potential to contribute to national electricity supply and to increase the security of supply to consumers.

2.1.1 The need and desirability of the proposed Kgabalatsane Solar project

The use of solar irradiation for electricity generation is essentially a non-consumptive use of a natural resource. A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies) as it meets all international requirements in this regard. The proposed site located on Syferfontein 430 was selected for the development of a solar energy facility based on its predicted climate (solar resource), suitable proximity in relation to the existing and available electricity grid, and minimum technical constraints from a construction and technical perspective. Built Environment Africa Energy Services (Pty) Ltd considers this area, and specifically the demarcated site on the farm

Syferfontein 430, to be highly preferred for the development of a solar energy facility as a result of:

» The agricultural potential of the site is very limited.
» The majority of the site appears to have been cultivated in the recent or more distant past and is classified as Medium-Low Sensitivity.
» The power can be readily evacuated to strengthen the local Eskom grid via Eskom's new Garankuwa Substation which is located approximately 16km east south west of the site.

The North West Province (NWP) has set ambitious targets of 15% renewables of total use by 2015, 30% by 2030, and 50% by 2050. The Renewable Energy Strategy (RES) for the NWP (2012) was specifically prepared by the DEDECT in order to increase the NWP's prospective stake in the commercial renewable energy sector. Key findings of the RES indicate that solar, and specifically solar PV (as is being proposed by Built Environment Africa Energy Services (Pty) Ltd) hold the greatest competitive potential for the NWP. The Madibeng LM area within which the site is located is identified as highly suitable for locating solar PV facilities.

2.2 Description of the Proposed Solar Energy Facility

The facility is proposed to accommodate static photovoltaic (PV) arrays, to harness the solar resource on the site. The facility is proposed to have an export capacity of up to 55MW. An area of less than 103 ha in extent will be occupied by the PV panels and associated infrastructure. A layout of the proposed Kgabalatsane Solar Energy Facility and associated infrastructure has been provided by the project developer, and is indicated in **Figure 2.1**. This is the layout which has been assessed within this EIA Report. **Table 2.1** summarises the dimensions of the project components.

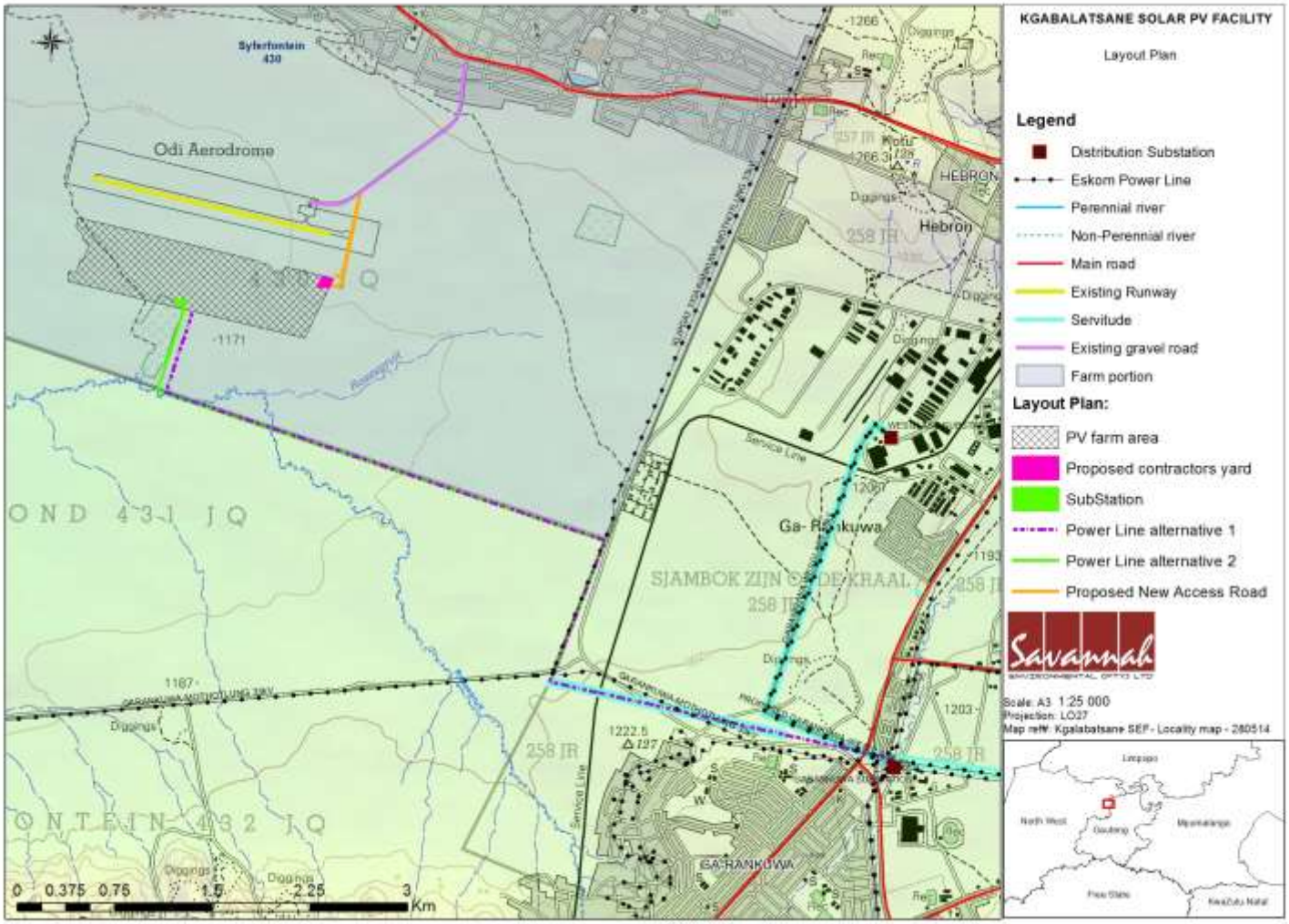


Figure 2.1: Layout for the proposed Kgabalatsane Solar Energy Facility and associated infrastructure.

Table 2.1: Technical details of the proposed facility

Component	Description/ Dimensions
Location of the site	Approximately 18 km north-east of Brits in the North West Province
Municipal Jurisdiction	» Madibeng Local Municipality » Bojanala Platinum District Municipality
Extent of the proposed development footprint	Approximately 103
Extent of broader site available for development	103ha
Site access	An access road from 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
Export capacity	55 MW
Proposed technology	Ground-mounted photovoltaic panels (fixed panel technology)
Cabling	Cabling between the project components is to be laid underground between 0.6 –1.2 meters deep, where feasible and practical.
Final Height of installed panels from ground level	up to 3m
Height of Buildings	» Maintenance building: 20m x 5m (2,5 m high) » Warehouse: 20mx10m (4m high)
Width and length of internal roads	Width: 1,8, length approximately 1km
Substation	A new 132 kV on-site substation (150m X 150m in extent) to evacuate the power from the facility into the Eskom grid
Power line connection (Grid connection)	» The proposed 132kV power line will be ~16km in length. Alternatively, the power would be excavated via a loop-in loop-out connection to the existing power line which is approximately 3km from the on-site substation.
Mounting Structure	Mounting structure to be either rammed steel piles or piles with pre-manufactured concrete footings to support the PV panels.

Component	Description/ Dimensions
Water requirements	Construction: 5 500 000 litres (100 000 litres/MW) Operation: 723 000 litres/annum

2.3 Solar Energy as a Power Generation Technology

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

The use of solar energy for electricity generation is a non-consumptive use of a natural resource and consumes no fuel for continuing operation. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially, and economically sustainable future. The challenge now is ensuring solar energy projects are able to meet all economic, social, and environmental sustainability criteria.

2.3.1 How do Grid Connected Photovoltaic Facilities Function?

Solar energy facilities convert solar energy to a useful form, such as electricity. Solar energy facilities produce an insignificant quantity of greenhouse gases over its lifecycle as compared to conventional coal-fired power stations. The operational phase of a solar facility does not produce carbon dioxide, sulphur dioxide, mercury, particulates, or any other type of air pollution, as do fossil fuel power generation technologies.

Globally, the solar PV market grew by 110% in 2008. Although South Africa has high levels of irradiation and could achieve between 4.5 kWh/m^2 and 6.55 kWh/m^2 from a solar PV panel, the installed capacity country-wide is currently only 12 MW, although there are a number of facilities currently under construction as part of the DoE REIPPP Programme.

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

» ***Photovoltaic Cells:*** An individual photovoltaic cell is made of silicone which acts as a semiconductor (refer to Figure 2.2). The cell absorbs solar radiation

which energises the electrons inside the cells and produces electricity. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. A single cell is sufficient to power a small device such as an emergency telephone, however to produce 55 MW of power, the proposed facility will require numerous cells arranged in multiples/arrays which will be fixed to a support structure.

Figure 2.2: Figures showing a typical PV cell and an array of PV panels (source: http://www.frv.com/multimedia-files/)

» ***Support Structure:*** In fixed mounted PV systems, the PV panels will be fixed to a support structure which will allow for them to be set at an angle so to receive the maximum amount of solar radiation (refer to Figure 2.3). The angle of the panels is dependent on the latitude of the proposed facility and may be adjusted to optimise for summer or winter solar radiation characteristics. The height of the PV arrays is expected to be up to 3 m.

2.4 Project Alternatives

In accordance with the requirements of the EIA Regulations[1], 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

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

2.4.1. Site Alternative

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 - space is a restraining factor for the development of a PV facility. An area of less than 103 ha will be utilised for a facility of up to 55 MW. The site has the required space to take into considerations the environmental sensitivities (buffers) identified in the environmental impact assessment phase.

Land availability and Site access - An access road from 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. An internal site road network to provide access to the solar field and associated infrastructure will also be required.

Climatic Conditions - the economic viability of a PV facility is directly dependent on the annual direct solar irradiation values. The site has been indicated as an area of high irradiation (approximately 2100 DNI; refer to Figure 2.3), which indicates that the regional location of the project is appropriate for a solar energy facility.

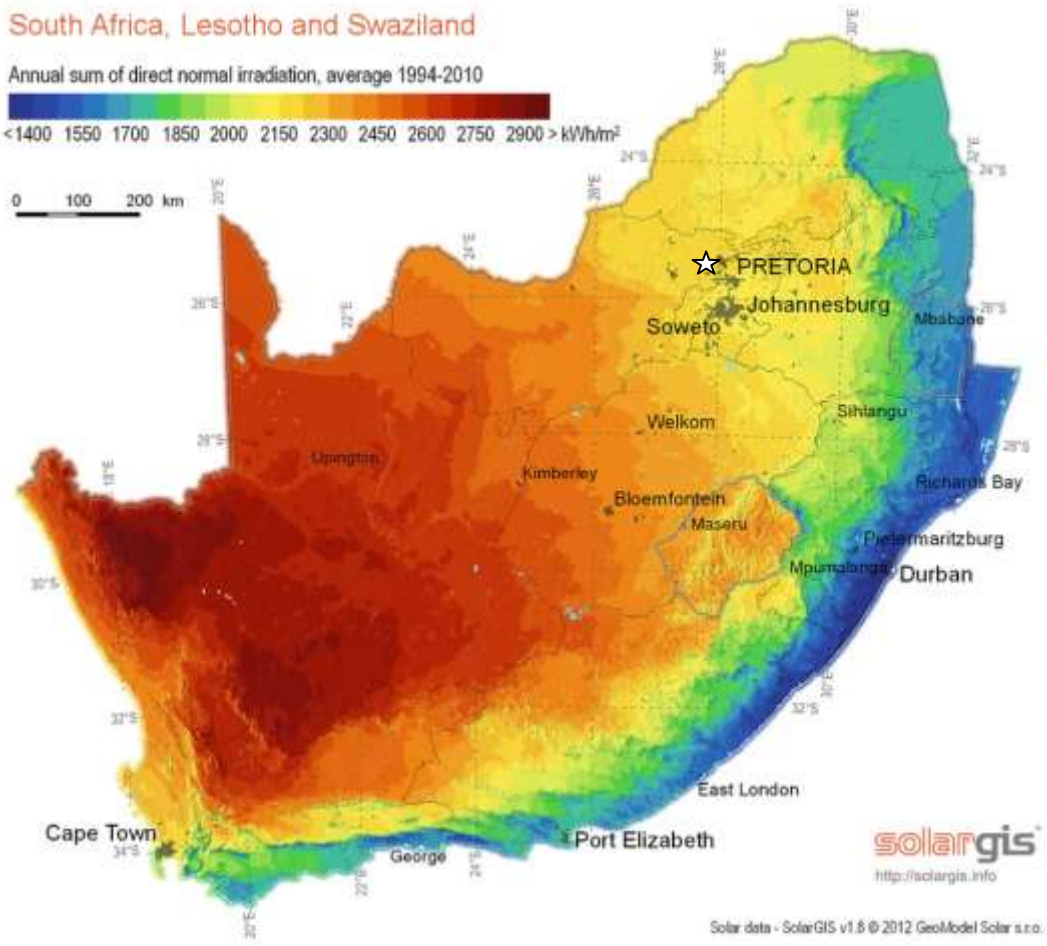


Figure 2.3: Solar irradiation map for South Africa (Source: adapted from SolarGIS). Location of the proposed site is indicated by the white star.

Gradient - a level surface area is preferred for the installation of PV panels. The slope of the proposed site is considered to be acceptable from a development perspective, which reduces the need for extensive earthworks and associated levelling activities, thereby minimising environmental impacts.

Grid Connection – 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 connection to the existing power line which is approximately 3km from the onsite substation.

Environmental sensitivity –The studies undertaken during this scoping phase indicated that 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. . The facility and associated infrastructure has been designed to avoid these sensitivities. The final facility layout will be designed to avoid the sensitivities that have been identified during the EIA phase of the process.

No technically feasible site alternatives have been identified for the proposed solar energy facility. Therefore, no alternative sites are considered within this EIA Report.

2.4.2. Project alternatives for the proposed Kgabalatsane Solar Energy Facility – Power line Alternatives

There are two alternatives that have been assessed for the connection to the Eskom grid:

a) A new 132kV power line into the Garankuwa Substation. The proposed 132kV power line will be ~16km in length.
b) The power would be excavated via a loop-in loop-out connection to the existing power line which is approximately 3km from the on-site substation.

The technically preferred alternative is the construction of a new 132kV power line into the Garankuwa Substation (which is approximately 16km) as Option 2 crosses a future mining area. Both power line alternatives are however assessed in the environmental impact assessment.

2.4.3. Layout Design Alternatives

The proposed Kgabalatsane PV facility is expected to have a development footprint of less than 103ha. The layout of the development area has taken into consideration the environmental sensitivities identified during the Scoping Phase. Therefore the facility and associated infrastructure (i.e. PV panels, internal roads, etc.) have been appropriately located to avoid sensitive areas within the broader study area.

The EIA Phase aims to confirm environmentally sensitive areas on the site which should be avoided by the proposed development as far as possible. These areas have been considered in greater detail than in the scoping study through site-specific specialist studies. The findings of these studies will be used to inform the final layout alternatives for the proposed development site and recommendations regarding a preferred alternative. Specific design alternatives will include *inter alia* the layout of the PV panels and the internal access roads.

2.4.4 Technology Alternatives

As it is the intention of Built Environment Africa Energy Services (Pty) Ltd to develop renewable energy projects as part of the DoE's REIPPP Programme, only renewable energy technologies are being considered. 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). PV is also preferred when compared to CSP technology because of the lower visual profile. This was confirmed during the scoping study through which the availability of water was identified as being a fatal flaw to the development of a CSP facility at this site.

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. There are a number of different solar PV technologies available, 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).

The choice of technology will affect environmental impacts of the proposed development as some technologies (such as tracking technology) require additional land when compared to others (such as fixed panel). The construction, operation and decommissioning activities associated with the facility will however be the same irrespective of the technology chosen.

Fixed Mounted PV System is considered as the preferred technology option for the proposed Kgabalatsane Solar Energy Facility. The preferred option has been influenced by financial, technical and environmental factors.

Fixed Mounted PV System

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

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

2.4.5. The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the proposed Kgabalatsane Solar Energy Facility. Should this alternative be selected, there would be no impacts on the site due to the construction and operation activities of the proposed solar energy facility. However, there will be impacts at a local and a broader scale. The study area has been grazed by cattle and other livestock for many years.

However, at a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the facility is only proposed to contribute 55 MW to the grid capacity, this would assist in meeting the growing electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy.

At a broader scale, the benefits of this solar energy facility would not be realised. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

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

- **Resource saving:** Conventional coal fired plants are major consumers of water during their requisite cooling processes. It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres, when compared with wet cooled conventional power stations. This translates into revenue savings of

R26.6 million. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.

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

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

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

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

» ***Employment creation:*** The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa.

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

» ***Support to a new industry sector:*** The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

The 'do nothing' alternative will not assist the South African government in addressing climate change, in reaching the set targets for renewable energy. South Africa currently relies on coal-powered energy to meet more than 90% of its energy

needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The No-Development option would represent a lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost. The 'do nothing alternative is assessed within this report.

2.5 Proposed Activities during the Project Development Stages

2.5.1 Construction Phase for the proposed solar energy facility

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

In order to construct the proposed project, a series of activities will need to be undertaken. The construction process is discussed in more detail below.

Conduct Surveys

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

Establishment of Access Roads to the Site

An access road from 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.

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.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation within the footprint of the PV arrays as well as within the footprint of other facility infrastructure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

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

Establishment of Laydown Areas on Site

Laydown and storage areas will be required for the typical construction equipment which will be required on site. The laydown area is proposed to be up to 20mx10m in extent.

Erect PV Panels and Construct Substation & Invertors

The PV cells will be arranged in arrays. The frames will be fixed onto the ground with the use of concrete, depending on the soil conditions at the site. This will make the installation of the plant less invasive for the territory and facilitate the decommissioning at the end of its production cycle. The height of the PV panel structure will be up to 3 m.

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

Figure 2.4: Frame, structural details (Courtesy of Igeam, 2011)

Figure 2.5 Mounting of the frame for the PV panels (Courtesy of Igeam, 2011)

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

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

Establishment of Ancillary Infrastructure

Ancillary infrastructure will include a workshop, storage areas, office and 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.

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.

2.5.2 Construction of the on-site substation and power line

The electricity generated at the facility will be evacuated to the Eskom grid via one of the following connections:

a) A new 132kV power line into the Garankuwa Substation. The proposed 132kV power line will be ~16km in length.
b) The power would be excavated via a loop-in loop-out connection to the existing power line which is approximately 3km from the on-site substation.

Proposed construction of the on-site substation
An on-site substation (and the associated power line) will be required to evacuate the power into the Eskom grid.

The area required for the on-site substation will be up to maximum of 150m x 150m in extent. A substation is constructed in the following simplified sequence:

Step 1: Survey the area
Step 2: Final design of the substation and placement of the infrastructure
Step 3: Vegetation clearance and construction of access roads (where required)
Step 4: Construction of foundations
Step 5: Assembly and erection of infrastructure on site
Step 6: Connect conductors
Step 7: Rehabilitation of disturbed area and protection of erosion sensitive areas

Proposed construction of the power line

A power line is constructed in the following simplified sequence:

Step 1: Survey of the route
Step 2: Selection of best-suited conductor, towers, insulators, foundations
Step 3: Final design of line and placement of towers
Step 4: Vegetation clearance and construction of access roads (where required)
Step 5: Tower pegging
Step 6: Construction of foundations
Step 7: Assembly and erection of towers on site
Step 8: Stringing of conductors
Step 9: Rehabilitation of disturbed area and protection of erosion sensitive areas

2.5.3 Operation Phase

The electricity that is generated from the PV panels will be stepped up through the on-site transformers at the on-site substation. This electricity will be fed into the electricity grid either via one of the grid connection options discussed above.

It is anticipated that a full-time security, maintenance and control room staff will be based on site. Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities.

An estimated 5 500 000 litres of water would be required for the construction of the PV facility plant. Water will be trucked from the nearest licenced water user, municipality or suitable borehole.

In addition to standard water use for an office and toilets, the PV panels may need to be cleaned. Six (6) cleaning events per year are estimated which should accommodate dust storm events and regular cleaning. For operations approximately 723 000 litres per annum (198 000 litres for washing and 525 000 litres for consumption) of water per annum is proposed to be trucked in from the nearest water source as per a water purchase agreement from a local authorised user. Depending on the quality of water, it is not expected that this water would need to be treated and thus this water will not accumulate any chemicals or hazardous materials and therefore is not regarded as waste water.

2.5.4 Decommissioning Phase

The operation phase of the project is expected to have a lifespan of more than 20 – 25 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 by undertaking the decommissioning activities described below.

Site Preparation

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

Disassemble and Remove Existing Components

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

REGULATORY AND LEGAL CONTEXT CHAPTER 3

3.1 Policy and Planning Context

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as solar energy facilities is illustrated in **Figure 3.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed Kgabalatsane Solar Energy Facility.

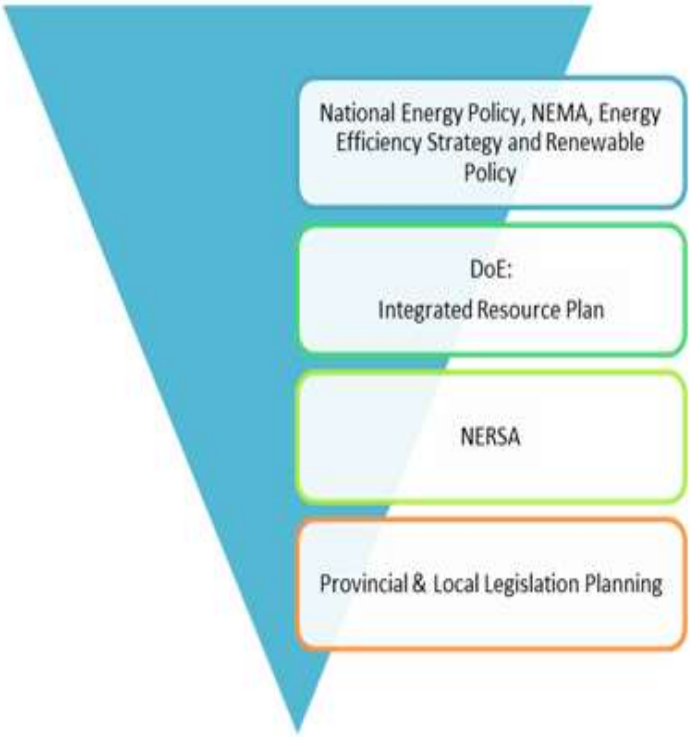


Figure 3.1: Hierarchy of electricity policy and planning documents

3.1.1 White Paper on the Energy Policy of South Africa

Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by the White Paper on Energy Policy for South Africa (December1998). In this regard the document notes: "Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential".

"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future". The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly ***solar*** and wind and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account. Government policy on renewable energy is thus concerned with meeting the following challenges:

» Ensuring that economically feasible technologies and applications are implemented;
» Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and,
» Addressing constraints on the development of the renewable industry.

The White Paper also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist. The White Paper also notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

» Minimal environmental impacts in operation in comparison with traditional supply technologies; and
» Generally lower running costs, and high labour intensities.

Disadvantages include:

» Higher capital costs in some cases;
» Lower energy densities; and
» Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.

The IRP 2010 also allocates 43% of new energy generation facilities in South Africa to renewables.

3.1.2 Renewable Energy Policy in South Africa, 1998

This White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This

Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.
The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[3], Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate.

South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act). Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels.

3.1.3 National Integrated Resource Plan, 2010 - 2030

The current iteration of the Integrated Resource Plan (IRP) for South Africa, initiated by the Department of Energy (DoE) after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6 GW; 6,3 GW of coal; 11,4 GW of renewables; and 11,0 GW of other generation sources.

[3] The **Kyoto Protocol** is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[1]The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (Wikipedia)

A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear units, which until then represented the costs of a traditional technology reactor and were too low for a newer technology reactor (a possible increase of 40%).

Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

» The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;
» To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
» The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and
» Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

	New build options							
	Coal (PF, FBC, imports, own build)	Nuclear	Import hydro	Gas – CCGT	Peak – OCGT	Wind	CSP	Solar PV
	MW	MW	MW	MW	MW	MW	MW	MW
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	300
2013	0	0	0	0	0	0	0	300
2014	500[1]	0	0	0	0	400	0	300
2015	500[1]	0	0	0	0	400	0	300
2016	0	0	0	0	0	400	100	300
2017	0	0	0	0	0	400	100	300
2018	0	0	0	0	0	400[4]	100[4]	300[4]
2019	250	0	0	237[3]	0	400[4]	100[4]	300[4]
2020	250	0	0	237[3]	0	400	100	300
2021	250	0	0	237[3]	0	400	100	300
2022	250	0	1 143[2]	0	805	400	100	300
2023	250	1 600	1 183[2]	0	805	400	100	300
2024	250	1 600	283[2]	0	0	800	100	300
2025	250	1 600	0	0	805	1 600	100	1 000
2026	1 000	1 600	0	0	0	400	0	500
2027	250	0	0	0	0	1 600	0	500
2028	1 000	1 600	0	474	690	0	0	500
2029	250	1 600	0	237	805	0	0	1 000
2030	1 000	0	0	948	0	0	0	1 000
Total	6 250	9 600	2 609	2 370	3 910	8 400	1 000	8 400

Firm commitment necessary now
Final commitment in IRP 2012

1. Built, owned & operated by IPPs 2. Commitment necessary due to required high-voltage infrastructure, which has long lead time 3. Commitment necessary due to required gas infrastructure, which has long lead time 4. Possibly required grid upgrade has long lead time and thus makes commitment to power capacity necessary

Figure 3.1 National Energy Development Commitments before the next IRP

Figure 3.1 above indicates the new capacities of the Policy commitment. The dates shown in Figure 3.1 indicate the latest that the capacity is required to be integrated into the grid in order to avoid security of supply concerns. The document notes that projects could be concluded earlier than indicated.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; **17,8 GW of renewables**; and 8,9 GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW. The key recommendations pertaining to PV solar energy contained in the IRP 2010 to 2013 (March 2011) include:

» Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment; and
» Solar PV 2016 to 2019: Grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed.

The Integrated Resource Plan (IRP) 2010-30 was promulgated in March 2011. It was indicated at the time that the IRP should be a "living plan" which would be revised by the Department of Energy (DoE) every two years. Since the promulgation of the Integrated Resource Plan (IRP) 2010-30 there have been a number of developments in the energy sector in South and Southern Africa. In addition the electricity demand outlook has changed markedly from that expected in 2010.

The Department of Energy have now completed an IRP 2010 Update (which was available for comments until 7 February 2014).

3.1.4 Electricity Regulation Act, 2006

Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of

Amendment, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by licence to Independent Power Producers (IPPs). NERSA has recently awarded electricity generation licences for new generation capacity projects under the IPP procurement programme.

3.1.5 National Development Plan

The National Planning Commission tasked with outlining a developmental growth vision and plan for the country during the course of 2011 released documents providing a diagnostic overview and vision statement/ plan. The National Development Plan (NDP) contains a plan aimed at eliminating poverty and reducing inequality by 2030, and provides that such should be the guiding objectives of the NDP over the next 20 years. While the Plan aims to address poverty and exclusion on the one hand, it simultaneously attempts to nurture economic growth by creating a virtuous cycle of expanding opportunities, building capabilities, poverty reduction, involving communities in their own development, all leading to rising living standards.

The NDP identifies 9 key challenges and associated remedial plans. While all nine challenges and plans are envisaged as part of integrated whole, the highest priorities are regarded as employment creation and improving the quality of national education. Managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

3.2 Provincial and Local Context

This section provides an overview of the policy and planning environment affecting the proposed Kgabalatsane Solar Energy Facility. The following policy and planning documents were reviewed at a provincial and local level:

- North West Province Growth and Development Strategy (2004-2014);
- Madibeng Local Municipality IDP 2012-2017;

The following policy and planning documents presents the key challenges and goals of the North West Province and Madibeng Local municipality.

3.2.1. North West Provincial Growth and Development Strategy (2004-2014).

The North West Province (NWP) Provincial Growth and Development Strategy (PGDS) was drafted in 2004 and aims to provide a framework for the 10 year

period up to 2014. The PGDS is aligned with amongst others, the United Nations endorsed Millennium Development Goals and Objectives 2015, and the 2003 National Spatial Perspective. The PGDS largely relies on Census 2001 for demographic and other statistical data, and is therefore relatively dated.

Key challenges and goals

The PGDS notes that the NWP is a medium-size province, covering ~10% of the total national surface area, accounting for ~ 8% of the national population, and contributing ~ 7% to the national economy. With the exception of the mining sector (~23.5% of provincial GDP in 2002), private sector activity in the NWP is very modest. Other development challenges include low population densities (largely rural province); inadequate infrastructure, and enormous service delivery backlogs; a predominantly poor population with high levels of illiteracy and dependency; great inequalities between rich and poor, and disparities between urban and rural; and the HIV/Aids pandemic.

Both the primary immediate and long term objectives of the PGDS are therefore to address poverty and unemployment, while simultaneously improving the low level of expertise and skills. Two primary (macro) goals are set:

- Economic goal: an average economic growth rate of 6.6% per year would be required to halve unemployment by 2014;
- Poverty eradication goal: to clear all service delivery backlogs by 2014.

Additional objectives include promoting equal and fair access to opportunities and assets; enhancing competitiveness, profitability and SMME development; and ensuring sustainable development through resource and environmental management in the NWP.

The proposed development will provide an opportunity to increase skills development and increase the economic growth. The proposed project will provide job and enterprise opportunities for the local municipality.

3.2.2 Madibeng Local Municipality IDP 2011-2016

An Integrated Development Plan (IDP) is required in terms of the Municipal Systems Act (2000) of all South African municipalities. The Madibeng 2011-2016 IDP represents the third generation IDP cycle. The document will serve as the basic developmental framework and the basis for annual reviews of municipal performance for the period up to 2016. Reviews will be based on an assessment against defined Objectives and associated Key Performance Indicators (KPIs).

Key Municipal Wide Needs, based on input from all 36 wards during 2011, are ranked as follows:

- Priority 1 : Water & Sanitation
- Priority 2 : Road and Storm water
- Priority 3 : Electricity
- Priority 4 : Social Services
- Priority 5 : Land and Housing
- Priority 6 : Local Economic Development

Council identified 13 key Objectives for the 2011-2016 period. With regard to the proposed Kgabalatsane solar energy facility, Objectives 1-4 are of key importance:

- Objectives 1-3 deal with infrastructure and access to basic services.
- Objective 4 is aimed at enhancing the quality of life of communities through social development initiatives in line with targets, norms & standards

The Kgabalatsane Solar Energy Facility will assist the LM and DM is achieving the goals set out in the policy and planning by providing the following benefits:

- Local companies or contractors will be hired for the duration of the construction period (24 months).
- Provide jobs forthe community members during the construction and operational phases
- Provide skills development and training
- The operational phase will provide permanent job opportunities to the local communities since security guards will be required on a full time basis.
- Generation of income to the Local Community - the REIPPP programme has a target that the applicant spend 2.1% of the company's revenue per annum on socio economic and local enterprise development initiatives. This will be for the full length of the project (minimum of 20 years).

3.3. Regulatory Hierarchy for Energy Generation Projects

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and local levels. As solar energy development is a multi-sectorial 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 (DoE):* This Department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for forming and approving the IRP (Integrated Resource Plan for Electricity).
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for solar energy developments to generate electricity.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
» *The South African Heritage Resources Agency (SAHRA):* SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa's cultural heritage.
» *National Department of Agriculture, Forestry, and Fisheries (DAFF):* This Department is responsible for activities pertaining to subdivision and rezoning of agricultural land. The forestry section is responsible for the protection of tree species under the National Forests Act (Act No 84 of 1998).
» *South African National Roads Agency (SANRAL):* This Agency is responsible for the regulation and maintenance of all national routes.
» *National Department of Water Affairs:* This Department is responsible for water resource protection, water use licensing and permits.
» *Department of Mineral Resources (DMR):* Approval from the may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.
» *Eskom:* Regarding Eskom infrastructure and grid connection.

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

» *Provincial Government of the North West – Department of Economic Development Environmental Conservation and Tourism (DEDECT).* This department is the commenting authority for this project.
» *Department of Transport and Public Works:* This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.

» *Provincial Department of Water Affairs:* This Department is responsible for water resource protection, water use licensing and permits.
» *North West Department of Agriculture, Land Reform and Rural Development:* This Department is responsible for all matters which affect agricultural land.

At the **Local Level,** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use, and the environment. The site falls within the Madibeng Local Municipality which is part of the Bojanala Platinum District Municipality.

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

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

» National Environmental Management Act (Act No 107 of 1998)
» EIA Regulations, published under Chapter 5 of the NEMA (GNR R543 in Government Gazette 33306 of 18 June 2010)
» Guidelines published in terms of the NEMA EIA Regulations, in particular:
  * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
  * Public Participation in the EIA Process (DEA, 2010)
  * International guidelines – the Equator Principles: The Equator Principles is a credit risk management framework for determining, assessing and managing environmental and social risk in project finance transactions. The Principles are based on the International Finance Corporation (IFC) Performance Standards on social and environmental sustainability and on the World Bank Group Environmental, Health, and Safety Guidelines.

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A listing of relevant legislation is provided in Table 3.1.

Table 3.1: Review of relevant policies, legislation, guidelines, and standards applicable to the proposed Kgabalatsane Solar Energy PV Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	The Environmental Assessment Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R543, R544, R545 and R546 of 18 June 2010, an Environmental Assessment Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority	The listed activities triggered by the proposed solar energy facility have been identified and have been assessed in this report. The FEIR will be submitted to DEA for review and decision-making.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the Environmental Assessment Process through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.		
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs Local Authorities	Noise impacts are expected to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. There is no requirement for a noise permit in terms of the legislation.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.	Department of Water Affairs Provincial Department of Water Affairs	The proposed development will not encroach on any water resources. Therefore, a Water Use Licence is not required.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management	Department of Mineral Resources	NO borrow pits are expected to be required for the proposed project. Therefore, no mining permit/mining right is expected to be required. A Section 53 application will be submitted the North West DMR office.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Plans are set out in S39 of the Act. S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site.		
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) – Regulations promulgated in November 2013. Measures to control noise (S34) - no regulations promulgated yet.	Department of Environmental Affairs	No permitting or licensing requirements applicable to this project arise from this legislation. A dust management plan may be required to be implemented, as determined by the Air Emissions Licensing Authority.
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers any	South African Heritage Resources Agency	An HIA was undertaken for the proposed facility and sites have been highlighted which require permits.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).		
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with	Department of Environmental Affairs	As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard. The Marula *Sclerocarya birrea* is also a protected tree species under the National Forests Act and the appropriate permit would be required if any of individuals of this species are impacted by the development. A single individual of this species was observed at the site near the location of the on-site substation during the current survey and an additional individual was observed during the previous studies at the site, but falls outside of the current development footprint.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	Department of Agriculture	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies have been developed and will be implemented.
National Forests Act (Act No. 84 of 1998)	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	Department of Agriculture, Forestry and Fisheries	There appears to be no threat to any protected tree species at the site (National Forests Act No. 84 of 1998) apart from *Acacia erioloba* trees which are present at the site. A permit should be

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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'.		requested in order to get permission to remove these trees. Note that although *Acacia erioloba* is a protected species, it is not a threatened species. Very few *Acacia erioloba* trees are present at the site.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operational phase of the project.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance; Group IV: any electronic product; and Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic. S (2 - 4) provides general principles for land development and conflict resolution.	Local Municipality	The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province	Department of Agriculture	Subdivision in terms of S24 and S17 of the Act needs to be adhered to.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from	National Department of Environmental Affairs (hazardous waste) Provincial Department of Environmental Affairs (general waste)	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation phase are required to be undertaken in accordance with the requirements of the Act and associated Regulations and Guidelines.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	the list. » Making other changes to the particulars on the list.		
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Final Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of » The National Road Traffic Act and the relevant Regulations.	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits which will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the facility and substation components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Provincial Legislation			
North West Province Provincial Growth and Development Strategy	As a provincial policy framework, it sets the tone and pace for shared growth and development in the Province. It addresses the key social, economic, environmental and spatial imperatives in the Province.	North West – Department of Economic Development Environmental Conservation and Tourism	A permit is not required but this documentation has been considered in this report and will remain applicable through the life cycle of the proposed project.
Nature and Environmental Conservation Ordinance, No. 19 of 1974	» Lists plant and animal species as protected	DEDECT	The Marula *Sclerocarya birrea* is also a protected tree species under the National Forests Act and the appropriate permit would be required if any of individuals of this species are impacted by the development. A single individual of this species was observed at the site near the location of the on-site substation during the current survey and an additional individual was observed during the previous studies at the site, but falls outside of the current development footprint.
Local legislation			
Madibeng Local Municipality Integrated Development Plan	The plan aims at: » Development of urban agriculture; » Promotion of small scale, intensive farming; » Organic and hydroponic cultivation; and » Development and promotion of agro-industries.	Local municipality	A permit is not required but this documentation has been considered in this report and will remain applicable through the life cycle of the proposed project.

APPROACH TO UNDERTAKING THE EIA PHASE CHAPTER 4

An EIA process is regulated by the EIA Regulations which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts (both positive and negative) associated with a proposed project. The EIA process forms part of the feasibility studies for a project, and comprises a Scoping Phase and EIA Phase which culminates in the submission of an EIA Report together with an Environmental Management Programme (EMPr) to the competent authority for decision-making.

The EIA Process for the proposed facility has been undertaken in accordance with the EIA Regulations in terms of Sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR544; GNR545; and GNR546 of Section 24(5) of NEMA (Act No. 107 of 1998). The environmental studies for this proposed project were undertaken in two phases, in accordance with the EIA Regulations.

4.1. Phase 1: Scoping Phase

The Scoping Study, which was completed in March 2014 with the acceptance of Scoping by the DEA, served to identify potential issues associated with the proposed project and define the extent of studies required within the EIA Phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs).

I&APs were provided with the opportunity to receive information regarding the proposed project, to participate in the process and to raise issues or concerns. Furthermore, the Draft Scoping Report was made available at Kgabalatsane Community Hall, Madibeng Local Municipality and on the Savannah Environmental website (www.savannahSA.com) for I&AP review and comment for a 30-day period. All the comments, concerns, and suggestions received during the Scoping Phase and the review period were included in the Final Scoping Report.

The Scoping Report was submitted to the National Department of Environmental Affairs in February 2014. The Final Scoping Report and Plan of Study for the EIA were accepted by the DEA, as the competent authority, in March 2014. In terms of this acceptance, an EIA was required to be undertaken for the proposed project.

4.2. Phase 2: Environmental Impact Assessment Phase

Through the Scoping Study, a number of issues requiring further study for all components of the project were highlighted. These issues have been assessed in detail within the EIA Phase of the process (refer to Chapter 6). The EIA Phase aims to achieve the following:

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

The EIA Report addresses potential direct, indirect, and cumulative[4] impacts (both positive and negative) associated with all phases of the project including design, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

4.2.1. Tasks to be completed during the EIA Phase

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

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

[4] "Cumulative environmental change or cumulative effects may result from the additive effect of individual actions of the same nature or the interactive effect of multiple actions of a different nature" (Spaling and Smit, 1993).

» Undertaking of independent specialist studies in accordance with Regulation 32 of GN R543 of 2010.
» Preparation of a Draft EIA Report in accordance with the requirements of the Regulation 31 of GN R543 of 2010.
» Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of GN R543 of 2010).
» Undertaking of independent specialist studies in accordance with Regulation 32 of GN R543 of 2010.
» Preparation of a Draft EIA Report in accordance with the requirements of the Regulation 31 of GN R543 of 2010.

4.2.2 Authority Consultation

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

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

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

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

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

4.2.3 Public Involvement and Consultation

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

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

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

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

Table 4.1: Key stakeholder groups identified during the Scoping Process

Stakeholder Group	Department
National and Provincial Authorities	» North West– Department of Economic Development, Environmental Conservation and Tourism (DEDECT) » North West- Agriculture, Fisheries and Forestry » North West– Roads and Public Works » North West- Water Affairs » South African Heritage Resources Agency National » SANRAL Northern Region » Department of Agriculture , Fisheries and Forestry » Department of Energy
Municipalities	» Madibeng Local Municipality » Bojanala Platinum District Municipality
Public stakeholders	» Advertisement placed to inform the public of the availability of the Draft Scoping report and public meeting held on the 02 July and an advert was placed for the availability of the Draft EIA and public meeting
Parastatals & service providers	» Eskom Transmission and Distribution (Eskom SOC Limited) » South African Heritage Resources Agency (SAHRA) » Ngwao-Boswa Jwa-Kapa-Bokone (Northern Cape SAHRA)South African Civil Aviation Authority (SACAA), » Square Kilometre Array (SKA)
NGOs/Business forums	» Wildlife Environment Society of South Africa

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

» **Newspaper Advertisements**

During the scoping phase a first round of adverts were placed in order to notify and inform the public of the proposed project and notify the public on the availability of the Draft Scoping report for public review and public meeting. These adverts were placed as follows:

* Brits Pos (English) – 26 April 2013
* Northern Review (Afrikaans) – 25-26 April 2013

During the scoping phase, a second round of newspaper adverts was placed to inform the public of the review date of the report and details of the public meeting. These adverts were placed in the following newspapers:

* Brits Pos (English) – 21 June 2013

Flyers were handed out to the local community to inform them of the public meeting by the councillor.

During the EIA phase, a third round of newspaper adverts were placed to inform the public of the availability of the Draft EIA report in the following newspapers:

* Brits Pos (English)
* Northern Review

» **Consultation**

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

* Public meetings
* Focus group meetings (stakeholders invited to attend)
* Written, faxed or e-mail correspondence

Records of all consultation undertaken are included within **Appendix D**.

PUBLIC REVIEW OF THE DRAFT EIA REPORT

The Draft EIA Report will be available for public review at the following public places in the project area from **28 May – 28 June 2014**:

» Kgabalatsane Community Hall
» Madibeng Local Municipality
» www.savannahSA.com

PUBLIC MEETING

In order to facilitate comments on the draft EIA 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:

» Date: 10 June 2014
» Time: 16:00
» Venue: Kgabalatsane Town Hall

4.2.4 Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process will be incorporated into Comments and Response Reports and included in the Final EIA report.

4.2.5 Assessment of Issues Identified through the Scoping Process

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

Table 4.1: Specialist studies undertaken within the EIA Phase

Specialist	Area of Expertise	Refer Appendix
Simon Todd of Simon Todd Consulting	Ecology, flora and fauna	**Appendix E**
Garry Patterson of ARC ISWC	Soils and Agricultural potential	**Appendix F**
Lourens du Plessis of MetroGIS	Visual impacts	**Appendix G**
Jaco van der Walt of Heritage Contracts and Archaeological Consulting CC (HCAC)	Heritage	**Appendix H**
Marion Bamford of the University of Witwatersrand	Palaeontology	**Appendix I**
Tony Barbour of Tony Barbour Environmental Consultancy	Social	**Appendix J**

Specialist studies considered direct, indirect, cumulative, and residual environmental impacts associated with the development of the proposed Everest Solar Energy Facility. Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected, and how it will be affected
- The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- The **duration**, wherein it is indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2
  - Medium-term (5–15 years) – assigned a score of 3
  - Long term (> 15 years) - assigned a score of 4
  - Permanent - assigned a score of 5
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes

- 4 is low and will cause a slight impact on processes
- 6 is moderate and will result in processes continuing but in a modified way
- 8 is high (processes are altered to the extent that they temporarily cease)
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes

» The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
- Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
- Assigned a score of 2 is improbable (some possibility, but low likelihood)
- Assigned a score of 3 is probable (distinct possibility)
- Assigned a score of 4 is highly probable (most likely)
- Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
» The **status**, which is described as either positive, negative or neutral
» The degree to which the impact can be reversed
» The degree to which the impact may cause irreplaceable loss of resources
» The degree to which the impact can be mitigated

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

S = (E+D+M) P; 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 or minimise impacts and plan for their management (in terms of the EIA Regulations), the mitigation of significant

impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A draft EMP is included as **Appendix J**.

4.2.6 Assumptions and Limitations

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

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

Refer to the specialist studies in **Appendices F-K** for specialist study specific limitations.

DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 5

This chapter of the Draft EIA Report provides a description of the environment that may be affected by the proposed Kgabalatsane Solar Energy Facility and associated infrastructure. 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 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 reports contained within **Appendices F-K.**

5.1 Regional Setting: Location of the Study Area

The project site is located in the Madibeng Local Municipality (Ward 10) in the North West Province and the Garankwa Substation is to which the facility is connecting is in the City of Tshwane, Gauteng Province The site is located ~ 15 km north-east of the town of Brits, which 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 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.

5.2 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.

5.3 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.

5.4 Biophysical Characteristics of the Study Area

5.4.1 Topography

The site is approximately 103 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%.

5.4.2 Geology & Land Types

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).

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

Two distinct soil map units (Hu and Sd) were identified, but with more or less similar characteristics. 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%.

Soil depths are mostly moderately deep and range from 400 mm to 1 200 mm. 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.

5.4.3 Agricultural Potential

The general agricultural potential of each map unit/soil type, and the main limiting factors, are given in Table 5.1 below.

Table 5.1: Agricultural Potential

Agricultural Potential	Map unit	Area (ha)	Limitations
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.
Total		**102.73**	

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 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.

5.4.4 Land use and Land capability of the Study Area

The broader 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 the farm 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 is located in the south-eastern portion of the broader farm of Syferfontein, ~1.8 km to the east of the proposed development site. No residences occur within the area proposed for the solar facility.

5.4.5 Water Resources

No drainage lines or other water bodies are evident on the site. This was confirmed through the field work undertaken.

5.5. Ecological Profile

5.5.1. Vegetation

According to the national vegetation map (Mucina & Rutherford 2006), 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 area adjacent to the facility traversed by the power line is highly disturbed and the area towards the substation sites is adjacent to or within urban development where the risk of significant ecological impact from the power lines would be very low

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, which is not surprising given its relatively limited total extent of 2528km^2. 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.

The density of woody plants at the proposed site varies considerably and there are some parts of the site which can be considered to be bush-encroached (Figure 5.1) and other areas which are more open with trees well-spaced (Figure 5.2).

The main driver of vegetation density and composition at the site is the history of land-use in the area. The majority of the site has been ploughed before at some time in the recent past and the various parts of the site show different degrees of recovery and response to this disturbance. The most obvious indication of the past disturbance is the large number of alien and weedy species present, as well as the remnants of contours and water diversion structures along the boundaries of the ploughed areas. Despite the disturbance, large parts of the site have recovered well and, at least in terms of broad structure, have returned to their former state. However, diversity of the site is likely to be lower than intact vegetation and there are likely to be some shifts in dominance as well, with disturbance adapted and faster growing species more common within the disturbed areas.

The woody vegetation at the site is dominated *by Acacia karoo, Acacia tortillis, Acacia caffra, Searsia lancea, Zizyphus mucronata* and *Dichrostachys cinerea* while trees such as *Peltophorum africanum, Gymnosporia maranguensis* and *Ehretia*

rigida subsp. rigida were less common. Larger woody shrubs present include *Diospyros lycioides subsp. guerkei, Carissa bispinosa, Asparagus cooperi, Grewia flava* and *Lantana rugosa*. Smaller shrubs present include *Pollichia campestris, Stylosanthes fruticosa, Indigofera cryptantha var cryptantha* and *Felicia muricata*. Forbs and annuals were common at the time of the site visit and included indigenous species such as *Achyranthes aspera, Aerva leucura, Sericorema remotiflora, Pentarrhinum insipidum, Geigeria burkei subsp. burkei var. burkei, Hirpicium bechuanense, Polydora poskeana, Chamaecrista mimosoides, Indigofera melanadenia, Pavonia burchellii* and *Withania somnifera.* Dominant grasses present include *Bothriochloa insculpta, Eragrostis rigidior, Cymbopogon caesius, Hyparrhenia hirta, Setaria sphacelata, Eragrostis superba, Aristida congesta subsp. barbicollis* and *Heteropogon contortus*. Succulents were generally uncommon and the only species observed at the site were *Aloe greatheadii* which occurred sporadically across the site and Cyphostemma cirrhosum which was uncommon. Geophytes were also not very abundant but included Gladiolus *permeabilis subsp edulis* and *Ledebouria revoluta*. Alien and weedy species were dominant and very common across large parts of the site and included species such as *Schkuhria pinnata, Flaveria bidentis, Zinnia peruviana, Chenopodium album, Euphorbia inaequilatera var inaequilatera, Bidens bipinnata* and *Tribulus terrestris.*

The western margin of the site is the only area that did not appear to have been ploughed in the past and species that were observed in this area that were either absent or rare on the rest of the site include *Sesbania transvaalensis, Diospyros lycioides subsp guerkei* and *Gladiolus crassifolius*. Given the high levels of transformation that Marikana Thornveld has exerienced, this area is considered sensitive and, as it is also classified as a CBA, it should be avoided by the development.

Figure 5.1: An area with a relatively large amount of bush thickening due to *Dichrostachys cinerea* which can be seen in the foreground. The large emergent trees are mostly *Acacia karroo*

Figure 5.2: Example of typical vegetation within the site, as illustrated here by the location of the on-site substation. The tree layer consists largely of *Acacia karoo*.

Figure 5.3 Looking down the power line route from near the on-site substation. The vegetation is open because the area has been recently cultivated and most trees are cleared and burnt. Such areas are considered to be of low sensitivity.

The site falls within the planning domain of the North-West Province Biodiversity Conservation Assessment (Skowno & Desmet 2008), which maps Critical Biodiversity Areas and Ecological Support Areas within the North West Province. The site lies within a Tier 2 Critical Biodiversity Area. The area has however also been mapped as intact vegetation under the Threatened Ecosystems in South Africa: Descriptions and Maps layer (SANBI 2011), which for the majority of the study area is clearly not the case. The majority of the site has been ploughed in the past and as the CBA status is generally only applicable to intact vegetation, the impact of the development on the CBA status of the area is significantly lower than if the site was intact.

Plant species of conservation concern

During previous studies undertaken on the site, five protected species were recorded at the site, *Sclerocarya birrea, Ammocharis coranica*, *Harpagophytum zeyheri subsp. zeyheri, Aloe greatheadii var. davyana* and *Aloe marlothii*. Of these *Sclerocarya birrea, Ammocharis coranica* and *Aloe greatheadii var. davyana* were recorded at the site during the current study, while *Aloe marlothii* and *Harpagophytum zeyheri subsp. zeyheri* were not observed, but given that they have been recorded at the site before, can be confirmed present as well. The *Marula* (*Sclerocarya birrea*) is a protected tree species under the National Forests Act and the appropriate permit would be required if any of individuals of this species are impacted by the development. A single individual of this species was observed at the site near the location of the on-site substation during the current survey and an additional individual was observed during the previous studies at the site, but falls outside of the current development footprint. While additional individuals may be present, it is not likely that significant numbers of this species would be impacted by the development. Overall, as the protected species at the site occur at a relatively low density and they are not rare per se, impacts on such species are not considered to be of high significance.

Mammals

The site falls within the distribution range of about 50 mammals, including four listed species. Listed species which may occur at the site include the Brown hyaena *Hyaena brunnea* (NT), Honey badger *Mellivora capensis* (IUCN LC, SA RDB EN), *Serval Leptailurus serval* (NT) and South African hedgehog *Atelerix frontalis* (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 due to the degraded nature of the area and the proximity of the site to human activity, including noise generated by the Odi aerodrome which is used as a racing track.

Birds

According to the SABAP2 database 327 bird species are known from the vicinity of the study site, indicating that the area has moderate bird diversity. This

includes at least nine listed bird species. It is only the Cape Vulture and Lanner Falcon which occur with any regularity and which have a reasonable probability of being impacted by the development. Given the high levels of human activity in the area, it is not likely that the Cape Vulture would be present in the area with any regularity. The Lanner Falcon is more tolerant of human activity and may be resident in the area. This species is however not highly vulnerable to collisions or electrocution and it is not likely that the development would generate significant impact on this species. Overall, the main impact of the development on avifauna is therefore likely to be habitat loss resulting from the PV facility footprint, but as the extent of the development is relatively low and the site already degraded, this is not likely to be of significance for any of the species present.

Reptiles

Only one listed species is known from the area, the Striped Harlequin Snake *Homoroselaps dorsalis* which is listed as Near Threatened. This species inhabits deserted termite mounds, which are largely absent from the study area on account of the ploughing that has taken place. Consequently, it is unlikely that this species occurs at the site or would be significantly impacted by the development. No reptiles were observed at the site during the site visit despite the relatively warm temperatures at the site, suggesting that reptile abundance at the site is low. The previous studies at the site also failed to report any reptiles as present, suggesting that the low reptile abundance is a real feature of the site and not a sampling artefact. While there are certainly some reptiles present at the site, the levels of past and current disturbance at the site appear to be unfavourable for reptiles.

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 *Pyxicephalus adspersus* 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.

5.6 Social Characteristics of the Study Area and Surrounds

The MLM covers an area of 3,839 km², and is mainly rural in nature. Urban and mining activities account for ~5% of land uses in the area. The majority of the MLM is covered by open bush and sparse or secondary bush land, specifically in the centre and the north. Conservation accounts for very little of the area, but significant irrigation agriculture is associated with the Hartbeespoort Dam and the Crocodile River Schemes.

Brits is the key town in the MLM. Other towns include Hartebeespoort, Letlhabile, Damonsville, Mothotlung Oukasie and Mooinooi. A total of 43 villages are scattered through the rural portions of the MLM. Most of these are characterized by lack of formal planning and socio-economic development.

Brits is the only sizeable town in the MLM, and has an estimated population of 12 000 people, mainly White. The town evolved from the nucleus of the Brits railway station which was commissioned in 1906 on the property of Johan Nicolaas Brits (farm Roodekopjes). The town was proclaimed (940 stands) in 1924.

Syferfontein borders onto Ga-Rankuwa View and Ga-Rankuwa Industrial area to the east. Ga-Rankuwa originated on one of the farms which Chief Mamogale and Lutheran missionaries bought back from Europeans during the late 19th century. Ga-Rankuwa was proclaimed a township in 1965, and was initially established to accommodate people who were displaced mainly from Lady Selborne under the Group Areas Act. The town was essentially developed as a dormitory town to service the industrial area of Rosslyn, 10 km away. Most residents continue to commute to work. Rosslyn continues to be a key employment provider to the community.

The central portion of Farm Syferfontein is comprised of the Kgabalatsane residential area, located ~1.8 km to the north of the proposed developmet site. Lerulaneng settlement to the west of Kgabalatsane is located ~2.8 km north-west of the proposed site. The site is located on land owned by the BaKwena BaMogopa Tribal Authority. The relevant portion of the MLM is characterized by scattered, largely underdeveloped settlements. Informal cattle grazing takes place on land surrounding the proposed site, and adjacent land is currently being prepared for community agricultural projects, such as a sugar cane plantation. The Odi Aerodrome is located <500 m north of the site. The Aerodrome is currently being used as a race track for recreational purposes.

5.6.1 Population

As may be seen in Table 5.2., the MLM population has increased significantly in the decade between the two Censuses, 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 5.2: Overview of key demographic indicators for the Madibeng LM

ASPECT	2001	2011	CHANGE (%)

Population	347 578	477 381	+3.7% p.a.
Households	95 924	160 723	-
Household size (average)	3.4	2.9	- 0.5
% Female headed households	35.3	30.3	- 5
Sex Ratio (males per 100 females)	105.2	113.7	+ 8.5
Dependency ratio per 100 (15-64)	49.6	44.4	- 5.2
% Population <15 years	26.3	25.7	- 0.6
% Population 15-64	68.8	69.2	+ 0.4
% Population 65+	4.9	5.1	+ 0.2
Unemployment rate (official) - % of economically active population	41.9	30.4	- 11.5
Youth unemployment rate (official) - % of economically active population 15-34	52.9	38.2	- 14.7
No schooling - % of population 20+	15.6	7.8	- 7.8
Higher Education - % of population 20+	5.6	7.7	+ 2.1
Matric - % of population 20+	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.

5.6.2 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.

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).

5.6.3 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.

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.

5.6.4 Access to municipal services

As may be seen in Table 5.3, with the exception of a small decrease in the % of formal dwellings (0.9%), all other indicators show improvement. However, with the possible exception of access to electricity, Census 2001 and Census 2011 baselines values are very low. Only 27.2% of MLM households had access to flush toilets in 2011, only 25.7% access to weekly refuse removal, and only 22.2% access to piped water.

Table 5.3: Overview of access to basic services in the Madibeng LM

	2001	**2011**	**Change (%)**
Formal dwellings % of total	61.1	59.2	- 0.9
% dwellings owned by occupant	49.1	54.1	+ 5
% households with access to flush toilet	22.5	27.2	+ 4.7
% households with weekly municipal refuse removal	25.5	25.7	+ 0.2
% households with piped water inside dwelling	13.7	22.2	+ 8.5
% households which uses electricity for lighting	69.7	81	+ 11.3

Source: Compiled from StatsSA Census 2011 Municipal Fact Sheet

5.6.5 Economic context

Mining plays an important role in the regional economy, and accounts for most of the employment opportunities in the DM. Most of the mining activities are concentrated in a band (the Merensky Reef) which stretches from west of the Pilanesberg, southwards through the Bafokeng area, and parallel to the Magaliesberg towards Marikana and Brits in the east.

Key MLM economic sectors are mining, agriculture and tourism. A total 45 mines are currently located in the MLM. The world's richest Platinum Group Metals Reserve (associated with the Merensky Reef) is located in the MLM and Rustenburg LMs. The MLM is the world's third largest producer of chrome, and one of the two largest platinum mines in the world are located in the MLM. Vanadium and granite are further key products.

Water availability constitutes a key limiting factor with regard to agriculture. The northern portion of the MLM is mainly used for cattle farming. Approximately 20 000 ha is currently under irrigation crops, with the Hartbeespoort Dam Irrigation Scheme in the south accounting for the bulk (16 000 ha). Key crops include tobacco, citrus and cereals.

Tourism activities in the MLM are currently mainly associated with the Hartebeespoort Dam in the south. The Hartebeespoort Dam is an extremely popular inland holiday/ recreation destination. Tourist attractions in and around Brits/ the study area include the De Wildt Cheetah Research Centre (near the N4) and the Vaalkop dam, located ~50 km north of Brits. No significant tourism attractions or scenic routes are associated with the Kgabalatsane study area.

5.7 Heritage

The proposed site is located in an area within which 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.

5.7.1. Observations of the field survey

The entire farm was not surveyed but only the footprint of the proposed PV layout area, access roads and power line as indicated in Figure 5.4 below. The study area has been used extensively for agricultural purposes in the past, these activities would have destroyed any surface indications of heritage sites. Currently these areas are now fallow with knee to waist high grass limiting archaeological visibility. The proposed access route follows a dirt track to the

south east of the Odi airfield. The proposed power line option traverses old agricultural fields from the PV plant in an easterly direction where it links up with the Garankua substation. For the most part the power lines follow existing power lines. During the survey, no sites of heritage significance were identified.

Figure 5.4: PV footprint, access route and power line connection (blue) and track logs of the area that was surveyed.

5.7 Palaeontology

Geologically the site is located in the Bushveld Complex and close to established platinum mines that are exploiting the Merensky reef. The underlying rocks are part of the western limb of the Rustenburg Layered Suite which comprises a complete differentiation sequence for a basic magma. These intrusive rocks have a noritic marginal zone and gabbronoritic main zone. More specifically the site has the Upper Zone of the Rustenburg Layered suite: the Pyramid gabbro/norite and the underlying Main Zone: the Bierkraal magnetite and gabbro (Figure 5.5).

The rocks are igneous and intrusive with large crystals from slow cooling, rich in a number of platinum group elements, but do not contain fossils. Furthermore they are too old for any recognizable forms of fossils; only bacteria and algae were present at this stage of Earth history.

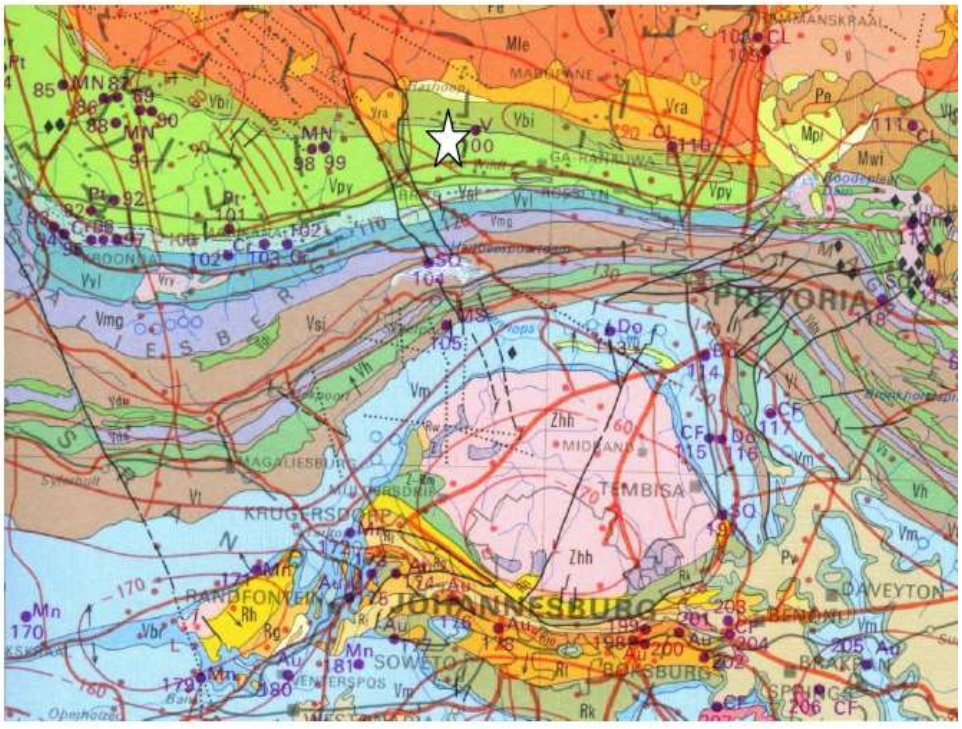


Figure 5.5: Geological Map (Council for Geosciences, 1984) of the region. Star shows site under investigation. Vbi = Bierkraal magnetite gabbro; Vpy = Pyramid gabbro norite.

ASSESSMENT OF POTENTIAL IMPACTS: PV FACILITY & POWER LINE ALTERNATIVES CHAPTER 6

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of the proposed Kgabalatsane Solar Energy Facility. This assessment is conducted for a 55 MW facility and for all the facility's components including:

» Photovoltaic (PV) panels and associated inverters
» 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 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 development of the Kgabalatsane Solar Energy Facility will comprise the following phases:

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of the access road, establishment of electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan. This phase is expected to take approximately 24 months.
» *Operation* – will include operation and maintenance of the facility and the generation of electricity. The operational phase is expected to extend in excess of 20 - 25 years.
» *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately within this chapter.

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

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed Kgabalatsane Solar Energy Facility on the farm Syferfontein 430 (for the ~103 ha solar facility footprint). The assessment of potential issues presented in this chapter has involved key input from specialist consultants, the public and the project developer. Issues were assessed in terms of the criteria detailed in Chapter 4. The nature of the potential impact is discussed, and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation/enhancement and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

There are two alternatives that have been assessed for the connection to the Eskom grid:

a) Alternative 1: a ~16 km
b) new 132 kV line to Eskom's Garankuwa substation located ~5.5 km to the south-east of the solar energy facility site;
c) Alternative 2: a loop-in/ loop-out line to the existing 132 kV Mothulung-Garankuwa line located to the south of Syferfontein.

A corridor of 300 metres was assessed.

6.1.1 Potential Impacts on Ecology

Construction Phase Impacts

Impacts on vegetation and protected plant species

The loss of vegetation within the development footprint is an inevitable consequence of the development. In addition, protected plant species are confirmed to occur within the site and it is highly likely that these would be affected by the development. This impact is certain to occur and is therefore assessed for the development.

Soil erosion and associated degradation of ecosystems

The large amount of disturbance created during construction would potentially leave the site vulnerable to soil erosion. The site is however fairly flat and in the medium to long-term it is not likely that soil erosion would be a significant impact resulting from the development. This is

supported by the fact that no visible erosion has taken place within the site despite the disturbance and vegetation clearing that has taken place at the site in the past. Soil erosion is therefore not considered a likely impact and is not assessed.

Direct Faunal impacts

Increased levels of noise, pollution, disturbance and human presence during construction 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. Some mammals and reptiles 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. Some impact on fauna is highly likely to occur during construction and this impact is therefore assessed for the construction phase.

Operational Phase

Alien Plant Invasion

The disturbance created during construction is highly likely to encourage the invasion of the disturbed areas by alien species. The site is already heavily invaded and it is likely that the disturbed areas will become dominated by alien and disturbance-adapted species. Given the previously disturbed nature of the site, the significance of this impact is not likely to be high as the alien species are already present in the vegetation and the ground layer at least would presumably recover to a similar state to the current condition following disturbance.

Direct Faunal impacts

During the operational phase of the development, interactions between fauna and the infrastructure of the facility is likely to be relatively low. Due to the degradation of the site, faunal abundance at the site appears to be low and the extent of interaction between the development and fauna at the site is therefore also likely to be low. However, some impacts associated with the development may generate a long-term cumulative impact on fauna and this impact is therefore assessed.

Avifaunal Impacts

Large raptors and many larger bird species such as cranes and bustards are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of the vulnerable species are long-lived slow-breeding species, collisions with power lines can be a major

source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide some mitigation against such impacts and is recommended as standard practice for new power line infrastructure. This impact is associated with the power line and not the PV Facility as such.

Power line

The area adjacent to the facility traversed by the power line is highly disturbed and the area towards the substation sites is adjacent to or within urban development where the risk of significant ecological impact from the power lines would be very low. The only area of potential sensitivity along the power line route is the Rosespruit river which is traversed several times in the area south of the development area. However, the areas adjacent to the river have been ploughed before and it is therefore only the river itself which is quite confined in extent which is considered sensitive. It is likely the river itself can be avoided by the placement of towers as it is very narrow and is not likely to pose a constraint on the power line route. Given the disturbed nature of the environment traversed by the power line, impacts on terrestrial biodiversity are likely to be low and the only significant potential impact would be on avifauna. While bird abundance at the site was relatively high at the time of the site visit, raptors and other large species which are vulnerable to collisions or electrocution from power lines were conspicuously absent, which may also be related to the disturbance and human activity in the area.

Figure 6.1: The final section of power line Alternative 1 looking down the route towards the Eskom substation.

Figure 6.2: The location of the connection point of the Alternative 2 power line.

(Refer to **Appendix E - Ecology Report** for more details).

a) Summary of impacts associated with the proposed solar energy facility, and access road during the construction and operational phase

Construction Phase

Nature: Impacts on vegetation and protected plant species would occur due to vegetation clearing associated with the construction of the facility. The loss of vegetation within the development footprint is an inevitable consequence of the development. In addition, protected plant species are confirmed to occur within the site and it is highly likely that these would be affected by the development. This impact is certain to occur and is therefore assessed for the development.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (3)
Magnitude	Medium (4)	Medium-Low (3)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (36)**	**Medium (32)**
Status (positive or negative)	Negative	Negative

Reversibility	Low	Low
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	While protected species can be translocated, the loss or transformation of intact vegetation cannot be avoided or mitigated.	
Mitigation: » Vegetation clearing to commence only after walk-through has been conducted and necessary permits obtained. » Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. » All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. » Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.		
Cumulative impacts: » The potential for cumulative impact is low as the site has already been transformed in the past and the ecological value of the area is therefore reduced. In addition, the extent of previously untransformed vegetation within the study area is low.		
Residual Impacts: » Some loss of vegetation is inevitable and cannot be avoided		

Nature: **Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.**

Increased levels of noise, pollution, disturbance and human presence during construction 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. Some mammals and reptiles 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. Some impact on fauna is highly likely to occur during construction and this impact is therefore assessed for the construction phase.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Medium (5)	Medium-Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (21)**
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be	Large amounts of noise and disturbance at the site during	

mitigated?	construction is largely unavoidable and cannot be effectively mitigated.

Mitigation:

» Site access should be controlled and no unauthorized persons should be allowed onto the site.
» Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
» The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.
» The area is susceptible to veld fires and therefore, fires should not be allowed on-site.
» No fuelwood collection should be allowed on-site, however during vegetation clearing the wood from cleared trees could be offered to local communities.
» No dogs should be allowed on site.
» If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects.
» All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
» All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises.
» Faunal sweeps within habitats such as bush clumps should take place before clearing and any fauna located should form part of a search and rescue and relocated to safety.

Cumulative impacts:

» During the construction phase the activity would contribute to cumulative fauna disturbance and disruption in the area, but the impact would be local extent and not of high significance.

Residual Impacts:

» Some habitat loss for fauna is an inevitable consequence of the development and cannot be fully mitigated. Noise and disturbance are typical of construction activities and cannot be avoided to a significant degree. The impact is however transient and confined to the construction period.

Nature: **The presence of the power line may lead to negative impacts on avifauna as a result of electrocution or collisions with the power line.**

Large raptors and many larger bird species such as cranes and bustards are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies within the movement or migration pathway of the birds. As many of the vulnerable species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional populations. Insulating electrical components and fitting bird flight diverters can provide some mitigation against such impacts and is recommended as standard practice for new power line infrastructure. This impact is associated with the power line and not the PV Facility as such.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (21)**	**Low (14)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Ensure that all new power lines are marked with bird flight diverters along their entire length, but particularly in areas where larger birds are likely to pass such as near drainage lines, dams or pans and hills.
» All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field.
» Any electrocution and collision events that occur during operation should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.

Cumulative impacts:

» The development would contribute to cumulative avifaunal impacts in the area, but the contribution would be very small and is not considered significant.

Residual Impacts:

» As mitigation is not 100% effective, some residual impact from the power line may occur.

Operational Phase Impacts

Nature: **Alien plants are likely to invade the site as a result of disturbance created during construction**

The disturbance created during construction is highly likely to encourage the invasion of the disturbed areas by alien species. The site is already heavily invaded and it is likely that the disturbed areas will become dominated by alien and disturbance-adapted species. Given the previously disturbed nature of the site, the significance of this impact is not likely to be high as the alien species are already present in the vegetation and the ground layer at least would presumably recover to a similar state to the current condition following disturbance.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)

Duration	Long-term (4)	Medium-term (3)
Magnitude	Medium (4)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	**Medium (36)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

» Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.
» Regular monitoring for alien plants within the development footprint.
» Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
» Alien species are already abundant at the site and are likely to increase rapidly in response to disturbance. However, not all species are serious invaders and those species which pose a threat to the recovery of the indigenous vegetation will need to be identified and controlled.

Cumulative impacts:

» Alien invasion would contribute to cumulative habitat degradation in the area. However if alien species are controlled then cumulative impacts from alien species would not be significant.

Residual Impacts:

» If alien species at the site are controlled, then there will be very little residual impact.

Nature: **The operation and presence of the facility may generate impact on fauna.**

During the operational phase of the development, interactions between fauna and the infrastructure of the facility is likely to be relatively low. Due to the current degradation of the site, faunal abundance at the site appears to be low and the extent of interaction between the development and fauna at the site is therefore also likely to be low. However, some impacts associated with the development may generate a long-term cumulative impact on fauna and this impact is therefore assessed.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	**Low (24)**	**Low (14)**
Status (positive or negative)	Negative	Negative

Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Some aspects such as those relating to human activity can be mitigated, but habitat loss cannot be mitigated.	
Mitigation: » Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. » If the site must be lit at night for security purposes, the lights should be downward projecting and the light source should be low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as come species such as tortoises and pangolins are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.		
Cumulative impacts: » The development would contribute to cumulative habitat loss for fauna, but the contribution would be very small and is not considered significant, especially as the site is already degraded.		
Residual Impacts: » Some habitat loss is an inevitable consequence of the development and cannot be fully mitigated.		

a) Comparison of the Alternatives

There is not a large difference in the likely impact associated with the two Alternatives. They both share their initial section and it is only the final section towards the power line where they deviate and although Alternative 1 is longer, the final section is within an area of high human activity where impacts from the power line would be very low. Therefore, both Alternatives are considered acceptable from an ecological perspective, and while the shorter Alternative 2 is preferable, if this Alternative cannot be built, then Alternative 1 is an acceptable alternative.

b) Implications for Project Implementation

» Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
» The majority of impacts are either of low significance or can be reduced to a low significance through avoidance and mitigation.
» There are no impacts of high significance associated with the development that would pose a significant obstacle for the development.

6.1.2 Potential Impacts on Soils and Agricultural Potential

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 were encountered.

Soil depths range from 400 mm to 1 200 mm. The area has 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.

The proposed access road is situated on deep red soils (map unit dSd21), while both of the power line alternatives run to the south, on shallow black clay soils (map unit sAr40), sometimes with a significant degree of surface rock outcrops (map unit Ar1/R and Sd1/R).

a) Summary of impacts associated with the proposed solar energy facility during the construction and operational phase

Nature: **Loss of agricultural land for arable cultivation during and after the construction phase due to placement of infrastructure** 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 current agriculture being practiced anywhere in the vicinity.		
	Without mitigation	**With mitigation**
Extent	Local (1)	NA
Duration	Long-term (4)	NA
Magnitude	Minor (2)	NA
Probability	Highly probable (4)	NA
Significance	**28 (Low)**	NA
Status	Negative	NA
Reversibility	Low	NA
Irreplaceable loss of resources?	No	NA

Can impacts be mitigated?	No
Mitigation: » None	
Cumulative impacts: » Little or none due to low potential of the site	
Residual impacts: » Little or none if proper restoration and rehabilitation is carried out.	

Nature: **Loss of agricultural land for arable cultivation during and after the construction phase due to placement of infrastructure.**

The power lines to the south will traverse swelling clay soils, generally shallow (<500 mm to bedrock) with rock in places. The agricultural potential of these soils is very limited, so with the reduced footprint of power line towers at intervals, the impact on agricultural soil will be very limited. However, the shrink-swell nature of the soils will mean that there will be a danger of soil movement over time if proper foundations (down to bedrock) are not established.

	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	**28 (Low)**	**28 (Low)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation: » Reduce vegetation removal as far as possible in construction of power line and access roads.		
Cumulative impacts: » Little or none		
Residual Impacts: » Little or none if proper restoration and rehabilitation is carried out.		

a) Comparison of the Alternatives

Both power line Alternatives are considered acceptable.

b) Implications for Project Implementation

» The soils of most of the site have a low agricultural potential but there is little agriculture being practiced anywhere in the vicinity.

6.1.3 Assessment of Potential Impacts on Heritage and Palaeontology

Heritage

The study area has been used extensively for agricultural purposes in the past. These activities would have destroyed any surface indications of heritage sites. Currently these areas are now fallow with knee to waist high grass limiting archaeological visibility.

The proposed power line Alternative traverses old agricultural fields from the PV plant in an easterly direction where it links up with the GaRankwa substation. For the most part the power lines follow existing power lines. During the survey no sites of heritage significance were identified and no concerns from a paleontological perspective were noted.

Palaeontology

A desktop study by Prof Marion Bamford (2012) indicated that the proposed development will not have negative effect on palaeontological heritage.

Geologically it is in the Bushveld Complex and close to established platinum mines that are exploiting the Merensky reef. The underlying rocks are part of the western limb of the Rustenburg Layered Suite which comprises a complete differentiation sequence for a basic magma. These intrusive rocks have a noritic marginal zone and gabbronoritic main zone. More specifically the site has the Upper Zone of the Rustenburg Layered suite: the Pyramid gabbro/norite and the underlying Main Zone: the Bierkraal magnetite and gabbro (Fig 1). These igneous rocks are around 2070 million years old (Cawthorn et al., 2006).

The rocks are igneous and intrusive with large crystals from slow cooling, rich in a number of platinum group elements, but do not contain fossils. Furthermore they are too old for any recognizable forms of fossils; only bacteria and algae were present at this stage of Earth history

a) <u>Heritage impacts associated with the construction and operation phase of the proposed facility</u>

Nature: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)

Probability	Probable (1)	Probable (1)
Significance	9 (low)	8 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» No sites were identified during the survey. However, if any archaeological or cultural material is uncovered during construction or operation a qualified archaeologist must be contacted to verify and record the find. Mitigation will then include documentation and sampling of the material. This will also be required if any archaeological or paleontological material is uncovered. In the case of the power line a heritage walk down is recommended when the alignment has been finalised. Any sites recorded during this exercise can ideally be preserved by micro adjustments to pylon positions.

Cumulative impacts:

» Archaeological and cultural sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.

Residual Impacts:

» Depletion of archaeological record of the area.

Nature: Construction of the power line alternatives on heritage resources

The power line will have a low impact on archaeological resources since the area it will be traversing is highly disturbed by agricultural activities. It is however recommended that the final route Alternative is subjected to an archaeological walk down before development can start.

	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	**Low (9)**	**Low (8)**
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	

Mitigation:

» If any archaeological material is uncovered during construction or operation a qualified archaeologist must be contacted to verify and record the find. Mitigation will then include documentation and sampling of the material. This will also be required if any paleontological material is uncovered.

» If Alternative 2 is the preferred alternative the line must be subjected to a heritage

walk down when the tower positions have been determined.
Cumulative impacts:
» Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.
Residual Impacts:
» Depletion of archaeological record of the area.

b) Comparison of the Alternatives

Both power line Alternatives are considered acceptable. The proposed power line option traverses old agricultural fields from the PV plant in an easterly direction where it links up with the Garankua substation. For the most part the power lines follow existing power lines. During the survey no sites of heritage significance was identified.

b) Implications for Project Implementation

» No sites of archaeological or heritage significance were identified during the survey. A Palaeontological desktop study by Prof Marion Bamford (2012) for the area also indicated that there is no impact foreseen on the fossil record of South Africa. However, if during construction, any archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds.

6.1.4 Assessment of Potential Visual Impacts

The topography of the region is broadly described as moderately or slightly undulating plains to the centre of the study area and lowlands with hills to the south. Prominent hills (Norite Koppies) occur towards the south of the study area. The terrain surrounding the proposed site is predominantly flat with an even southern slope towards the Rosespruit. This stream or drainage line is expected to be dry for most parts of the year due to the relatively low annual rainfall (500-600mm) within the region.

Potential visual exposure

The potential visual exposure of the proposed facility is shown on Figure 6.1. The analysis was 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.

It must be noted that the analysis does 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 evident from the viewshed analysis that the proposed facility would have relatively contained core area of potential visibility 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 local hills to the north and south of the proposed facility.

» A number of populated places fall within the zone of potential visual exposure, including parts of Rabokala to the north west, Kgabalatsane to the north east, Mothutlung and Makau to the south west, Ramogodi to the south east and Ga-Rankuwa and the *informal* residential area to the east.
» Sections of the road connecting Kgabalatsane and Rabokala are also likely to be visually exposed.
» The extent of potential visual impact is significantly reduced beyond the 4km radius, with limited exposure expected to the south and south-west of the site, and to a lesser degree to the north west.
» 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.

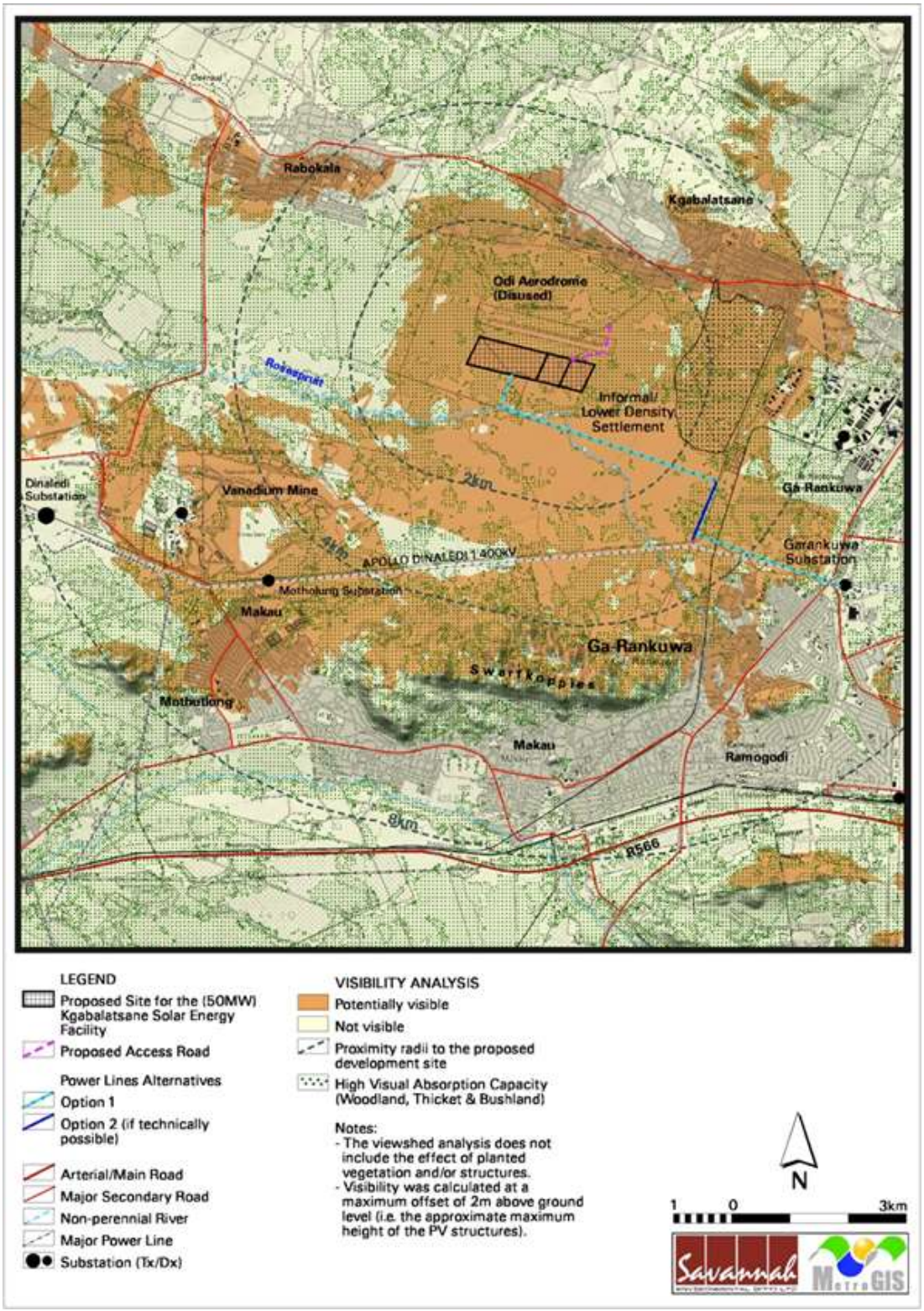


Figure 6.1: Potential Visual Exposure

Visual Impact Index

The combined results of the visual exposure, viewer incidence / perception and visual distance of the proposed facility are displayed on Figure 6.2. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index.

Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a high viewer incidence and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact.

The visual impact index for the proposed facility is further described as follows.

» The visual impact index map indicates a core zone of moderate visual impact within 2 km of the proposed facility.
» Sensitive visual receptors within this zone are limited to residents on the outskirts of Kgabalatsane and the informal settlement to the east of the site. These receptors are likely to experience high visual impact.
» The extent of visual impact remains high between 2 km and 4 km of the proposed facility, especially in the south and east. Visually screened areas lie in the west and the north as a result of topography. Visual impacts within this zone are mostly low.
» Sensitive visual receptors include users of the secondary road to the north of the site and residents on the outskirts of Rabokala, Kgabalatsane, Ga-Rankuwa and the informal settlement to the east of the site. These receptors are likely to experience moderate visual impact.
» Between 4km and 8km of the proposed facility, the extent of potential visual impact is significantly reduced. Visually exposed areas occur mainly in the south and east, and to a lesser extent in the north west. Areas in the north and west are screened from potential visual impact. Where they occur, visual impacts within this zone are likely to be very low.
» Sensitive visual receptors at this distance include residents on the periphery of Rabokala, Ga-Rankuwa, and Ramogodi. Mothutlung and Makau as well as users various secondary roads. Visual impacts on these sensitive receptors are likely to be low.
» Remaining impacts beyond 8km of the proposed facility are expected to be very low or negligible, where these occur at all.
» Visibility of the proposed power line was calculated at a height of 20m above ground level, for a distance of 2 km on either side of the proposed line. It is clear from Figure 6.4 that the majority of the area within the 2km offset will be exposed to potential visual impact as a result of this line

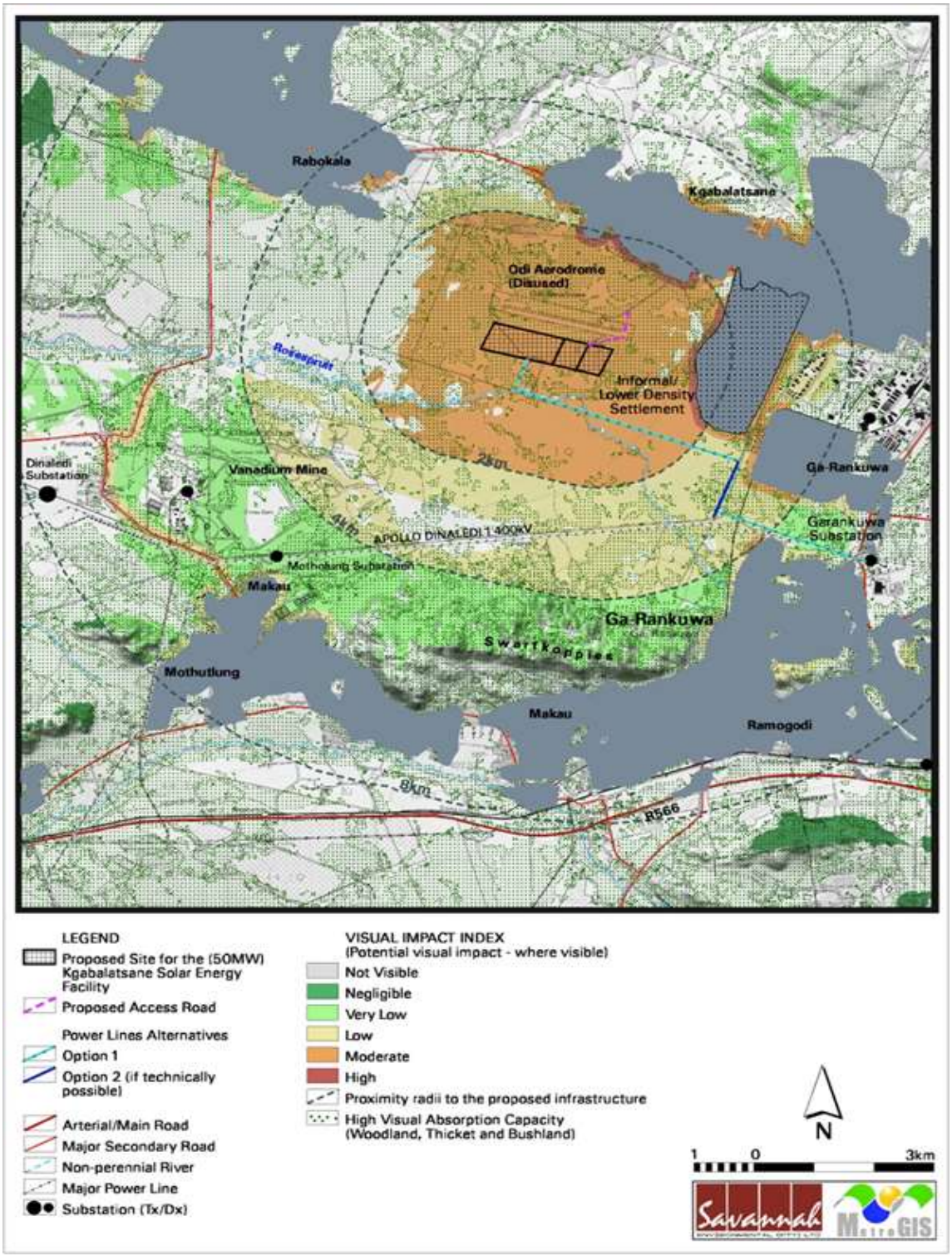
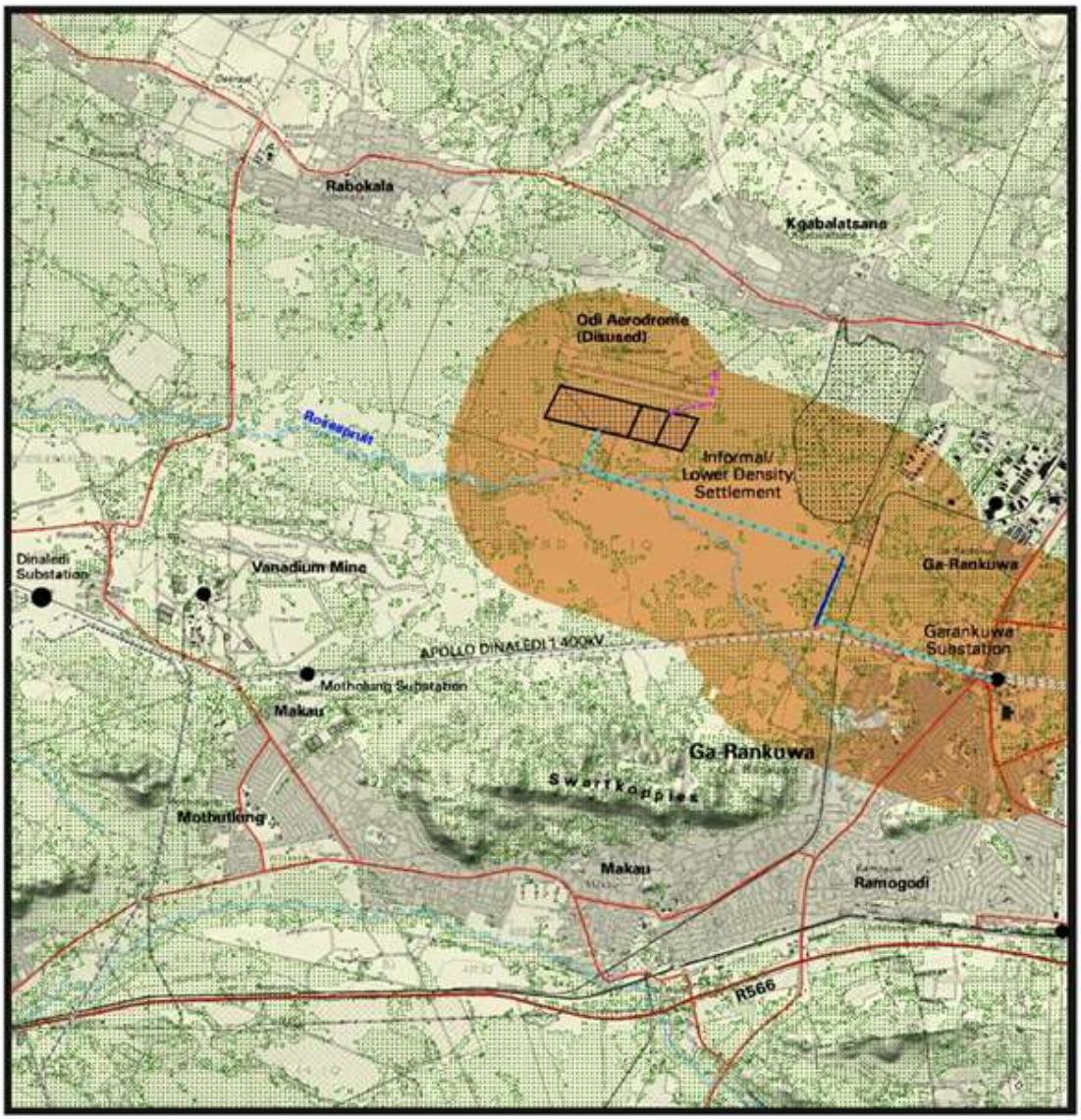


Figure 6.2: Visual Impact Index


Rabokala
Kgabalatsane
Odi Aerodrome (Disused)
Informal/ Lower Density Settlement
Vanadium Mine
Dinaledi Substation
APOLLO DINALEDI 1 400kV
Motholung Substation
Makau
Ga-Rankuwa
Garankuwa Substation
Swartkoppies
Mothutlung
Ramogodi
R566
LEGEND
Proposed Site for the (50MW) Kgabalatsane Solar Energy Facility
Proposed Access Road
Power Lines Alternatives
Option 1
Option 2 (if technically possible)
Arterial/Main Road
Major Secondary Road
Non-perennial River
Major Power Line
Substation (Tx/Dx)
VISIBILITY ANALYSIS
Not Visible/Negligible
Potentially Visible
Areas of Potential Visual Impact (areas of higher viewer incidence and potential sensitive visual receptors)
High Visual Absorption Capacity (Woodland, Thicket & Bushland)
Notes:
The viewshed analysis does not include the effect of planted vegetation and/or structures.
Visibility was calculated at a maximum offset of 20m above ground level for a distance of 2km from the alignment.
N
1 0 3km
Savannah
MetroGIS

Construction Impacts:

Nature: Visual impact of construction activities, vehicles and dust on sensitive visual receptors in close proximity to the proposed facility.

During construction, there will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance a visual nuisance to other road users and land owners in the area.

The clearing of vegetation during construction is unavoidable. Dust from construction work could also result in potential visual impact.

Again, the VAC of the receiving environment reduces the probability of this impact occurring.

	Without mitigation	**With mitigation**
Extent	Local **(2)**	Local **(2)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	**Moderate (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

Mitigation:

Planning:

- Retain and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- Ensure that vegetation is not unnecessarily removed during the construction period.
- Reduce the construction period through careful logistical planning and productive implementation of resources.
- Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
- Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.
- Rehabilitate all disturbed areas immediately after the completion of construction works

Cumulative impacts:

- None

Residual Impacts:
» None, provided rehabilitation works are carried out as specified.

Operation Impacts

Nature: Visual impact on residents of the outskirts of Kgabalatsane and the informal settlement to the east, in close proximity to the proposed facility		
	Without mitigation	**With mitigation**
Extent	Local (2)	N/a
Duration	Long term (4)	N/a
Magnitude	High (8)	N/a
Probability	High (4)	N/a
Significance	**Moderate (56)**	**N/a**
Status (positive or negative)	Negative	N/a
Reversibility	Recoverable (3)	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation:

Planning:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- » Rehabilitate all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

- » Maintain the general appearance of the facility as a whole.
- » Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

- » Remove infrastructure not required for the post-decommissioning use of the site.
- » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions

Cumulative impacts:

» The construction of the PV panels together with the associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the approved PV facilities to the immediate east of the site (i.e. Kgabalatsane PV1 and PV2), as well as the power line infrastructure, industry and and mining already present within the region.

Residual Impacts:

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

Nature: Visual impact on users of the R566 and secondary roads as well as residents on the periphery of Rabokala, the informal settlement east of the site, Kgabalatsane, Ga-Rankuwa, Ramogodi, Mothutlung and Makau within the region.		
	Without mitigation	**With mitigation**
Extent	Regional **(3)**	N/a
Duration	Long term **(4)**	N/a

Magnitude	Moderate **(6)**	N/a
Probability	Improbable **(2)**	N/a
Significance	Low **(26)**	N/a
Status (positive or negative)	Negative	N/a
Reversibility	Recoverable **(3)**	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation:

Planning:

» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:

» Rehabilitate all construction areas.

» Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

» Maintain the general appearance of the facility as a whole.

» Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.

» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.

» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

» The construction of the PV panels together with the associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the the power line infrastructure, industry and mining already present within the region.

Residual Impacts:

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

Nature: Visual impact of the substation, access roads and fencing located on the site on residents of the outskirts of Kgabalatsane and the informal settlement to the east, in close proximity to the proposed facility.

	Without mitigation	**With mitigation**
Extent	Local (2)	N/a
Duration	Long term (4)	N/a
Magnitude	Moderate (6)	N/a
Probability	Improbable (2)	N/a
Significance	**Low (24)**	**N/a**
Status (positive or negative)	Negative	N/a
Reversibility	Recoverable (3)	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation:

Planning:

» Plan ancillary infrastructure in such a way and in such a location that clearing of

vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:
» Rehabilitate all construction areas.
» Ensure that vegetation is not cleared unnecessarily to make way for access roads and ancillary infrastructure.

Operation:
» Maintain the general appearance of the infrastructure.
» Maintain roads to avoid erosion and suppress dust.
» Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:
» Remove infrastructure not required for the post-decommissioning use of the site.
» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

» The construction of the substation, access roads and fencing will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the power line infrastructure, industry and mining already present within the region.

Residual Impacts:

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

Nature: Visual impact of direct lighting and sky glow on sensitive visual receptors in close proximity to the proposed facility.

	Without mitigation	**With mitigation**
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	**Moderate (36)**	**Low (20)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

Planning & operation:
» Shield the sources of light by physical barriers (walls, vegetation, or the structure itself).
» Limit mounting heights of lighting fixtures, or alternatively use foot-lights or bollard level lights.
» Make use of minimum lumen or wattage in fixtures.

- » Make use of down-lighters, or shielded fixtures.
- » Make use of Low Pressure Sodium lighting or other types of low impact lighting.
- » Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes..

Cumulative impacts:

» The local residential, industrial and mining areas already generate light at night. The impact of the proposed SEF will contribute to a regional increase in lighting impact.

Residual Impacts:

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

Nature: Visual impact of the proposed facility on the visual quality of the landscape and sense of place of the region

	Without mitigation	**With mitigation**
Extent	Regional **(3)**	N/a
Duration	Long term **(4)**	N/a
Magnitude	**Moderate (6)**	**N/a**
Probability	Improbable **(2)**	N/a
Significance	**Low (26)**	**N/a**
Status (positive or negative)	Negative	N/a
Reversibility	Recoverable **(3)**	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation:

Planning:

- » Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:

- » Rehabilitate all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

- » Maintain the general appearance of the facility as a whole.
- » Monitor rehabilitated areas, and implement remedial action as and when required.
- » Decommissioning:
- » Remove infrastructure not required for the post-decommissioning use of the site.
- » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
- » Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

» The construction of the PV panels together with the associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of power line infrastructure, industry and mining already present within the region.

Residual Impacts:

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

Nature: **Visual impact of the 132kV power line on residents on the outskirts of the informal settlement east of the site, parts of Ga-Rankuwa, Ramogodi and users of various secondary roads in close proximity to the proposed line.**

Sensitive receptors within this viewshed include residents on the outskirts of the informal settlement east of the site, parts of Ga-Rankuwa, Ramogodi and users of various secondary roads.

Of note is that the eastern third of the line runs alongside the existing 400kV line. This consolidation of infrastructure is considered desirable from a visual perspective as it limits the cumulative extent of visual impact within the region.

	Without mitigation	**With mitigation**
Extent	Local **(2)**	N/a
Duration	Long term **(4)**	N/a
Magnitude	High **(8)**	N/a
Probability	High **(4)**	N/a
Significance	**Moderate (56)**	**N/a**
Status (positive or negative)	Negative	N/a
Reversibility	Recoverable **(3)**	N/a
Irreplaceable loss of resources?	No	N/a
Can impacts be mitigated?	No	

Mitigation:

Planning:

» Plan infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
» Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint.

Construction:

» Rehabilitate all construction areas.
» Ensure that vegetation is not cleared unnecessarily to make way for infrastructure.

Operations:

» Maintain the general appearance of the infrastructure.
» Maintain servitude to avoid erosion and suppress dust.
» Monitor rehabilitated areas, and implement remedial action as and when required.

Decommissioning:

» Remove infrastructure not required for the post-decommissioning use of the site.
» Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications.
» Monitor rehabilitated areas post-decommissioning and implement remedial actions.

Cumulative impacts:

» The construction of the power line will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the power line infrastructure, industry and mining already present within the region.

Residual Impacts:

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

c) Comparison of the Alternatives

The visual impact of the 132kV power line on sensitive visual receptors in close proximity thereto is likely to be of moderate significance. This is true for both alignment Alternatives, Both are considered acceptable due to the limited exposure expected.

d) Implications for Project Implementation

» The anticipated visual impacts listed above (i.e. post mitigation impacts) range from moderate to low, with the highest significance relating to impacts on sensitive visual receptors located in close proximity to the proposed facility and the anticipated visual impact on Sense of Place.
» Affected visual receptors include people living in residential areas, working in industrial areas and mines and commuters travelling along roads.
»

6.1.5 Assessment of Potential Social Impacts

e) Social Impacts - Construction Phase

The key social issues associated with the construction phase are the following:
Potential positive impacts
» Creation of employment and business opportunities, and opportunity for skills development and on-site training.

Potential negative impacts
» Impacts associated with the presence of construction workers on local communities;
» Increased risks to livestock associated with the construction related activities and presence of construction workers on the site;
» Increased risk of grass fires associated with construction related activities;
» Noise, dust and safety impacts of construction related activities and vehicles;
» Impact on productive farmland.

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

Based on the information from other solar energy facility projects the construction phase for a 55 MW SEF is expected to extend over a period of 12-18 months and create approximately 200 employment opportunities during peak construction. The work associated with the

construction phase will be undertaken by contractors and will include the establishment of the solar energy facility and the associated components, including, access roads, substation, services and power line. It is anticipated that approximately 60% (120) of the employment opportunities will be available to low skilled workers (construction labourers, security staff etc.), 25% (50) for semi-skilled workers (drivers, equipment operators etc.) and 15% (30) for skilled personnel (engineers, land surveyors, project managers etc.).

The total wage bill for the construction phase is estimated to be in the region of R 30 million (2014 rand value). This is based on the assumption that the average monthly salary for low skilled, semi-skilled and skilled workers will be in the region of R 5 000, R 8 000 and R 30 000 respectively for a period of 12-18 months. Members from the local communities are likely to be in a position to qualify for the majority of the low skilled and some of the semi-skilled employment opportunities. The majority of these employment opportunities are also likely to accrue to Historically Disadvantaged (HD) members from the local community in the area and Ga-Rankuwa. Given high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The remainder of the semi-skilled and majority of the skilled employment opportunities are likely to be associated with the contactors appointed to construct the solar energy facility and associated infrastructure. However, in the absence of specific commitments from the developer to maximise local employment targets the potential opportunities for local employment will be limited. In addition, the low education and skills levels in the area may also hamper potential opportunities for local communities.

The hospitality industry in the area is also likely to benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project. Experience from other construction projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project.

	Without Enhancement	**With Enhancement**
Extent	Local – Regional (3)	Local – Regional (4)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (44)**	**Medium (48)**
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	N/A	N/A
Can impact be enhanced?	Yes	

Enhancement measures :

In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:

Employment

» Where reasonable and practical, the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely

to be filled by people from outside the area.

» Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria;
» Before the construction phase commences the proponent should meet with representatives from the Bakwena Ba Mogopa clan and MLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase.
» The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project.
» Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
» The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

» The proponent should liaise with the Bakwena Ba Mogopa clan and MLM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work.
» Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.
» The MLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

Cumulative impacts:

» Opportunity to up-grade and improve skills levels in the area.

Residual impacts:

» Improved pool of skills and experience in the local area.

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

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

» An increase in alcohol and drug use;
» An increase in crime levels;
» The loss of girlfriends and/or wives to construction workers;
» An increase in teenage and unwanted pregnancies;
» An increase in prostitution;
» An increase in sexually transmitted diseases (STDs), including HIV.

The potential risk to local residents in the area will be mitigated by a commitment from the proponent's to the implementation of a local employment policy, specifically for the low and semi-skilled employment opportunities associated with the construction phase. As indicated above, the majority of the low skilled (120) and semi-skilled (50) work opportunities are likely to benefit members from the local community. Employing members from the local community to fill the low-skilled job categories will reduce the risk and mitigate the potential impacts on the local communities.

	Without Mitigation	**With Mitigation**
Extent	Local (2) (Rated as 2 due to potential severity of impact on local communities)	Local (1) (Rated as 1 due to potential severity of impact on local communities)
Duration	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STDs etc. (51)	Low for the community as a whole (21 Moderate-High for specific individuals who may be affected by STDs etc. (48)
Status	Negative	Negative
Reversibility	No in case of HIV and AIDS	No in case of HIV and AIDS
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impact be mitigated?	Yes, to some degree. However, the risk cannot be eliminated	

Mitigation:
The potential risks associated with construction workers can be mitigated. The detailed mitigation measures should be outlined in the Environmental Management Plan (EMP) for

the Construction Phase. Aspects that should be covered include:

» Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories.
» The proponent should consider the alternative of establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from the Bakwena Ba Mogopa Tribe councillors, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community associated with construction workers.
» The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation.
» The proponent and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase.
» The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area.
» The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site.
» Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.
» It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

Cumulative impacts:

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

Residual impacts:

» Community members affected by STDs etc. and associated impact on local community and burden services etc.

Nature: Potential risk to livestock associated with the presence of construction workers on site.

The presence on and movement of construction workers on and off the site poses a potential safety threat to the livestock (goats) in the area, which is used for communal grazing. The potential risks can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase.

	Without Mitigation	**With Mitigation**
Extent	Local (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Low (24)**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock losses and damage to farm infrastructure etc.	Yes, compensation paid for stock losses and damage to farm infrastructure etc.
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	Yes

Mitigation:

Key mitigation measures include:

» The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area.
» The proponent should enter into an agreement with the Bakwena Ba Mogopa tribe whereby loss of livestock during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
» Contractors appointed by the proponent should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk to livestock.
» The proponent should consider the Alternative of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site.
» The proponent should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below).
» The Environmental Management Plan (EMPr) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested,
» Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft.
» Contractors appointed by the proponent must ensure that construction workers who are found guilty of stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation.
» The housing of construction workers on the site should be limited to security personnel.

Cumulative impacts:

» None, provided losses are compensated for.
Residual impacts:
» None, provided losses are compensated for.

Nature: Potential loss of grazing land and impact on livestock

The potential risk of grass fires in the area is regarded as moderate to high, specifically during the dry winter months. The present presence of construction workers and construction-related activities on the site may pose an increased risk of grass fires that could in turn pose a threat to livestock and grazing. The potential risk can be effectively reduced by implementing the mitigation measures listed below.

	Without Mitigation	**With Mitigation**
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate due to reliance on agriculture for maintaining livelihoods (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

The mitigation measures include:

» The proponent should enter into an agreement with the local farmers and the Bakwena Ba Mogopa Tribe whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences.
» A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase.
» Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas.
» Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months.
» Contractor to provide adequate firefighting equipment on-site, including a fire fighting vehicle.

» Contractor to provide fire-fighting training to selected construction staff. » No construction staff, with the exception of security staff, to be accommodated on site overnight. » As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the firefighting costs borne by farmers and local authorities.
Cumulative impacts: » None, provided losses are compensated for.
Residual impacts: » Potential loss of income and impact on livelihoods and economic viability of affected farms.

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

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. The property on which the solar energy facility is located, Farm Syferfontein, is bisected by an extension of the M20 (Kgabalatsane Road) from west to east. The proposed dvelopment site is located in the central southern part of the property, and is accessed off the Kgabalatsane Road via a tarred link to the former Odi Aerodrome, locally referred to as "Airport Road". The central and eastern portions of Syferfontein on either side of Kgabalatsane Road consist of built up residential areas, namely Kgabalatsane Village on both sides of the road, and the Kagisano View informal area in the south-eastern portion. The Kgabalatsane Road is also used by pedestrians. The movement of construction related traffic will therefore also create dust and safety risks for pedestrians and other road users.

	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Medium (30)**	**Low (15)**
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impact be mitigated?	Yes	

Mitigation:

The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:

» The movement of heavy vehicles associated with the construction phase should be timed to avoid times of the day when scholars may use the Kgabalatsane Road to walk to schools.
» The movement of heavy vehicles associated with the construction phase should be timed to avoid holiday periods, long weekends and weekends when tourists, and local

community members are more likely to use the Kgabalatsane Road.

» The contractor must ensure that damage caused by construction related traffic to the internal access roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor.
» Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.
» All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.

Cumulative impacts:

» If damage to roads is not repaired then this will impact on other road users and result in higher maintenance costs for vehicles. The costs will be borne by road users who were not responsible for the damage.

Residual impacts:

» Reduced quality of road surfaces and impact on road users.

Nature: The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the solar energy facility and associated power line will damage farmlands and result in a loss of farmlands for grazing.

The activities associated with the construction phase will result in the loss of land available for grazing. It would appear that the Bakwena Ba Mogopa tribe has entered into a lease agreement with the proponent for the use of the land for the proposed facility. The impact on associated with the loss of grazing will be more than offset by the income from the proponent. The impact of the proposed solar energy facility on the economic potential of the farm will therefore be low.

In addition, the final disturbance footprint can also be reduced by careful site design and placement of components. The impact on farmland associated with the construction phase can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase.

	Without Mitigation	**With Mitigation**
Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Medium (6)	Minor (2)
Probability	Probable (3)	Highly Probable (4)
Significance	**Moderate (36)**	**Low (20)**
Status	Negative	Negative
Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be

		rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
Mitigation: The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The aspects that should be covered include: » The site for the proposed solar energy facility should be fenced off prior to commencement of construction activities. » The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised. » An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase. » All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. » The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA. » The implementation of the Rehabilitation Programme should be monitored by the ECO.		
Cumulative impacts: » Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		
Residual impacts: » Land would be available for farming once rehabilitation has been completed.		

f) <u>Social Impacts associated with the operational phase of the proposed facility</u>

The following key social issues are of relevance to the operational phase:

Potential positive impacts

- » Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- » Benefits associated with the establishment of a Community Trust;
- » The establishment of renewable energy infrastructure.

Potential negative impacts

- » Impact on productive farmland;
- » The visual impacts and associated impact on sense of place;
- » Potential impact on tourism.

Operational Impacts:

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

Based on information from estimated global employment ratios per MW of solar PV installed (viz. 0.7 direct long term opportunities/ MW), the proposed SEF would create ~ 35 employment opportunities for over a 20 year period. Of this total approximately 25 will be low skilled, 8 semi-skilled and 2 high skilled positions. The annual wage bill for the operational phase would be ~ R 3 million. The majority of employment opportunities associated with the operational phase is likely to benefit HD members of the local communities in the area. However, given that the solar energy sector in South Africa is relatively new, a number of the skilled positions may need to be filled by people from other parts of South Africa.

It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the MLM IDP.

Given the location of the proposed facility the majority of local permanent staff is likely to reside in local settlements in the area. Non-local permanent staff is likely to look for accommodation in Brits or Haartbeesport Dam. In terms of accommodation Alternatively, a percentage of the non-local permanent employees may purchase houses in the area, while others may decide to rent. Both alternatives would represent a positive economic benefit for the region. In addition, a percentage of the monthly wage bill earned by permanent staff would be spent in the local economy, which will benefit local businesses in the area. The benefits to the local economy will extend over the 20 year operational lifespan of the project.

The local hospitality industry in the area is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations.

	Without Mitigation	**With Enhancement**
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (40)**	**Medium (44)**
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be mitigation?	Yes	

Mitigation:

» As part of the Social Economic Development programme the proponent is committed to implement a training and skills development programme for the duration of the 20 year operating period. The programme should seek to maximise the number of locals that benefit from the programme. The proponent, in consultation with the Bakwena Ba

Mogopa tribe and MLM, should investigate alternatives for the establishment of a Community Development Trust.
Cumulative impacts:
» Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area
Residual impacts:
» Creation of pool of people with experience in field of STPs who are economically mobile

Nature: Establishment of a Community Trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development.

In terms of the Request for Proposal document prepared by the Department of Energy all bidders for operating licences for renewable energy projects must demonstrate how the proposed development will benefit the local community. This can be achieved by establishing a Community Trust which is funded by a dividend stream generated from the sale of energy to the Buyer (Eskom).

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. This revenue can be used to fund development initiatives in the area and support the local community. The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed SEF plant can be used to support a number of social and economic initiatives in the area, including:

» Creation of jobs;
» Education;
» Support for and provision of basic services;
» School feeding schemes;
» Training and skills development;
» Support for SMMEs.

In addition, the establishment of a solar energy facility will not result in a significant loss of grazing land and, as such, impact on the current agricultural land uses that underpin the local economic activities in the area. The facility will therefore not impact on the current and future farming activities.

Experience has shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust.

Community ownership in the project would also create socio-economic benefits for local communities in the area. In terms of REIPPPP the minimum/threshold for shares reserved for the community is 2.5% and a target of 5%. However, the higher the share in terms of ownership the greater the annual cash flow generated by the project to the community.

	Without Enhancement	**With Enhancement**
Extent	Local (2)	Local and Regional (4)

Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	**Medium (30)**	**High (70)**
Status	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impact be mitigation?	Yes	

Enhancement:

In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:

» The Ba Mogopa Tribe and MLM should liaise with the proponent to investigate how best the Community Trusts can be established and managed so as to promote and support local, socio-economic development in the region as a whole.
» The Ba Mogopa Tribe and MLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the MLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager.
» Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;
» Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the solar facility.

Cumulative impacts:

» Promotion of social and economic development and improvement in the overall well-being of the community.

Residual impacts:

» Investment in local economic development in the area that would benefit the community post operational phase.

Nature: Promotion of clean, renewable energy.

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. Much of the coal used has a high sulphur content. As a result South Africa is the nineteenth largest per capita producer of carbon emissions in the world, and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions.

The overall contribution to South Africa's total energy requirements of the proposed SEF is relatively small. However, the 55MW produced will help to offset the total carbon emissions associated with energy generation in South Africa. Given South Africa's reliance on Eskom as a power utility, the benefits associated with an IPP based on renewable energy are regarded as an important contribution.

	Without Enhancement	**With Enhancement** (The provision of renewable energy infrastructure is in itself a mitigation measure)

Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	**Medium (48)**	**Medium (48)**
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impact be mitigated?	Yes	

Enhancement Measures

The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project the proponent should:

» Use the project to promote and increase the contribution of renewable energy to the national energy supply.
» Maximise the public's exposure to the project via an extensive communication and advertising programme.
» Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project.

Cumulative impacts:

» Reduced carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.

Residual impacts:

» Reduced reliance on coal generated energy

Nature: Potential loss of productive agricultural land associated with the solar energy facility footprint and associated potential impact on viability of operations.

The Ba Mogopa clan has entered into a lease agreement with the proponent for the use of the land for the proposed solar energy facility. The impact on farm income due to the loss of grazing will be more than offset by the income from the proponent. The impact of the proposed facility on the grazing related farming activities will therefore be low. The income generated from the lease agreement, as well as a potential shareholding in the project will provide a source of funds for the Ba Mogopa Tribe.

In addition, the final disturbance footprint can also be reduced by careful site design and placement of components. The impact on farmland associated with the operational phase can therefore be mitigated by minimising the footprint of the proposed facility. The impact on current and future agricultural uses of the land is therefore regarded as low.

	Without Mitigation	**With Mitigation** (The provision of renewable energy infrastructure is in itself a mitigation measure)

Extent	Local (1)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	**Low (24)**	**Low (15)**
Status	Negative	Negative
Reversibility	Yes, disturbed areas can be rehabilitated	Yes, disturbed areas can be rehabilitated
Irreplaceable loss of resources?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	Yes, loss of farmland. However, disturbed areas can be rehabilitated
Can impact be mitigated?	Yes, however, loss of farmland cannot be avoided	Yes, however, loss of farmland cannot be avoided
Mitigation: » Recommendations for the construction phase should be implemented. » In terms of closure costs, the costs associated with decommissioning and the rehabilitation of disturbed areas will be covered by the sale of scrap metal (steel and copper) and panels from the PV plant.		
Cumulative impacts: » Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.		
Residual impacts: » Damaged land rehabilitated once project is decommissioned and therefore no residual impacts are expected		

g) Comparison of the Alternatives

The findings of the SIA indicate that Both Alternatives are feasible from a social perspective, as both are largely aligned across vacant BBMTA land, and the portion of Alternative 1 located in Ga-Rankuwa traverses an open area with sufficient space to accommodate an additional 132 kV servitude. Portions of both Alternatives in proximity to residential areas (Ga-Rankuwa RDP and Ga-Rankuwa Unit 20) would be aligned with existing Eskom lines. The potential social impacts associated with each of the overhead power lines Alternatives will therefore be low.

h) Implication for project implementation

» The findings of the SIA indicate that the development of the proposed Kgabalatsane solar energy facility will create employment and business opportunities for locals during both the construction and operational phase of the project.

» The proposed solar energy facility will also create a significant source of much needed revenue for the Ba Mogopa Tribe from the lease of the land.
» The establishment of a Community Trust will also benefit the local community.
» The enhancement measures listed in the report should be implemented in order to maximse the potential benefits.
» The proposed establishment of a number of renewable energy facilities in the MLM will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.
» The proposed development represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Kgabalatsane Solar Energy Facility is therefore supported by the findings of the SIA.

6.3. Assessment of the Do Nothing Alternative

The 'do-nothing' alternative is the Alternative of not constructing the proposed Kgabalatsane Solar Energy Facility. The area has however also been mapped as intact vegetation under the Threatened Ecosystems in South Africa: Descriptions and Maps layer (SANBI 2011), which for the majority of the study area is clearly not the case. The majority of the site has been ploughed in the past and as the CBA status is generally only applicable to intact vegetation, the impact of the development on the CBA status of the area is significantly lower than if the site was intact.

At a local level, the level of unemployment will remain the same and there will not be any transfer of skills to people in terms of the construction and operation of the solar energy facility. Furthermore, the community would lose the opportunity to improve and uplift their infrastructures through the community trust.

At a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the facility is only proposed to contribute 55 MW to the grid capacity, this would assist in meeting the growing electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy. The generation of electricity from renewable energy resources offers a range of potential socio-economic and environmental benefits for South Africa. These benefits include:

» ***Increased energy security:*** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in

a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.

» ***Resource saving:*** Conventional coal fired plants are major consumers of water during their requisite cooling processes. It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres, when compared with wet cooled conventional power stations. This translates into revenue savings of R26.6 million. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.

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

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

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

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

» ***Employment creation:*** The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa.

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

» ***Support to a new industry sector:*** The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

The 'do nothing' alternative will not assist the South African government in addressing climate change, in reaching the set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. In addition the North West power grid will lose an opportunity to benefit from the additional generated power being evacuated directly into the Province's grid at the Garankuwa Substation. The 'do nothing alternative is, therefore, not a preferred alternative.

6.4 Summary of Impacts

Tables 6.1 and 6.2 below summarises all potential impacts associated with the proposed Kgabalatsane Solar Energy Facility.

Table 6.1: Summary of the construction and decommissioning impacts associated with the proposed Kgabalatsane Solar Energy Facility

Construction / Decommissioning Impacts	**Significance of Impact**		**EIA Regulation Listed activity assessed**
	Without mitigation	**With mitigation**	
Ecology Impacts			
Impacts on vegetation and protected plant species would occur due to vegetation clearing associated with the construction of the facility.	Medium (36)	Medium (32)	GNR 545 Item 1 GNR 545 Item 15 GNR 546 Item 14(a) (i)
Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.	Low (24)	Low (21)	
Potential Impacts on Soils and Agricultural Potential			
Loss of agricultural land for arable cultivation during and after the construction phase due to placement of infrastructure	Medium (44)	Medium (44)	GNR 545 Item 1 GNR 545 Item 15
Assessment of Potential Impacts on Heritage and Palaeontology			
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.	Low (9)	Low (8)	GNR 545 Item 1 GNR 545 Item 15
Visual Impacts			
Visual impact of construction activities, vehicles and dust on sensitive visual receptors in close proximity to the proposed facility.	Medium (30)	Low (16)	GNR 545 Item 1 GNR 545 Item 15
Social Impacts			
Creation of employment and business opportunities during the construction phase	Medium (44)	Medium (48)	GNR 545 Item 1 GNR 545 Item 15
Potential impacts on family structures and social networks associated with the presence of construction workers.	Low for the community as a whole (24)	Low for the community as a whole	

	Moderate-High for specific individuals who may be affected by STDs etc. (51)	(21 Moderate-High for specific individuals who may be affected by STDs etc. (48)	
Potential risk to livestock associated with the presence of construction workers on site.	Low (27)	Low (24)	
Potential loss of grazing and impact on livestock	Medium (36)	Low (24)	
Potential dust and safety impacts associated with movement of construction related traffic to and from the site	Medium (30)	Low (15)	
The activities associated with the construction phase, such as establishment of access roads and the construction camp, movement of heavy vehicles and preparation of foundations for the SEF and power lines will damage farmlands and result in a loss of farmlands for grazing.	Medium (36)	Low (20)	

Table 6.2: Summary of operational impacts associated with the proposed Kgabalatsane Solar Energy Facility

Operational Impacts	**Significance of Impact**		**EIA Regulation Listed activity assessed**
	Without mitigation	**With mitigation**	
Ecology Impacts			
Alien plants are likely to invade the site as a result of disturbance created during construction	Medium (36)	Low (18)	GNR 545 Item 15
The operation and presence of the facility may generate impact on fauna.	Low (24)	Low (14)	
Soil Impacts			

Loss of agricultural land for arable cultivation during and after the construction phase due to placement of infrastructure	Medium (44)	Medium (44)	GNR 545 Item 15
Assessment of Potential Impacts on Heritage and Palaeontology			
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.	Low (9)	Low (8)	GNR 545 Item 15
Visual Impact			
Visual impact on residents of the outskirts of Kgabalatsane and the informal settlement to the east, in close proximity to the proposed facility	Medium (56)	N/a	GNR 545 Item 15
Visual impact on users of users of the R566 and secondary roads as well as residents on the periphery of Rabokala, the informal settlement east of the site, Kgabalatsane, Ga-Rankuwa, Ramogodi, Mothutlung and Makau within the region.	Low (26)	N/a	
Visual impact of the substation, access roads and fencing located on the site on residents of the outskirts of Kgabalatsane and the informal settlement to the east, in close proximity to the proposed facility.	Low (24)	N/a	
Visual impact of direct lighting and sky glow on sensitive visual receptors in close proximity to the proposed facility.	Medium (36)	Low (20)	
Visual impact of the proposed facility on the visual quality of the landscape and sense of place of the region	Medium (26)	N/a	
Social Impacts			
Creation of employment and business opportunities associated with the operational phase.	Medium (40)	Medium (44)	GNR 545 Item 15
Establishment of a Community Trust funded by revenue generated from the sale of energy. The revenue can be used to fund local community development.	Medium (30)	High (70)	
Promotion of clean, renewable energy.	Medium (48)	Medium (48)	
Potential loss of productive agricultural land associated with the SEF footprint and associated potential impact on viability of operations.	Low (24)	Low (15)	

Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place.	Medium (32)	Low (28)	

L **Low** M **Medium** H **High**

Table 6.3: Summary of impacts associated with the proposed construction of the power line.

Impacts	**Significance of Impact**		**EIA Regulation Listed activity assessed**
	Without mitigation	**With mitigation**	
Potential Impacts on Ecology			
The presence of the power line may lead to negative impacts on avifauna as a result of electrocution or collisions with the power line.	Low (21)	Low (14)	GNR 544 Item 10 (i)
Potential Impacts on Soil			
Loss of agricultural land for arable cultivation during and after the construction phase due to placement of infrastructure.	Low (28)	Low (28)	GNR 544 Item 10 (i)
Potential Impacts on Heritage and Palaeontology			
Construction of the power line alternatives that may affect heritage resources	Low (9)	Low (8)	GNR 544 Item 10 (i)
Potential Impacts on Visual Impacts			
Visual impact of the 132kV power line on residents on the outskirts of the informal settlement east of the site, parts of Ga-Rankuwa, Ramogodi and users of various secondary roads in close proximity to the proposed line.	Medium (56)	N/a	GNR 544 Item 10 (i)
Potential Impacts on of Social Impacts			
Potential visual impact and impact on sense of place associated with power lines	Low (24)	Low (21)	GNR 544 Item 10 (i)

L **Low** M **Medium** H **High**

ASSESSMENT OF CUMULATIVE IMPACTS:

PV FACILITY AND POWER LINE ALTERNATIVES CHAPTER 7

Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R543) as meaning "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".

There has been a substantial increase in renewable energy developments recently in South Africa as legislation is evolving to facilitate the introduction of Independent Power Producers (IPPs) and renewable energy into the electricity generation mix. Due to the recent substantial increase in interest in renewable energy developments in South Africa, it is important to follow a precautionary approach in accordance with NEMA to ensure that the potential for cumulative impacts are considered and avoided where possible.

It is legal requirement to assess cumulative impacts associated with a proposed development. This chapter considers whether the proposed project's potential impacts become more significant when considered in combination with the other known or proposed solar farm projects within the broader area. There is only one other solar project known to be proposed within the region, and is located approximately 20km from the site. This solar project is located within the footprint of an existing power station. Other electricity related infrastructures surrounding the Kgabalatsane Solar Energy Facility are power lines and substation infrastructure.

7.1 Approach Taken to Assess Cumulative Impacts

Significant cumulative impacts that could occur due to the development of numerous similar developments in an area include impacts such as:

» Loss of vegetation and impacts on ecology
» Impacts on soil and agricultural potential
» Heritage impacts
» Visual impacts
» Social impacts

Figure 7.1 shows the proposed location of the Kgabalatsane Solar Energy Facility in relation to all other known renewable energy applications (These projects were identified using the Department of Environmental Affairs Geographic Information

System digital data developed by the CSIR). It must be noted that none of these facilities are yet Preferred Bidder projects and therefore the potential for implementation is unknown at this stage.

In the sections below the potential cumulative impacts associated with similar projects and energy infrastructure within the immediate vicinity of the proposed Kgabalatsane Solar Energy Facility are explored. The discussion and associated conclusions must be understood in the context of the uncertainty associated with the proposed developments and the qualitative nature of the assessment.

7.2 Cumulative Impacts

In the case of the proposed Kgabalatsane Solar Energy Facility, there is a PV project proposed within 20km of the Kgabalatsane site. However, this proposed facility is contained with an existing power station footprint.

However, the potential cumulative impacts as a result of the proposed projects in the area and existing and planned energy infrastructure (power lines, substations) are expected to be associated predominantly with:

» Ecology: The site lies within a critical biodiversity area and the transformation of habitat within the critical biodiversity area may negatively affect the biodiversity or the functioning of the critical biodiversity area. However, given the fact that the majority of the site has been transformed in the past, cumulative impacts on natural vegetation are expected to be relatively low. However the development would still potentially impact the connectivity of the landscape as the current state still allows the use of the area by the majority of fauna.

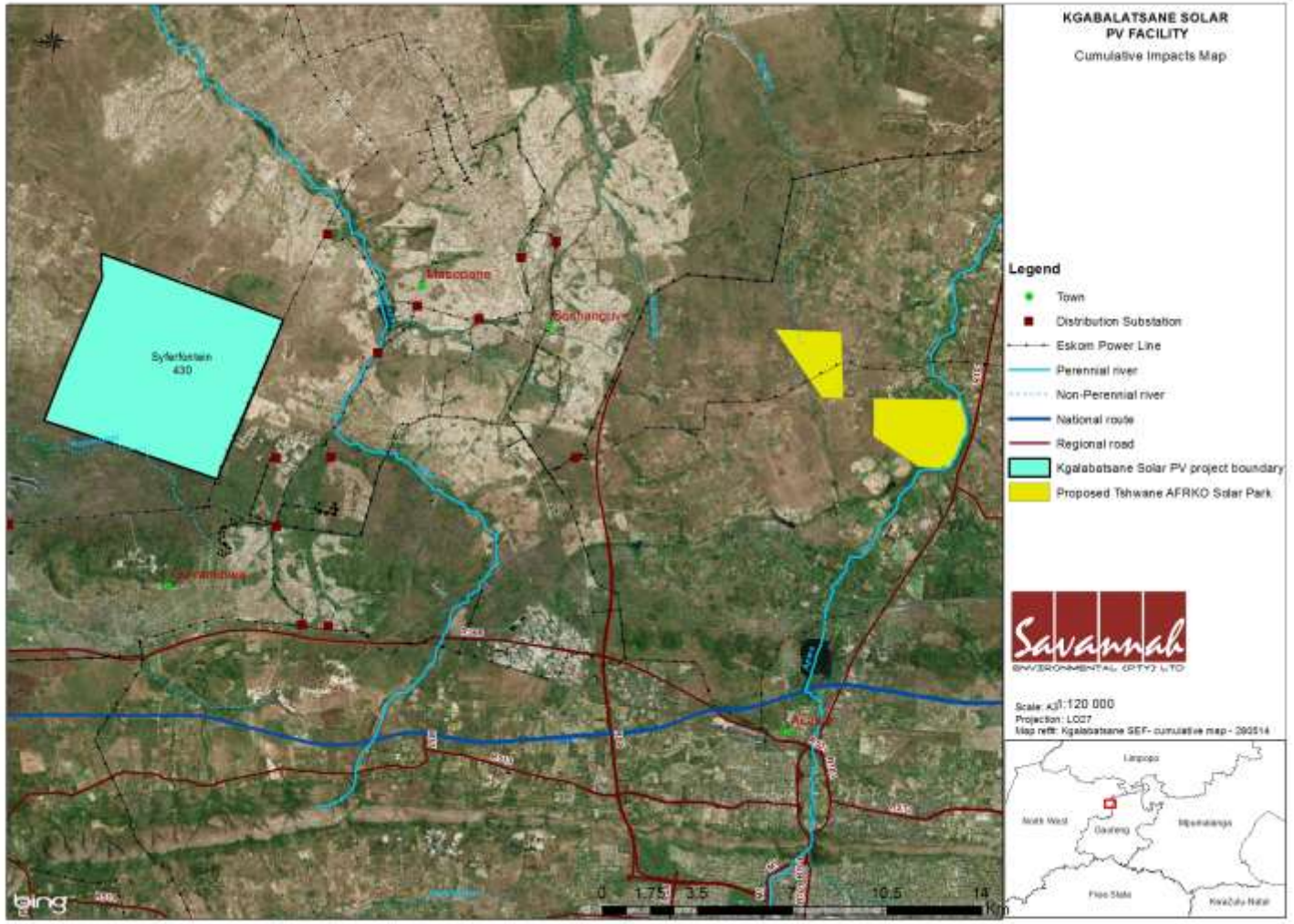


Figure 7.1: Proposed renewable energy facilities on whole farm portions in the vicinity of Kgabalatsane Solar Energy Facility

» Visual - The visual integrity of the area has already been impacted by the existing power lines that traverse the area. In addition, at a broader level the visual integrity of the area has been negatively impacted by the mining activities and associated mine dumps and mining related infrastructure. The potential for cumulative impacts on the area's sense of place and landscape character due to the establishment of the proposed solar facility and other proposed renewable energy projects in the area is therefore considered to be limited.

» Social - The proposed solar energy facility and establishment of other proposed renewable energy projects in the area have the potential to result in significant positive cumulative socio-economic impacts for the community at a regional level. The positive cumulative impacts include creation of employment, skills development and training opportunities (construction and operational phase), creation of downstream business opportunities and stimulation of the local property market. The significance of this impact is rated as High positive with enhancement.

» Soil and agricultural potential: With other similar developments in the direct vicinity, the cumulative impact of regional soil erosion raises a concern. However, this is not the case. The closest development is approximately 20km from the proposed Kgabalatsane Solar Energy Facility. For all types of development, soil erosion needs to be properly manage and protect soil surfaces and mitigate the impact of soil erosion this impact should not have a significant cumulative effect. On a cumulative basis, the impact resulting from a change in land use or veld condition could have a significant impact on agricultural potential. The site however, is of low agricultural potential.

7.3 Conclusion regarding Cumulative Impacts

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa.

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

It is also important to note that it is unlikely that all proposed renewable energy facilities located in the 20km radius will be constructed and operated due to

capacity constraints on the Eskom grid and the limits placed on renewable energy targets. Considering the findings of the specialist assessments undertaken for the project, the cumulative impacts for the proposed Kgabalatsane Solar Energy and power line alternatives will be of **low significance.**

CONCLUSIONS AND RECOMMENDATIONS CHAPTER 8

The Kgabalatsane Solar Energy Facility is proposed to be developed as a commercial solar energy facility to be located on the farm Syferfontein 430, which falls within the Madibeng Local Municipality, North West Province (refer to Figure 8.1). The purpose of the proposed facility is to add new capacity for generation of power from renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand), and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

Globally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of non-renewable resources. In order to meet the long-term goal of a sustainable renewable energy industry, 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. This is however dependent on the assumed learning rates and associated cost reductions for renewable options.

As such Kgabalatsane Solar (Pty) Ltd, as an IPP, is proposing the establishment of a 55MW photovoltaic solar energy facility and associated infrastructure for the purpose of commercial electricity generation. The proposed facility will require a development footprint area of approximately 103 ha, and will be comprised of the following primary elements (refer to Chapter 2 for more details):

» 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 a loop-in loop-out connection to the existing power line which is located approximately 3km from the on-site 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.

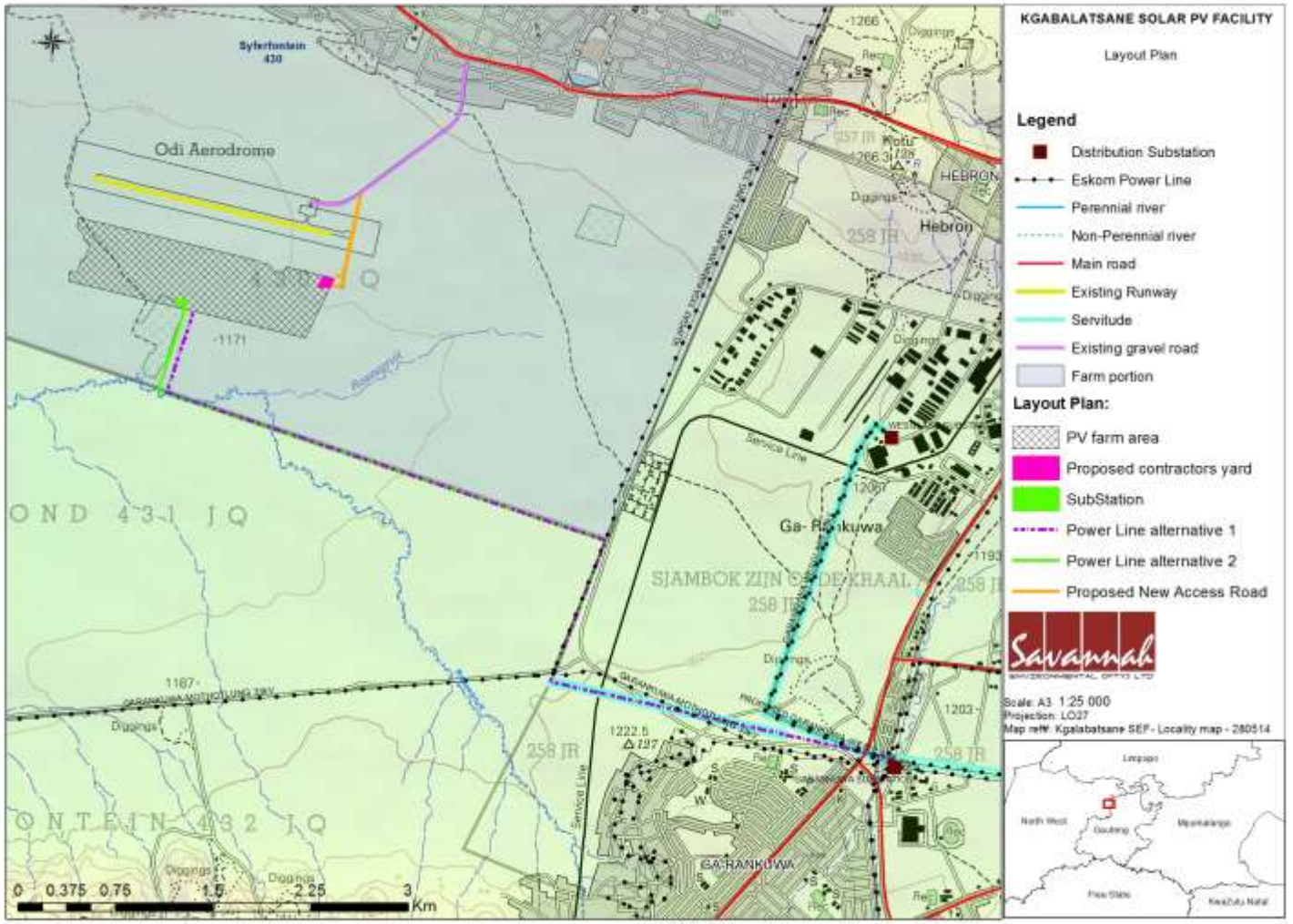


Figure 8. 1: Layout map illustrating the location of the development site for the proposed Kgabalatsane Solar Energy Facility and preliminary layout of the proposed facility

An EIA process, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing, and reporting environmental impacts associated with an activity. The EIA process forms part of the feasibility phase of a project and informs the final design of a development. In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), Kgabalatsane Solar (Pty) Ltd requires authorisation from the National Department of Environmental Affairs (DEA) (in consultation with the North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) for the establishment of the proposed facility. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR543, GNR544, GNR545, and GNR546, a Scoping and an EIA Phase have been undertaken for the proposed project. As part of this EIA process comprehensive, independent environmental studies have been undertaken in accordance with the EIA Regulations. The following key phases have been included in the EIA Process.

» *Notification Phase* – organs of state, stakeholders, and interested and affected parties (I&APs) were notified of the proposed project using adverts, site notices, background information documents, and stakeholder letters. Details of registered parties have been included within an I&AP database for the project.
» *Scoping Phase* [5]– potential issues associated with the proposed project and environmental sensitivities (i.e. over the broader project development site), as well as the extent of studies required within the EIA Phase were identified.
» *EIA Phase* – potentially significant biophysical and social impacts[6] and identified feasible alternatives put forward as part of the project have been comprehensively assessed through specialist investigations. Appropriate mitigation measures have been recommended as part of a draft Environmental Management Programme (EMPr) (refer to **Appendix K)**.

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

[6] Direct, indirect, cumulative that may be either positive or negative.

8.1 Evaluation of Kgabalatsane Solar Energy Facility

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

From the conclusions of the detailed EIA studies undertaken, sensitive areas within the development footprint area were identified and flagged for consideration and avoidance by the facility layout (refer to **Figure 8.2**). Potential impacts which could occur as a result of the proposed project are summarised in the sections which follow.

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

» Impacts on Ecology
» Impacts on soil and agricultural potential
» Heritage and palaeontological impacts
» Social impacts

8.1.1. Impacts on Ecology

The vegetation of the site is representative of Marikana Thornveld and a large proportion of the species is reportly typical of this vegetation type were observed at the site. The majority of the site has been disturbed by ploughing in the past, which is contradictory to the desk-top information which indicates that the site is classified as a CBA on the basis that it represents intact vegetation. Due to the previously disturbed and ploughed nature of the site, several potentially highly significant impacts associated with the development are reduced to a low level, especially those on vegetation and CBAs. It is only a small section of the proposed development area along the western boundary of the site which is considered relatively sensitive on account of the lower level of disturbance which characterises this area.

The density of woody plants at the site varies considerably and there are some parts of the site which can be considered to be bush-encroached. The only area at the site which is considered to be of higher sensitivity is along the western margin

of the site where there is a less disturbed area which may also have been disturbed in the past but retains a greater degree of structural integrity that the rest of the site. Due to the Vulnerable status of Marikana Thornveld, this area should be avoided. Although there are a number of plant species of conservation concern known from the area, none of these were observed at the site and it is highly unlikely that any of these species are present. There are however a number of protected tree species present including Marula *Sclerocarya birrea*. The density of these species within the site is however low and it is not likely that the development would compromise the local populations of any of these species.

There are a number of plant species of conservation concern known from the area. None of these were observed at the site and it is highly unlikely that any of these species are present. There are however a number of protected tree species present including *Marula Sclerocarya birrea*. The density of these species within the site is however low and it is not likely that the development would compromise the local populations of any of these species.

The Kgabalatsane PV Facility is likely to result in ecological impacts of low overall significance and there are no highly significant impacts that would represent a red-flag or fatal flaw for the development.

The following recommendations are made for the proposed site:

» Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained.
» Due to the disturbance at the site as well as the increased runoff expected to be generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented.
» Regular monitoring for alien plants must be undertaken within the development footprint.

8.1.2 Soil and Agricultural Potential Impacts

The soils on the site are 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 were encountered.

Soil depths range from 400 mm to 1 200 mm. The area has been previously cultivated, and the natural vegetation consists of 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.

The impacts for the proposed project:

- Loss of agricultural land for arable cultivation during and after the construction phase due to placement of the facility and the power line
- Soil erosion

8.1.3. Visual Impacts

The anticipated visual impacts range from **moderate to low**, with the highest significance relating to impacts on sensitive visual receptors located in close proximity to the proposed facility and the anticipated visual impact on Sense of Place.

- 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. Visual impacts of the solar energy facility on sensitive visual receptors within a 2km radius of the site (i.e. residents on the outskirts of Kgabalatsane and the informal settlement to the east of the site) are expected to be of moderate significance.
- 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.
- Visual impacts of the solar energy on sensitive visual receptors beyond a 2 km radius of the site (i.e. users of the R566 and secondary roads as well as residents on the outskirts of Rabokala, the informal settlement east of the site, Kgabalatsane, Ga-Rankuwa, Ramogodi, Mothutlung and Makau) are expected to be of low significance.
- The visual impact of on site ancillary infrastructure (i.e. the substation, the access roads and fencing) on sensitive visual receptors in close proximity to the solar energy is expected to be of low significance.
- The visual impact of the 132kV power line on sensitive visual receptors in close proximity thereto is likely to be of moderate significance. This is true for both alignment options.
- The visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed solar energy facility will be of low significance.
- The visual impacts related to construction on sensitive visual receptors in close proximity to the proposed facility will be of low significance.

» In terms of secondary visual impacts, the significance of the anticipated impact on the visual quality of the landscape and the sense of place of the region is expected to be of low significance.

8.1.4. Impacts on Heritage Sites and Palaeontology

No sites of archaeological or heritage significance were identified during the heritage survey. A Palaeontological desktop study by Prof Marion Bamford (2012) for the area also indicated that there is no impact foreseen on the fossil record of South Africa. However, if during construction, any archaeological finds are made (e.g. stone tools, skeletal material), the operations must be stopped, and the archaeologist must be contacted for an assessment of the finds.

It was concluded that the power line options considered will have a low impact on archaeological and paleontological resources since the area it will be traversing is highly disturbed by agricultural activities. It is however recommended that the final route option preferred by the developers is subjected to an archaeological walk through survey before the commencement of construction.

8.1.5. Impacts on the Social Environment

The findings of the SIA indicate that the development of the proposed Kgabalatsane Solar Energy Facility will result in positive social impacts as a result of the creation of employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximse the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the Madibeng Local Municipality and North West Province will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed Kgabalatsane Solar Energy Facility is therefore supported by the findings of the SIA. However, the potential impacts associated with large, solar energy facilities on an areas sense of place and landscape cannot be ignored.

8.2 Evaluation of Power line Alternatives Facility

The most significant environmental impacts associated with the proposed construction of the power line, as identified through the EIA include:

» **Impacts on avifauna**

The presence of the power line may lead to negative impacts on avifauna as a result of electrocution or collisions with the power line. New power line infrastructure should be bird-friendly in configuration and adequately insulated. These activities should be supervised by someone with experience in this field.

Both power line options assessed are considered acceptable and while the shorter Option 2 is preferable, if this option cannot be built, then Option 1 is an acceptable alternative.

» **Impacts on heritage resources**

Connection to the power grid consists of two options. The power line will have a low impact on archaeological resources since the area it will be traversing is highly disturbed by agricultural activities. It is however recommended that the final route option preferred by the developers is subjected to an archaeological walk down before development can start. Both options are considered acceptable

» **Visual impacts**

Visibility of the proposed power line was calculated at a height of 20m above ground level, for a distance of 2 km on either side of the proposed line. It is clear from the map that just about all of the area within the above 2km offset will be exposed to potential visual impact as a result of this line.

Sensitive receptors within this viewshed include residents on the outskirts of the informal settlement east of the site, parts of Ga-Rankuwa, Ramogodi and users of various secondary roads.

» Of note is that the eastern third of the line runs alongside the existing 400kV line. This consolidation of infrastructure is considered desirable from a visual perspective as it limits the cumulative extent of visual impact within the region.

» The anticipated visual impact resulting from the proposed 132 kV power line is thus likely to be of **moderate** significance. No mitigation of this impact is

possible, but measures are recommended as best practice. The table below illustrates this impact assessment.

» **Impacts on the social environment**
The findings of the SIA indicate that both power line Options are feasible from a social perspective, as both are largely aligned across vacant BBMTA land, and the portion of Alternative 1 located in Ga-Rankuwa traverses an open area with sufficient space to accommodate an additional 132 kV servitude.

From a technical perspective, Alternative 1 is preferred as Alternative 2 traverses a future mining area. Therefore, Alternative 1 is recommended as the preferred option.

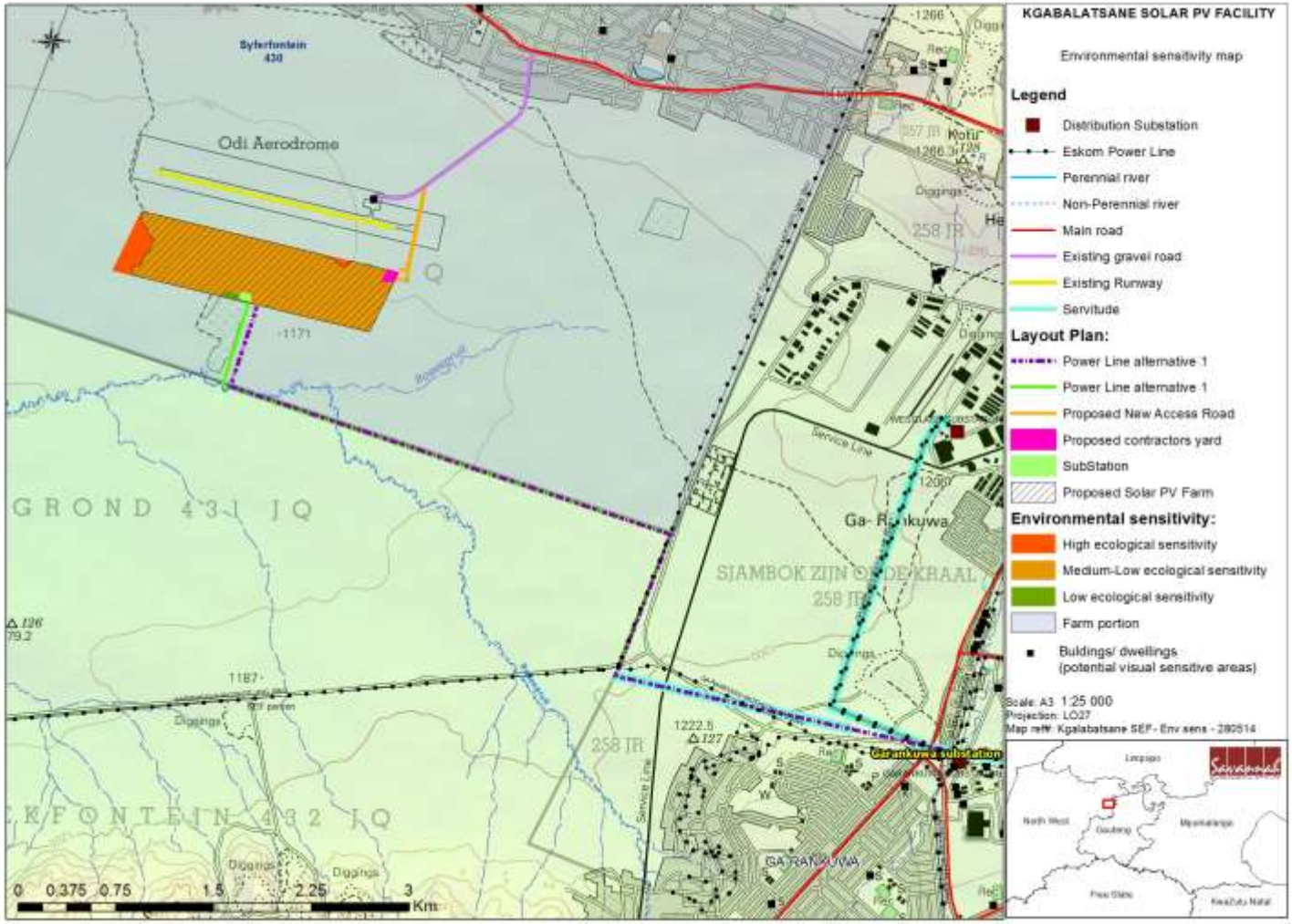


Figure 8.2: Sensitivity map of the proposed Kgabalatsane Solar Energy Facility

8.2 Assessment of Potential Cumulative Impacts

The potential ***direct and indirect cumulative impacts*** as a result of the proposed project (PV facility and power line) are expected to be of low significance as the nearest solar development is 20km from the site and is located in a developed area.

8.3. Overall Conclusion (Impact Statement for the project on the development footprint)

The technical viability of establishing a solar energy facility with an export capacity of 55 MW on the farm Syferfontein 430, as well as an associated power line connecting to the electricity grid has been established by Kgabalatsane Solar (Pty) Ltd. The positive implications of establishing a solar energy facility on the identified site within the North West Province include the following:

» Creation of local employment, business opportunities, skills development and upliftment for the area.
» The potential to harness and utilise solar energy resources within the study area.
» Promotion of clean, renewable energy in South Africa. The project would assist the South African government in reaching their set targets for renewable energy.
» The project would assist the South African government in the implementation of its green growth strategy and job creation targets.
» The project would assist the district and local municipalities in reducing level of unemployment through the creation of jobs and supporting local business.
» The National electricity grid as well as the local grid within in the North West Province would benefit from the additional generated power.

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

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

8.4. Overall Recommendation

Global climate change is widely recognised as being one of the greatest environmental challenges facing the world today. How a country sources its energy plays a big part in tackling climate change. As a net off-setter of carbon, renewable energy technologies can assist in reducing carbon emissions, and can play a big part in ensuring security of energy supply, as other sources of energy are depleted or become less accessible. South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result, South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer of carbon emissions. With the aim of reducing South Africa's dependency on coal generated energy, and to address climate change concerns, the South African Government has set a target, through the Integrated Resource Plan (IRP) for electricity to develop 17.8 GW of renewables (including 8,4GW solar) within the period 2010 – 2030.

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

The layout that was assessed and presented in the EIA phase is considered to be acceptable as the developer has taken the identified environmental sensitivities into consideration. Both power line options are considered to be acceptable from an environmental perspective. However, from a technical perspective, Alternative 1 is considered to be preferred. The preferred power line route is therefore Alternative 1.

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

» The draft Environmental Management Programme (EMPr) as contained within Appendix L of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed solar energy facility, and will

be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.

» Power line Alternative 1 is recommended as the preferred.
» It is recommended that the final power line route option preferred by the developers be subjected to an archaeological walk through survey before development can start.
» Rehabilitate an acceptable vegetation layer according to rehabilitation recommendations of the relevant EMPr.
» The grid connection should be planned to follow existing tracks as far as possible to avoid or minimise further disturbances to remaining natural vegetation on the site.
» All declared aliens must be identified and managed in accordance with the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), the implementation of a monitoring programme in this regard is recommended.
» Develop emergency maintenance operational plan to deal with any event of contamination, pollution, or spillages.
» Access roads to the development should follow existing tracks. Where new access routes will be necessary, suitable erosion control measures must be implemented.
» In terms of ancillary infrastructure, it is recommended that access roads and other on-site infrastructure be planned so that the clearing of vegetation is minimised.
» Once the facility has exhausted its life span, the main facility and all associated infrastructure not required for the post rehabilitation use of the site should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.
» An independent Environmental Control Officer (ECO) must be appointed by the project developer prior to the commencement of any authorised activities.
» Compile a comprehensive stormwater management plan, as part of the final design of the project and implement during construction and operation.

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