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Savannah
ENVIRONMENTAL (PTY) LTD

06 February 2012

South African Heritage Resource Agency: North West Province
111 Harington Street
Cape Town
8001

9/2/215/0001

ATT: Colette Scheemeyer
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PROPOSED KABI VAALKOP SOLAR PV FACILITY ON A SITE NEAR ORKNEY, NORTH WEST PROVINCE
(DEA Ref No. 12/12/20/2513/1 to 12/12/20/2513/4)

An Environmental Impact Assessment (EIA) process is currently being undertaken by Savannah Environmental in accordance with the EIA Regulations GNR544; GNR545; and GNR546 published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998) for the establishment of above mentioned project.

Please find herewith the following for your review and comment:
1XCD and Hard Copy of the Draft Scoping Report

The public review period for the Draft Scoping Report is between **03 February 2012 and 05 March 2012**. Please note that as an organ of state, you have **40 days** to comment on this report.

Please submit written comment to:
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Kind Regards

Bongani Khupe

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT SCOPING REPORT

PROPOSED KABI VAALKOP SOLAR PV FACILITY ON A SITE NEAR ORKNEY, NORTH WEST PROVINCE

DEA Ref No: 12/12/20/2513/1to 12/12/20/2513/4

DRAFT FOR PUBLIC REVIEW

03 February 2012 - 05 March 2012

Prepared for:

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PROJECT / EIA INFORMATION LIST – DEA REQUIREMENTS

According to the requirements of the DEA, site, technical and environmental information on the proposed project are to be included in the scoping and/or EIA reports, or appended to these reports. The tables below provide details of where the required information is presented in this Final Scoping Report. Where information can only be provided in the EIA phase, this is indicated in the tables below.

1. General Site

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

2. Site maps and GIS information

No.	Information	Provided
2.1	All maps/information layers must also be provided in ESRI Shapefile format	Included on the CD submitted with the report
2.2	All affected farm portions must be indicated	Refer to Figure 1.1 of this report – locality map
2.3	The exact site of the application must be indicated (the areas that will be occupied by the application)	Refer to Figure 1.1 of this report – locality map
2.4	A status quo map/layer must be provided that includes the following: Current use of the land on site including:	See Figure 1.1 and 4.4 for land cover/land use map
	2.4.1 Buildings and other structures	Also shown on Figure 4.2
	2.4.2 Agricultural fields	*The entire site fall within*

No.	Information	Provided
		mining land there are no agricultural activities.
	2.4.3 Grazing areas	*Grazing is currently restricted on site due to safety reasons. However, some livestock still find their way to the site.*
	2.4.4 Natural vegetation areas (natural veld not cultivated for the preceding 10 years) with an indication of the vegetation quality as well as fine scale mapping in respect of Critical Biodiversity Areas and Ecological Support areas	See Figure 4.4 (Vegetation quality to be confirmed in the EIA Phase)
	2.4.5 Critically endangered and endangered vegetation areas that occur on the site	Vegetation types on site are considered Vulnerable see chapter 4 and Appendix E
	2.4.6 Bare areas which may be susceptible to soil erosion	*These areas will be mapped in the EIA phase as they cannot be mapped on a desktop level.*
	2.4.7 Cultural historical sites and elements	No sites have been identified at desktop level (see appendix H)
	2.4.8 Rivers, streams and water courses	No sites have been identified at desktop level
	2.4.9 Ridgelines and 20m continuous contours with height references in the GIS database	See Figure 4.2
	2.4.10 Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs	*To be confirmed in the EIA phase (unknown at desktop level)*
	2.4.11 High potential agricultural areas as defined by the Department of Agriculture, Forestry & Fisheries	No agricultural areas identified
	2.4.12 Buffer zones (also where it is dictated by elements outside the site): • 500m from any irrigated agricultural land • 1km from residential areas • Indicate isolated residential, tourism facilities on or within 1km of the site	*Buffer zones to be mapped in the EIA phase*
2.5	A site development proposal map(s)/layer(s) that indicate:	*Facility layout with this information to be provided in the EIA phase.*
	2.5.1 Position of solar facility	
	2.5.2 Foundation footprint	
	2.5.3 Permanent laydown area footprint	*Facility layout with this information to be provided in the EIA phase*
	2.5.3 Construction period laydown footprint	
	2.5.4 Internal road indicating width (construction period width and operation period width) and with	

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

3. Regional map and GIS information

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

No.	Information	Provided
	upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams	

PROJECT DETAILS

DEA Reference No.	:	» Kabi Vaalkop Solar I PV Facility, DEA ref: 12/12/20/2513/1 » Kabi Vaalkop Solar II PV Facility, DEA ref: 12/12/20/2513/2 » Kabi Vaalkop Solar III PV Facility, DEA ref: 12/12/20/2513/3 » Kabi Vaalkop substation and power line, DEA ref: 12/12/20/2513/4
Title	:	Environmental Impact Assessment Process Draft Scoping Report: Proposed Kabi Vaalkop Solar PV Facility on a site near Orkney, North West Province
Authors	:	Savannah Environmental (Pty) Ltd Bongani Khupe Karen Jodas
Sub-consultants	:	Terrasoil Science David Hoare Consulting cc University of South Africa: Department of Anthropology & Archaeology Index MetroGIS
Client	:	Kabi Solar (Pty) Ltd
Report Status	:	Draft Scoping Report for Public Review

When used as a reference this report should be cited as: Savannah Environmental (2012) Draft Scoping Report: Proposed Kabi Vaalkop Solar PV Facility on a site near Orkney, North West Province

PURPOSE OF THE SCOPING REPORT

Kabi Energy is currently undertaking an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of the proposed Kabi Vaalkop Solar PV Facility on a site near Orkney, North West Province. Kabi Energy has appointed **Savannah Environmental** as the independent environmental consultants to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The EIA process is divided into two phases, namely the Scoping Phase and the EIA Phase. Scoping plays a vital role as it ensures that the EIA is appropriately focused; the main objectives of the Scoping Phase are:

- To **engage with stakeholders** at an early stage of the project development so that they may contribute their views/interest/concerns
- To **define the scope** of the EIA;
- To **define the methodology** that is required for the EIA
- To **describe the plan of study** for the EIA

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

- **Chapter 1** introduces the reader to the proposed project, including information regarding Kabi Solar, the rationale/motivation for the proposed project and the requirements for an EIA as per the legislation.
- **Chapter 2** provides an overview of the project including alternatives, a description of solar energy as an electricity generation option and the steps to be undertaken during the construction, operation and decommissioning phases.
- **Chapter 3** outlines the approach to undertaking the Scoping Phase which includes the phase's objectives, the legal context by which it is being undertaken, the methodology used and the public participation process.
- **Chapter 4** provides a brief description of the receiving environment in terms of the regional setting, the climatic conditions, the biophysical characteristics and the social characteristics.
- **Chapter 5** evaluates the potential issues associated with the project by summarising the nature and extent of potential issues as well as "No-Go" areas within the broader site. It also identifies gaps in knowledge and recommendations for studies within the EIA Phase.
- **Chapter 6** presents the conclusions of the Scoping Phase with respect to the identified potential impacts.
- **Chapter 7** describes the Plan of Study for the EIA which includes the aims of this phase, the nature of the authority consultation, the consideration of

SUMMARY

Kabi Solar (Pty) Ltd (Kabi Solar) is proposing to establish a commercial solar photovoltaic energy generation facility as well as associated infrastructure on a site approximately 8 km north east of Orkney, in the North West Province (see figure 1). The facility will be referred to as the **Kabi Vaalkop Solar PV Facility** and will have a generating capacity of up to **225 MW**, which will be developed in three phases of 75 MW each, with a fourth aspect of the proposed development being the substation and power line required for grid connection of the three PV facilities. Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs). As such, each phase/part of this project has been registered with the National DEA under following application reference numbers respectively:

- Kabi Vaalkop Solar I PV Facility (75MW), DEA ref: 12/12/20/2513/1
- Kabi Vaalkop Solar II PV Facility (75MW), DEA ref: 12/12/20/2513/2
- Kabi Vaalkop Solar III PV Facility (75MW), DEA ref: 12/12/20/2513/3
- Kabi Vaalkop substation and power line, DEA ref: 12/12/20/2513/4

Infrastructure associated with **each of the three** PV facilities will include:

- Photovoltaic solar panels;
- Foundations to support the PV panels;
- Cabling between the project components, to be laid underground where practical;
- Internal access roads; and
- Workshop area for operations, maintenance and storage

The new onsite substation will be shared by all the three phases. Electricity form the first phase is to be evacuated to via the existing Jouberton – Hermes 132 kV power line that crosses the site. To evacuate additional power generated by the second and third phases a new overhead 132 kV power line to connect directly to the Eskom Hermes Substation via the new on site substation will need to be constructed.

A broader study area of approximately 779 ha is being considered within which the facility is to be constructed, although the actual development footprint of the proposed facility would be smaller in extent. Therefore, the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid any identified environmental sensitivities.

The proposed PV facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA) 107 of 1998. In terms of Section 24(1) of NEMA, the potential impact on the environment must be considered, investigated, assessed, and reported on to the competent

authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As each phase/part of the project will be constructed and operated by a separate Special Purpose Vehicle, separate Environmental Authorisations will be required to be obtained. As such, each phase/part of this project has been registered with the National DEA under reference numbers 12/12/20/2513/1 to 12/12/20/2513/2.

The majority of potential impacts identified to be associated with the construction and operation of the proposed three solar energy facilities including the substation and power line are anticipated to be local to regional in extent. The study area covering all the three phases and transmission infrastructure appears to be in a mostly natural condition. From the project point of view, these are areas where infrastructure should only be placed with caution or mitigation measures must be implemented to minimize impacts. No environmental fatal flaws were identified to be associated with the site. In addition, due to the nature of the site, no areas of potential high environmental sensitivity were identified at the scoping stage.

A ground-truthing exercise will be conducted during the EIA phase to verify any sensitive area that could occur on site. Any potentially sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase.

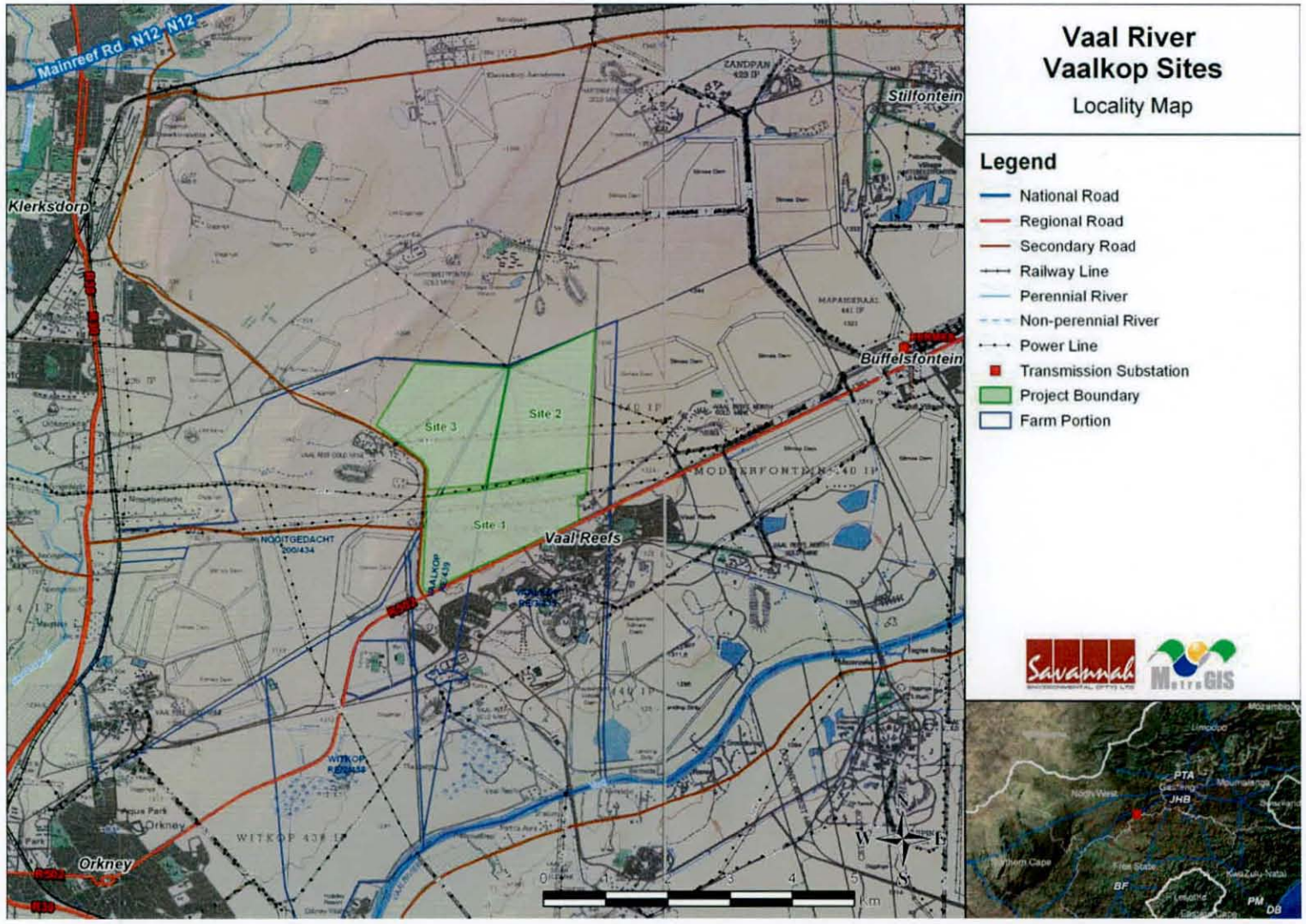

Figure 1: Locality map showing the Portion 200 of Farm Nooitgedacht 434 IP, a portion of Portion 3 of the Farm Vaalkop 439 IP and on a portion of Farm Vaalkop 439 IP, the proposed site for the establishment of the solar facility, as well as the position of the 3 phases of the proposed 225MW PV solar facility including the power line and substation

CHAPTER: 8 REFERENCES **99**

APPENDICES

Appendix A: EIA Project Consulting Team CVs
Appendix B: Correspondence from Department of Environmental Affairs
Appendix C: I&AP Database
Appendix D: Public Participation Information
Appendix E: Background Information Document
Appendix F: Ecology Scoping Study
Appendix G: Soil and Agricultural Potential Scoping Study
Appendix H: Heritage Scoping Study
Appendix I: Visual Scoping Study
Appendix J: Social Scoping Study
Appendix K: Project Maps

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place.

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

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

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

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

Photovoltaic effect: This is where energy, in the form of photons, is converted into electrical energy. It is also defined as the process where a photon is detected by an imager, and the imager then converts the photon into an electrical current (i.e., voltage).

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

Ramsar Convention on Wetlands: "The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer http://www.ramsar.org/). South Africa is a Contracting Party to the Convention.

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

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

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

Sustainable Utilisation (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". (Ramsar Convention Secretariat. 2004. Ramsar

handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer http://www.ramsar.org/).

Wise Use (*sensu* Convention on Wetlands): Defined in Handbook 1 (citing the third meeting of the Conference of Contracting Parties (Regina, Canada, 27 May to 5 June 1987) as "the wise use of wetlands is their sustainable utilisation for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem".(Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (see http://www.ramsar.org/)

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CO_2	Carbon dioxide
DEA	Department of Environmental Affairs
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FIT	Feed-in Tariffs
GDP	Gross Domestic Profit
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
LUPO	Rezoning and Subdivision in terms of Land Use Planning Ordinance, Ordinance 15 of 1985
NCDENC	Northern Cape Department of Environment and Nature Conservation
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)
REFIT	Renewable Energy Feed-in Tariffs
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

Kabi Solar (Pty) Ltd (Kabi Solar) is proposing to establish a commercial solar photovoltaic energy generation facility as well as associated infrastructure on a site approximately 8 km north east of Orkney, in the North West Province. The facility will be referred to as the **Kabi Vaalkop Solar PV Facility** and will have a generating capacity of up to **225 MW**, which will be developed in three phases of 75 MW each, with a fourth aspect of the proposed development being the substation and power line required for grid connection of the three PV facilities. Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs). From a regional perspective, this region of the North West Province is considered by the developer to be preferred for solar energy development by virtue of its climatic conditions (primarily due to the economic viability of a solar energy facility being directly dependent on the annual direct solar irradiation values for a particular area). A study of available radiation undertaken by the developer shows that the proposed site is uniformly irradiated by the sun. From a local perspective, the site is preferred by Kabi Solar due to suitable topography, relative proximity to a suitable grid connection, access, the extent of the site available for development (site falls within mining land owned by AngloGold Ashanti Limited) and the surrounding industrial type land use (mining).

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

1.1. Summary of the proposed Development

The facility is proposed on Portion 7 of Farm Vaalkop 439 IP, a portion of Farm Vaalkop 439 IP, a portion of Portion 3 of Farm Vaalkop 439 IP, and a portion of Portion 200 of Farm Nooitgedacht 434 IP near Orkney, North West Province. The site is bordered to the south by the R502 from Orkney with Eskom's Hermes Substation located approximately 6 km east of the site (refer to Figure 1.1). A broader study area of approximately 779 ha is being considered within which the facility is to be constructed, although the actual development footprint of the proposed facility would be smaller in extent. Therefore, the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the broader site to avoid any identified environmental sensitivities.

It is proposed that the PV solar facility be developed as three (3) phases. In addition, grid infrastructure would be developed to connect the three PV facilities to

the Eskom grid. Each phase of the PV facility, as well as the grid infrastructure will be developed and operated by a separate Special Purpose Vehicle (SPV). The following phases/projects are proposed to be developed (see the attached locality map for the location of each phase):

- **Kabi Vaalkop Solar I PV Facility** (75 MW)
- **Kabi Vaalkop Solar II PV Facility** (75 MW)
- **Kabi Vaalkop Solar III PV Facility** (75 MW)
- **Kabi Vaalkop Substation and power line**

Infrastructure associated with **each of the three** PV facilities will include:

- Photovoltaic solar panels;
- Foundations to support the PV panels;
- Cabling between the project components, to be laid underground where practical;
- Internal access roads; and
- Workshop area for operations, maintenance and storage.

The **fourth project** planned as part of the proposed development involves the construction of an on-site substation and power line which will be used to evacuate power from the proposed development. As the four phases/projects are proposed to form part of a larger solar energy facility development, a consolidated EIA process[1] is being undertaken with a single EIA report being produced to assess the potential environmental impacts associated with each phase of the development, as well as the potential cumulative impacts of all four phases/projects. A single public participation process will be undertaken to consider all four phases/projects of development.

The scope of the proposed Kabi Vaalkop Solar PV 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] The approach to undertake one consolidated EIA process has been accepted by DEA

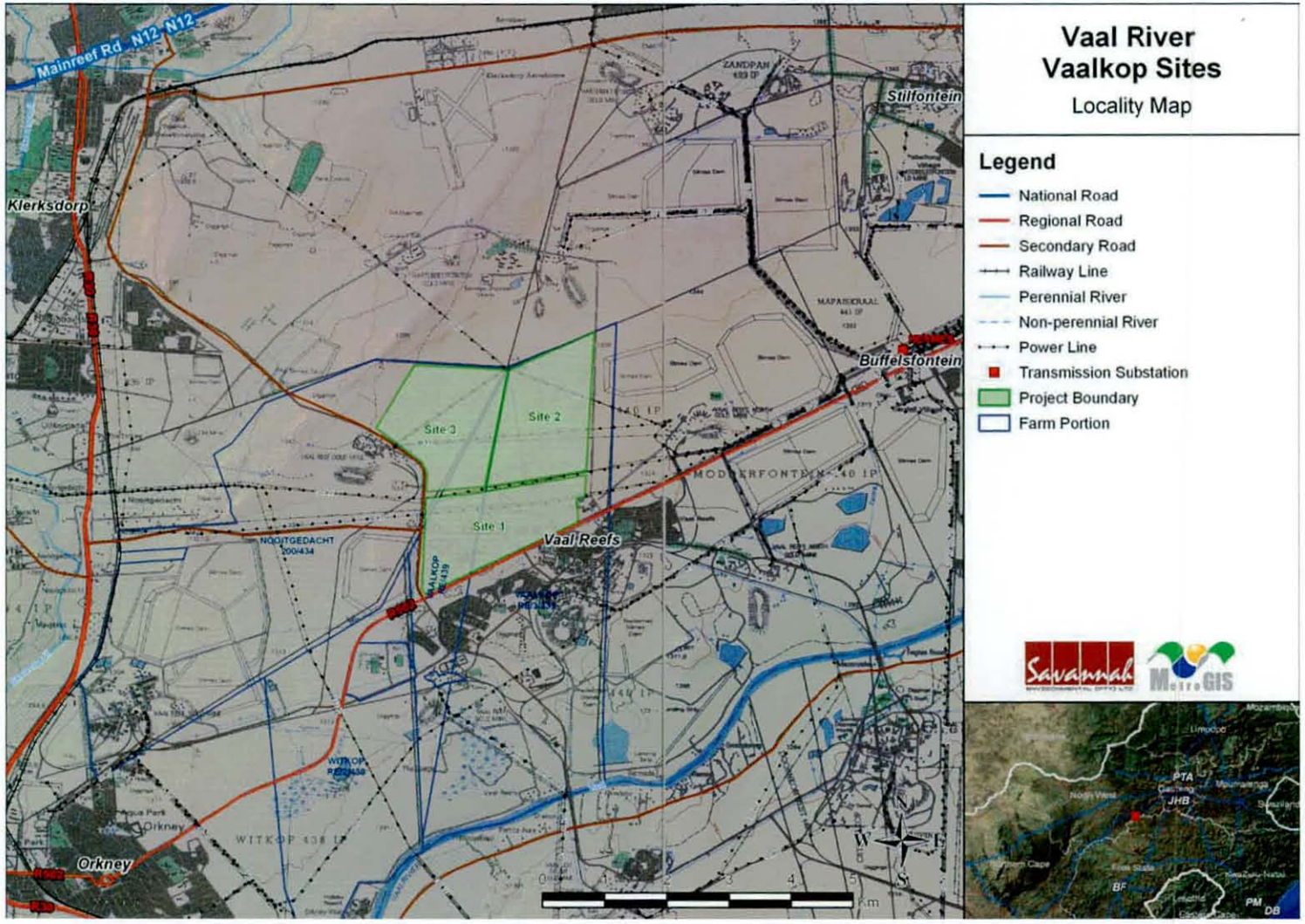

Figure 1.1: Locality map showing the Portion 200 of Farm Nooitgedacht 434 IP, a portion of Portion 3 of the Farm Vaalkop 439 IP and on a portion of Farm Vaalkop 439 IP, the proposed site for the establishment of the solar facility, as well as the position of the 3 phases of the proposed 225MW PV solar facility including the power line and substation

1.2. Requirement for an Environmental Impact Assessment Process

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

NEMA is the national legislation that provides for the authorisation of "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority who has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the North West Department of Economic Development, Environment, Conservation and Tourism (North West DEDECT), will act as a commenting authority for the application. As each phase/part of the project will be constructed and operated by a separate Special Purpose Vehicle, separate Environmental Authorisations will be required to be obtained. As such, each phase/part of this project has been registered with the National DEA under following application reference numbers respectively:

- Kabi Vaalkop Solar I PV Facility (75MW), DEA ref: 12/12/20/2513/1
- Kabi Vaalkop Solar II PV Facility (75MW), DEA ref: 12/12/20/2513/2
- Kabi Vaalkop Solar III PV Facility (75MW), DEA ref: 12/12/20/2513/3
- Kabi Vaalkop substation and power line, DEA ref: 12/12/20/2513/4

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

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the developer with the opportunity of being fore-warned of potential environmental issues. Subsequently it may assist with the resolution of issues reported on in the Scoping and EIA Phases as well as promoting dialogue with interested and affected parties (I&APs) and stakeholders.

In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations R543, a Scoping Phase and an EIA are required to be undertaken for each phase of the project including the associated powerline and substation as the proposed project includes the following "listed activities" in terms of GN R544 and R545 (GG No 33306 of 18 June 2010).

Number and date of the relevant notice:	**Activity No (s) (in terms of the relevant notice):**	**Description of listed activity from Regulations**	**Relevance of Regulation to Project**
GN544[2]	10	The construction of facilities or infrastructure for the transmission and distribution of electricity – (a) Outside urban areas or industrial complexes with a capacity of more than 33kV but less than 275kV	Construction of a 132 kV power line (outside an urban area).
GN544	11 (ii)(xi)	The construction of: (iii) bridges; (xi) infrastructure or structures covering 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measures from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	Potential construction of buildings within 32m of a watercourse (to be confirmed in the EIA phase, based on the design of the facility).
GN544	18 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil shells, shell grit, pebbles or rock from a watercourse	Potential activities required to cross watercourse (to be confirmed in the EIA phase).
GN544	22	The construction of a road, outside urban areas, (i) with a reserve wider than 13.5 metres or, (ii) where no road reserve	Access roads will be constructed, dimensions to be confirmed in the EIA phase, based on the design of the facility.

[2] Activities requiring a Basic Assessment

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of listed activity from Regulations	Relevance of Regulation to Project
		exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 of Government Notice 387 of 2006 or activity 18 of Notice 545 of 2010.	
GN544	47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (i) where the existing road reserve is wider than 13.5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.	Farm (gravel) access roads may be widened, to be confirmed in the EIA phase, based on the design of the facility.
GN545[3]	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.	The solar energy facility will consist of PV panels for electricity generation of up to 225MW for the whole facility (all 3 PV facilities combined). Invertors and substations are ancillary infrastructure for this facility.
GN545	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; Except where such physical alteration takes place	The footprint of physical alternation will exceed 20ha.

[3] Activities requiring a Scoping and EIA Study

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice):	Description of listed activity from Regulations	Relevance of Regulation to Project
		for: (i) Linear development activities. (ii) Agriculture or afforestation where activity 16 in this schedule will apply.	

This Draft Scoping Report documents the description and evaluation of the potential environmental impacts of the proposed photovoltaic plant and forms part of the EIA process. The Scoping Phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of NEMA.

1.3. Details of the Environmental Assessment Practitioner and Expertise to conduct the EIA Process

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

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

» *Karen Jodas* - a registered Professional Natural Scientist and holds a Master of Science degree. She has 15 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which

includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. She is currently responsible for the project management of EIAs for several renewable energy projects across the country.

» *Bongani Darryl Khupe* – the principle author of this report is a registered Professional Natural Scientist who holds a Bachelor of Science Honours degree and has more than 5 years' experience in the environmental field. His key focus is on environmental impact assessments, environmental permitting, public participation, environmental management plans and programmes, strategic environmental advice, rehabilitation advice and monitoring, environmental compliance advice and monitoring as well as providing technical input for projects in the environmental management field. He is currently the responsible EAP for several renewable energy projects and other EIAs across the country.

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

» EIA and EMP for the proposed Kathu Solar Energy Facility, Northern Cape Province
» EIA and EMP for the proposed Sishen Solar Energy Facility, Northern Cape Province
» EIA and EMP for the proposed Waterberg Solar Energy Facility, Limpopo Province.
» BA and EMP for the proposed Photovoltaic Installation at the OR Tambo Airport, Gauteng Province
» BA and EMP for the proposed Photovoltaic Installation at the Kimberley Airport, Northern Cape Province
» BA and EMP for the proposed Photovoltaic Installation at the Upington Airport, Northern Cape Province
» BA and EMP for the proposed Photovoltaic Installation at the Bloemfontein Airport, Free State Province
» EIA and EMP for the proposed Khi CSP Solar Thermal Plant near Upington, Northern Cape Province
» The proposed KaXu CSP Solar Thermal Plant near Pofadder, Northern Cape Province
» The proposed Thupela Energy PV Plant near Vaalwater, Limpopo Province
» EIA and EMP for the proposed Ilanga Solar Thermal Power Plant, Northern Cape Province

- BA and EMP for the proposed Kabi Kimberley PV Solar Energy Facility, Northern Cape Province
- BA and EMP for the proposed RustMo1 Photovoltaic Plant, North West Province
- BA and EMP for the proposed RustMo2 Photovoltaic Plant, North West Province.

Savannah Environmental has developed a valuable understanding of impacts associated with the construction and operation of renewable energy facilities. In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed specialist consultants as required. Curricula vitae for the Savannah Environmental project team and its specialist sub-consultants are included in Appendix A.

OVERVIEW OF THE PROPOSED PROJECT CHAPTER 2

This chapter provides an overview of the proposed Kabi Vaalkop Solar PV Facility. The project scope includes the planning/design; construction; operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also explores the "Do-Nothing" alternative - that is the alternative of not establishing the facility. Lastly, it explores solar energy facilities, particularly, solar photovoltaic facilities, as a means for power generation.

2.1. Overview of the proposed project

The solar PV energy facility is proposed to accommodate an array of **photovoltaic** (PV) panels with a generating capacity of up to **225 MW**, which will be developed in three phases of 75MW each, with a fourth aspect of the proposed development being the substation and power line required for grid connection for the three facilities. Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs). The following phases/projects are proposed to be developed (also refer to Figure 1.1):

» **Kabi Vaalkop Solar I PV Facility** (75 MW)
» **Kabi Vaalkop Solar II PV Facility** (75 MW)
» **Kabi Vaalkop Solar III PV Facility** (75 MW)
» **Vaalkop Substation and power line**

Infrastructure associated with **each of the three** PV facilities will include:

» Photovoltaic solar panels with a generating capacity of 75 MW
» Foundations to support the PV panels;
» Cabling between the project components, to be laid underground where practical;
» Internal access roads; and
» Workshop area for operations, maintenance and storage.

Table 2.1 below shows a detailed breakdown of infrastructure associated with each phase, generating capacity of each phase as well as the affected farm portions.

Table 2.1: Proposed phases and associated infrastructure

Phase	DEA Ref: Number	Capacity	Area	Farm Portions	21 Digit Numbers	Associated infrastructure
Kabi Vaalkop Solar I PV Facility	12/12/20/2513/1	75 MW	255.6 Ha	• a portion of Portion 200 of Farm Nooitgedacht 434 IP, • a portion of Portion 3 of the Farm Vaalkop 439 IP and • on a portion of Farm Vaalkop 439 IP	• T0IP00000000043400200 • T0IP00000000043900003 • T0IP00000000043900000	» Photovoltaic solar panels » Onsite substation to be shared by all three phases » Short 132 kV power line to turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via the new onsite substation » Foundations to support the PV panels; » Cabling between the project components, to be laid underground where practical; » Internal access roads; and » Workshop area for maintenance and storage
Kabi Vaalkop Solar II PV Facility	12/12/20/2513/2	75 MW	261.6 Ha	• a portion of Portion 3 of the Farm Vaalkop 439 IP	• T0IP00000000043900003	» Photovoltaic solar panels » New onsite substation to be shared by all three phases » A new overhead 132 kV power line to connect directly to the Eskom Hermes Substation via the new on site substation (to be shared with the Kabi Vaalkop Solar III PV Facility)

Phase	DEA Ref: Number	Capacity	Area	Farm Portions	21 Digit Numbers	Associated infrastructure
						» Foundations to support the PV panels; » Cabling between the project components, to be laid underground where practical; » Internal access roads; and » Workshop area for maintenance and storage
Kabi Vaalkop Solar III PV Facility	12/12/20/2513/3	75 MW	262 Ha	• on a portion of Portion 200 of Farm Nooitgedacht 434 IP and • on a portion of Farm Vaalkop 439 IP	• T0IP00000000043400200 • T0IP00000000043900000	» Photovoltaic solar panels » New onsite substation to be shared with all three phases » A new overhead 132 kV power line to connect directly to the Eskom Hermes Substation to be shared with the Kabi Vaalkop Solar II PV Facility via the new onsite substation. » Foundations to support the PV panels; » Cabling between the project components, to be laid underground where practical; » Internal access roads; and » Workshop area for maintenance and storage

Phase	DEA Ref: Number	Capacity	Area	Farm Portions	21 Digit Numbers	Associated infrastructure
Vaalkop Substation and power line	12/12/20/2513/4			• substation is proposed to be located on a portion of Portion 3 of the Farm Vaalkop 439 IP and on a portion of Farm Vaalkop 439 IP	• T0IP00000000043900000 • T0IP00000000043900003	The new substation (100 m X 100 m) is to be shared by all three phases. Phase I of the proposed development will turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via this new substation while a new power line to Hermes substation will be required for phase II and III. Details of the additional power line are as follows. The new 132 kV power line will be less than 6 km in length and will connect the new on-site substation to the Eskom Hermes Substation, which lies to the east of the site. The new power line is to be used to evacuate the power from the Kabi Vaalkop Solar II and Kabi Vaalkop Solar III PV facilities.

2.2. Solar Energy as a Power Generation Technology

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

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

2.2.1 How do Grid Connected Photovoltaic Facilities Function?

Photovoltaic facilities generate electricity through the use of photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells which absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the **"photovoltaic effect"**. The individual photovoltaic cells are commonly constructed from silicon, are linked together and placed behind a protective glass sheet to operate in unison as a photovoltaic panel (refer to Figure 2.2).

In order to produce 225 MW (all three PV facilities combined) of power, the proposed plant will require numerous panels arranged in multiples/arrays which will be fixed to a support structure. In order to maximise the amount of electricity generated the panels need to be angled in such a fashion so to receive the maximum amount of solar radiation throughout the year. The preferred angle of the panels (which is dependent on the latitude of the proposed facility) may be adjusted to optimise for summer or winter solar radiation characteristics. Lastly, an **inverter** will be used to convert the electricity which is produced as direct current (DC) to alternating current (AC).

Figure 2.2: Photograph illustrating photovoltaic panels

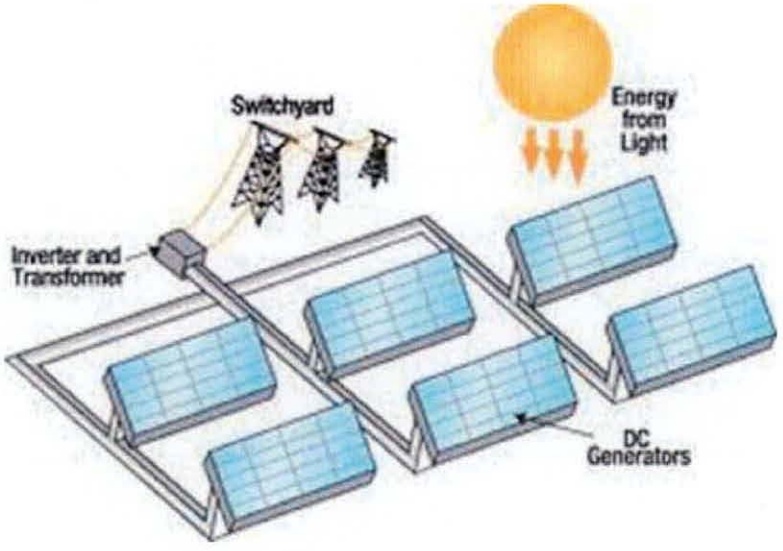

Figure 2.3: Schematic diagram of a PV plant (Sourced from: http://www.solar-green-wind.com/archives/tag/solar-cells)

2.3. Rationale for the proposed Kabi Vaalkop Solar PV Facility

The primary rationale for the proposed Kabi Vaalkop Solar PV Facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of a 42% share of all new installed generating capacity (new build) being derived from renewable energy forms, as targeted by the Department of Energy (DoE) (Integrated Resource Plan (IRP), 2010 – 2030). In terms of the

Integrated Resource Plan (IRP), approximately 8.4% of the renewable energy mix is planned to be generated from PV technologies over the next thirty years. This is, however, dependent on the assumed learning rates and associated cost reductions for renewable options.

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

In addition, the project location was specifically chosen for the construction of a PV solar facility (Kabi Vaalkop PV I to III) for the following reasons:

» Close proximity to the Hermes Substation located approximately 6 km east of the site. Whilst Kabi Vaalkop PV I will connect directly (via the proposed Vaalkop Substation) into the Jouberton-Hermes 132 kV line, the development of the Kabi Vaalkop PV II and III will only require the construction of a new short power line to Hermes Substation.
» A study of available radiation data from both satellite sources and from two ground-based meteorological stations shows that the proposed site has sufficient solar irradiation levels to warrant the development of a solar PV generation facility.
» The site is relatively flat as preferred for the installation of PV panels.
» Parts of the site are relatively degraded due to mining activities.

2.4. Project Alternatives

2.4.1. Site Alternatives

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

» **Climatic conditions**: The economic viability of a photovoltaic plant is directly dependent on the annual direct solar irradiation values. A study of available

radiation shows that the proposed site is uniformly irradiated by the sun and therefore appropriate for a solar energy facility.

- **Topography**: A level surface area is preferred for the installation of PV panels. This reduces the need for extensive earthworks associated with the levelling of a site, thereby minimising environmental impacts. The topography of the area proposed for the PV facility is relatively flat.
- **Extent of site:** Space is a restraining factor; for example an area of 779 ha will be required for a 225 MW facility (all three PV facilities and the new substation). The proposed site will therefore be more than sufficient for the installation of the plant as well as its associated infrastructure within the boundary of the broader site.
- **Power transmission considerations:** Due to historical gold mining activity in the area, the site is crossed by a number of Eskom power lines. In addition, Eskom's Hermes Substation is located less than 6 km from the eastern boundary of the site. Whilst there is sufficient capacity for the first phase of the PV facility to connect directly (via the proposed Vaalkop Substation) into the Jouberton-Hermes 132 kV line that traverses the site, a new short overhead power line between Vaalkop Substation and Hermes Substation will be needed for the subsequent two phases. It has been determined through preliminary discussions with Eskom that this substation has capacity to receive the power from the proposed facility.
- **Site accessibility**: The site can be accessed directly from the R502 from Orkney. The site lies approximately 8 km northeast of Orkney. The site is therefore appropriately located for easy transport of components and equipment.
- **Land use**: The proposed site is on mining land that is part of Vaal Reefs Mine (owned by AgloGold Ashanti Limited). The site is currently vacant and the proposed development will fit with the current land use.

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

2.4.2. Layout Design Alternatives

Based on engineering and technical considerations, the areas being considered for the establishment of the three proposed PV facilities has been determined. The areas being considered are relatively larger than the area that will be required for the installation of the PV panels and associated infrastructure (for each phase). However, once sufficient information is available from an environmental and planning perspective for the broader site, a detailed micro-siting exercise will be undertaken to effectively 'design' the solar facility and its associated infrastructure within the boundaries of the study site. A preliminary layout will be considered during the EIA Phase.

Local level issues being considered within site-specific studies and assessments in order to delineate areas of sensitivity within the proposed study area include:

» Soil, agricultural potential and land capacity;
» Social impacts;
» Ecological impacts on flora and fauna;
» Heritage resources, and
» Visual impacts and site aesthetics.

The facility layout will be planned through the process of determining constraining factors. The overall aim is to **maximise electricity production** through exposure to the solar resource, while **minimising infrastructure, operation and maintenance costs, and social and environmental impacts.** The planning process will also include the positioning of the ancillary infrastructure, including but not limited to the internal access roads and the substation.

2.4.3. The 'Do-Nothing' Alternative

The 'Do-Nothing' alternative is the option of not constructing the proposed Kabi Vaalkop Solar PV Facility. This alternative would result in no environmental impacts on the site or surrounding area. However, should this alternative be selected then the socio-economic and environmental benefits of this renewable energy facility will not be realised. These benefits are explored in further detail in the South Africa REFIT Regulatory Guideline published by NERSA (March 2009), and include:

» **Increased energy security:** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
» **Resource saving:** Conventional coal fired plants are major consumers of water during their requisite cooling processes. It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres, when compared with wet cooled conventional power stations; this translates into revenue savings of R26.6 million. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.
» **Exploitation of our significant renewable energy resource:** At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will

strengthen energy security through the development of a diverse energy portfolio.

» **Pollution reduction:** The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation.

» **Climate friendly development:** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for ~1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita CO_2 emissions.

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

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

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

» **Protecting the natural foundations of life for future generations:** Actions to reduce our disproportionate carbon footprint can play an important part in ensuring our role in preventing dangerous anthropogenic climate change; thereby securing the natural foundations of life for generations to come.

This alternative will be assessed further within the EIA phase.

2.5. Proposed Activities during the Project Development Stages

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

2.5.1 Construction Phase

The construction of the facility will be phased. Approximately 75 MW will be constructed for each of the three PV facilities. In addition, grid infrastructure (including an on-site substation and overheard power line) will be constructed to connect all three phases to the Hermes Substation. The construction of each of the three (3) phases/facilities is anticipated to take up to 24 months while construction

of the substation and power line would take a period of approximately 6 months. Construction would entail a series of activities including:

Conduct Surveys

Prior to initiating construction, a number of surveys will be required including, but not limited to confirmation of the micro-siting footprint (i.e. the precise location of the PV panels and the plant's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed site. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

A power line servitude survey will also be conducted for the proposed distribution power line to connect to the Hermes Substation. Once the placement of the towers for the power line has been finalised, a walk through survey may be undertaken for ecological, archaeology and heritage resources (where deemed necessary) which may necessitate certain towers to be moved to avoid on-the-ground sensitivities.

Establishment of Access Roads

The identified farm portion for the proposed facility can be accessed directly via the R502 Road from Orkney. It is not envisaged that any new access roads will be required to be constructed in order to access the site. However, internal access roads will be required to access the individual components within the facility during construction and operation. Where necessary, it may be required, in some areas, to strip off the existing vegetation and level the exposed ground surface 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 at the footprint of each support structure. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site. If the terrain is undulating, then the ground may have to levelled. Rocks may also be removed as well as trees that may be obstacles.

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

Transport of Components and Construction Equipment to Site

The components for the proposed facility will be transported to site, in sections, by road. Some of the substation components may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)[4] by virtue of the dimensional limitations (i.e. length and weight). The typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.), as well as components required for the establishment of the substation and power line.

Establishment of Construction Equipment Camps

Once the required equipment has been transported to site, a dedicated construction equipment camp will need to be established within the developmental footprint (a separate area is likely to be established for each phase). The purpose of this camp is to confine activities and storage of equipment to one designated area to limit the potential ecological impacts associated with this phase of the project. The laydown area(s) will be used for assembly purposes and the general placement/storage of construction equipment. The storage of fuel for the on-site construction vehicles and equipment will need to be secured in a temporary bunded facility so as to prevent the possibility of leakages and soil contamination.

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

Establishment of the PV Panels

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

The PV panels will be mounted via steel structures which will be attached to uprights which are stabilised by concrete foundations where necessary. The angle of the panels will be tilted at 25° from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2.8 m -3 m from ground level.

The establishment of the tracker foundations can only be determined after geotechnical testing has been performed to confirm geophysical and geochemical ground conditions. The installation of the underground cables will require the excavation of trenches of approximately 40 cm – 100 cm deep within which they can then be laid.

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

Figure 2.6: Trenching for underground cables for the PV panels

Establishment of Ancillary Infrastructure

Ancillary infrastructure per phase includes inverters, a security room, and a temporary contractor's equipment camps.

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

Construct on-site substation

An on-site substation of approximately 100 x 100 m will be required to be established on the site within the development footprint for use by the Kabi Vaalkop Solar I, II and III PV solar energy facilities. The construction of the substation would include the construction of the foundations, erection and installation of equipment (including the transformer) and connection of the necessary conductors.

Undertake Site Rehabilitation

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

2.5.2 Operational Phase

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

The proposed operational phase is expected to run for more than 20 years, with plant maintenance. It is anticipated that during this time full time security, maintenance, supervision and monitoring teams will be required on site. Maintenance activities will include *inter alia*, replacement and cleaning of the panels. The photovoltaic plant will be operational during daylight hours only. However, it will not be operational under circumstances of mechanical breakdown, extreme weather conditions or maintenance activities.

2.5.3 Decommissioning Phase

The Power Purchase Agreement (PPA) associated with the solar PV plant is for a 20 year duration. Depending on the prevailing electricity regulatory regime at the end of the PPA and economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. However, if the decision is made to decommission the facility the following activities will form part of the project scope.

Site Preparation

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

Disassemble and Replace Existing Components

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

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 3

An Environmental Impact Assessment (EIA) refers to the process involving the identification and assessment of potential direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises a **Scoping Phase** and an **EIA Phase**. The Scoping Phase culminates in the submission of a Scoping Report to DEA as the competent authority for review and acceptance before proceeding onto the EIA Phase of the process. The EIA Phase culminates in the submission of an EIA Report, including a draft Environmental Management Programme (EMP), to the competent authority for decision-making.

Figure 3.1: Summary of the phases of the EIA process, as is relevant to this project

Phase 1 (notification of the EIA Process) has already been undertaken. This phase included:

- The submission of the application form to undertake a Scoping and EIA Process to the National Department of Environmental Affairs on 10 October 2011. Application reference numbers **12/12/20/2513/1 to 12/12/20/2513/4** were issued on 21 October 2011.
- A process advert which details the nature and scope of the proposed project as well as the manner in which to raise comments or concerns was placed in the Klerksdorp Record, on 11 November 2011.
- Several site notices, in both English and Afrikaans were placed on the site boundary and at public locations in Orkney on the 22nd of November 2011 (refer to Appendix D).
- A stakeholder letter and Background Information Document (BID) has been distributed together with a reply form to potential interested and affected parties (I&APs).
- Adjacent landowners (i.e. within 100m of the site) have also been informed of the proposed development.

Phase 2 (Scoping Phase) is the current phase of the process. The Scoping process has been undertaken in accordance with the EIA Regulations GN R543 published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This scoping process aimed at identifying potential issues associated with all four phases of the proposed project, and defining the extent of studies required within the EIA for each of the phases. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders (including relevant government authorities) and interested and affected parties (I&APs).

As the three (3) PV facilities and the associated power line and substation are proposed to form part of a larger solar energy facility development, a consolidated EIA process is being undertaken with single Scoping and EIA reports being produced to assess the potential environmental impacts associated with each phase of the development, as well as the potential cumulative impacts of all four phases. This Scoping Report evaluates all four development phases (i.e. the full 225 MW facility as well as the substation and power line component of the development). This has been achieved through the consideration of each individual development phase as a stand-alone development, as well as the consideration of the full extent of the development (i.e. cumulative impacts). A single public participation process is being undertaken to consider all phases of the development, and allows for I&APs and stakeholders to be able to comment on one or all of the development phases.

This chapter serves to outline the process which was followed during the Scoping Phase of the EIA process.

3.1. Objectives of the Scoping Phase

The Scoping Phase aims to:

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

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

» Clarify the **scope** and **nature** of the proposed development.
» Clarify the reasonable and feasible project-specific **alternatives** to be considered through the EIA Phase, including the 'do nothing' alternative.
» Identify and evaluate key **environmental issues/impacts** associated with the proposed project and, through a process of broad-based consultation with I&APs and stakeholders and desk-top specialist studies, identify those issues to be assessed in more detail in the EIA Phase of the EIA process.
» Conduct an open, participatory and transparent **public participation process** and facilitate the inclusion of I&AP and stakeholder concerns regarding the proposed project in the decision-making process.

3.2. Regulatory and Legal Context

The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority which exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels. As renewable energy development projects are multi-sectoral, encompassing economic, spatial, biophysical, and cultural dimensions, various statutory bodies are likely to be involved in the approval process for the proposed facility.

3.2.1. Regulatory Hierarchy

At the **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 are responsible for forming and approving the IRP (Integrated Resource Plan for Electricity). Solar energy is considered under the White Paper for Renewable Energy (2003) and the Department undertakes research in this regard. It is the controlling authority in terms of the Electricity Regulation Act (Act No 4 of 2006). In order to initiate the renewable energy procurement process, the department has released the South African Renewable Energy Independent Power Producers Request for Proposals.
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for wind energy developments to generate electricity.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this application for

authorisation, and charged with granting the relevant environmental authorisation.

- *The South African Heritage Resources Agency (SAHRA):* The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations provide legislative protection for listed or proclaimed heritage sites.
- *Department of Transport – South African Civil Aviation Authority (SACAA):* This Department is responsible for aircraft movements, controlled airspace and radar.
- *South African National Roads Agency Limited (SANRAL):* This body is responsible for all National road routes.
- *Department of Agriculture, Forestry and Fisheries (DAFF):* This Department is responsible for agriculture, forestry and fishery matters. In order, to protect agricultural resources, reports detailing agricultural potential of proposed areas for development are to be submitted to the Department for comment. DAFF supports a zero-loss of irrigated agricultural land policy.
- *Department of Water Affairs (DWA).* This Department will be involved should water resources be required or if any activities in terms of S21 of the National Water Act are triggered (i.e. the crossing of drainage lines and water abstraction for use in the facility).

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

- *North West Department of Economic Development, Environment, Conservation and Tourism (North West DEDECT).* This Department is the commenting authority for this application for authorisation, and will provide comment to DEA regarding the EIA reporting.
- *Department of Transport and Public Works - North West Province.* This Department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.

At the **Local Level** the local and municipal authorities are the principal regulatory authorities responsible for planning, land use, and the environment. The municipalities are:

- City of Matlosana Local Municipality
- Dr. Kenneth Kaunda District Municipality

In terms of the Municipal Systems Act (Act No. 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control. City of Matlosana Local Municipality and Dr. Kenneth Kaunda District Municipality's IDPs for 2010/2011 will be used to inform the assessment of social/land use impacts within the EIA process. By-laws and policies have been formulated by

these local authorities and those relevant to the project will be consulted where necessary.

3.2.2. Legislation and Guidelines that have informed the preparation of this Scoping Report

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

- National Environmental Management Act (Act No. 107 of 1998)
- EIA Regulations (GN R543) and associated Listed Activities (GN R544, GN R545 and GN R546), published under Chapter 5 of the NEMA in Government Gazette 33306 of 18 April 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

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 Phase. A listing of relevant legislation is provided in Table 3.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA Phase.

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

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2). » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being. » Rights to freedom of movement and residence (S22). » Property rights (S25). » Access to information (S32). » Right to just administrative action (S33).
National Environmental Management Act (Act No 107 of 1998)	» National environmental principles (S2), providing strategic environmental management goals and objectives of the government applicable throughout the Republic to the actions of all organs of state that may significantly affect the environment » NEMA EIA Regulations (GN R543, 544 & 545 of June 2010) (published in terms of Chapter 5), with effect from August 2010. » The requirement for potential impact on the environment of listed activities must be considered, investigated, assessed, and reported on to the competent authority (S24 – Environmental Authorisations). » Duty of Care (S28) requiring that reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise & rectify pollution or degradation of the environment. » Procedures to be followed in the event of an emergency incident which may impact on the environment (S30).
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992).
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites,

Legislation	Applicable Sections
	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 person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to list ecosystems which are threatened and in need of protection (S52) – none have as yet been published. » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) - none have as yet been published. » A list of threatened & protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened or Protected Species Regulations). » This act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively affect the survival of a listed protected species.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	» Measures in respect of dust control (S32) – no regulations promulgated as yet. » Measures to control noise (S34) - no regulations promulgated as yet.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5).

Legislation	Applicable Sections
	» 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).
National Water Act (Act No 36 of 1998)	» National Government is the public trustee of the Nation's water resources (S3). » Entitlement to use water (S4) – entitles a person to use water in or from a water resource for purposes such as reasonable domestic use, domestic gardening, animal watering, fire fighting and recreational use, as set out in Schedule 1. General Authorisation Government Gazette No. 20526 8 October 1999 is of relevance. » Duty of Care to prevent and remedy the effects of pollution to water resources (S19). » Procedures to be followed in the event of an emergency incident which may impact on a water resource (S20). » Definition of water use and requirement for water use licenses for certain activities (S21). » Requirements for registration of water use (S26 and S34). » Definition of offences in terms of the Act (S151).
National Environmental Management: Waste Act (Act No 59 of 2008)	» The purpose of this Act is to reform the law regulating waste management in order to protect health and the environment by providing for the licensing and control of waste management activities. » The Act provides listed activities requiring a waste license.
National Forests Act (Act No 84 of 1998)	» Protected trees: According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or

Legislation	Applicable Sections
	collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. » Forests: The Act prohibits the destruction of indigenous trees in any natural forest without a licence.
Guideline Documents	
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	» Outlines the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits.
Policies and White Papers	
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	» Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by this white Paper.
The White Paper on Renewable Energy (November 2003)	» This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.
City of Matlosana Local Municipality (2010)	According to the Municipal Systems Act of 2000, all Municipalities have to undertake an Integrated Development Planning (IDP) process to produce Integrated Development Plans (IDPs). As the IDP is a legislative requirement it has a legal status and it supersedes all other plans that guide development at local government level. The proposed development has to fit in with the local municipality`s plans.

3.3. Methodology for the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of NEMA. Key tasks undertaken within the Scoping Phase are illustrated in Figure 3.2 and are discussed in further detail below.

Figure 3.2: Key tasks undertaken in the Scoping Phase

3.3.1 Authority Consultation and Application for Authorisation in terms of GN No R543 of 2010

As this is an energy generation project the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within the North West Province, the North West Department of Economic Development, Environment, Conservation and Tourism (North West DEDECT) is the commenting authority for the application. Consultation with both these authorities has been undertaken throughout the Scoping Phase and has included the following:

» Submission of an application for authorisation to DEA with a copy submitted to North West DEDECT. An application reference numbers **12/12/20/2513/1 to 12/12/20/2513/4** were issued on 21 October 2011 for each of the PV facilities including the substation and powerline.

3.3.2. Public Participation Process

The aim of the public participation process is primarily to ensure that information containing all relevant facts in respect of the application is made available to potential stakeholders and I&APs. Furthermore, participation by potential I&APs is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the application. Lastly, all comments received from stakeholders and I&APs are recorded which serve to further direct the specialist studies and the EIA process (refer to Figure 3.3).

Figure 3.3. Overview of the tasks undertaken within the public participation process

» **Identification of I&APs and establishment of a database**

Identification of I&APs was undertaken by **Index** (specialist public participation consultants) through existing contacts and databases, recording responses to site notices and the newspaper advertisement, as well as through the process of networking. The key stakeholder groups identified include authorities, local and district municipalities, public stakeholders, Parastatals and Non-Governmental Organisations (refer to Table 3.2 below).

Table 3.2: Key stakeholder groups identified during the Scoping Phase

Stakeholder Group	Department
National and Provincial Authorities	» National Department of Environmental Affairs » North West Department of Environment and Nature Conservation » Department of Energy » Department of Water Affairs » Department of Agriculture, Forestry and Fisheries » South African Heritage Resources Agency » South African National Roads Agency Limited
Municipalities	» City of Matlosana Local Municipality » Dr. Kenneth Kaunda District municipality
Public stakeholders	» Adjacent and surrounding landowners

Stakeholder Group	Department
	» Orkney residents and local business owners
Parastatals & service providers	» Eskom Distribution
NGOs/Business forums	» Wildlife Society of South Africa » Birdlife South Africa

Stakeholder and I&APs details have been recorded within a database (refer to Appendix C). The database will be updated on an on-going basis during the EIA process.

» **Site Notices**

Site notices were erected in English and Afrikaans on 22 November 2011 at the following locations (refer to Appendix D):

* At the entrance to the site along the main R502
* On the site boundary of the site
* Community notice board at Spar in Orkney
* Community notice board at Shoprite in Orkney

» **Newspaper Advertisements**

A newspaper advert was placed on 11 November 2011 in the Klerksdorp Record to notify and inform the public of the proposed project and invite members of the public to register as I&APs. A second advert was placed on 02 February 2012 in the Klerksdorp Record to inform the public of the public meeting and the review period for the Draft Scoping Report

» **Distribution of Background Information Documents and Reply Forms**

In order to provide information regarding the proposed project and the EIA process, a Background Information Document (BID) together with a reply form was compiled (in English and Afrikaans) and distributed to identified stakeholders and I&APs. Additional copies were made available at public venues within the broader study area (refer to Appendix E). An electronic copy of the Background Information Document was also made available on www.savannahsa.com.

Forms of Public Consultation

In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been and will continue to be provided for I&APs to have their issues noted after the release of the draft Scoping Report for public review, as follows:

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

Networking with I&APs will continue throughout the duration of the Scoping and EIA Phases.

» **Identification and Recording of Issues and Concerns**
No comments have been received from stakeholders and I&APs at this time. However, comments received during the review period will be included in the final report to be submitted to DEA. A Comments and Response Report will also be compiled in the EIA Phase to include all comments received during the EIA process.

3.3.3. Evaluation of Issues identified through the Scoping Process

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

Specialist	Area of Expertise	Refer Appendix
David Hoare Consulting cc	Ecology, flora and fauna	Appendix F
Terrasoil Science	Soil, erosion potential, agricultural potential and land capacity	Appendix G
University of South Africa: Department of Anthropology & Archaeology	Heritage	Appendix H
MetroGIS	Visual	Appendix I
Index	Social	Appendix J

In order to evaluate issues and assign an order of priority, the following methodology was used to identify the characteristics of each potential issue/impact for each of the proposed phases:

» Identify the **nature** of the potential impact, which includes a description of what causes the effect, what will be affected and how it will be affected
» Identify the **extent** of the potential impact, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development) or regional

» Identify **sensitive receptors** that may be impacted on by the proposed facility and the **types of impacts** that are most likely to occur.
» Evaluate the **significance** of potential impacts in terms of the requirements of the EIA Regulations.
» Identify the potential impacts that will be **considered further** in the EIA Phase. Table 5.1 and Table 5.2 summarise the findings of the Scoping Phase undertaken for the construction and operation phases. The decommissioning impacts can be said to be similar to impacts from the construction phase.

Specialist scoping reports are contained within Appendices F-J.

3.3.4. Public Review of Draft Scoping Report and Feedback Meeting

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from **03 February 2012 - 05 March 2012** at the following locations:

» www.savannahsa.com
» Orkney Public Library

A public feedback meeting is being held on **16 February 2012** at Orkney Library, Cnr Partmore & Shakespeare Roads, Orkney at **17:30**.

3.3.5. Final Scoping Report

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

DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 4

This section of the Draft Scoping Report provides a description of the environment that may be affected by all the three phases of the proposed Kabi Vaalkop Solar PV Facility and the substation and power line required for grid connection of the three PV facilities. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is proposed to be situated. Features of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within Appendices F - J. At this scoping phase the entire project development area is described below as the phases are fairly uniform (and are located next to each other). The larger project site for all the proposed phases is therefore considered together as the site. A summary of the receiving environment for each phase is however provided at the end of this chapter.

4.1. Regional Setting and the Study Area

4.1.1 Regional Setting

The site identified for the proposed Kabi Vaalkop Solar PV Facility is situated on Portion 7 of Farm Vaalkop 439 IP, a portion of Farm Vaalkop 439 IP, a portion of Portion 3 of Farm Vaalkop 439 IP, and a portion of Portion 200 of Farm Nooitgedacht 434 IP near Orkney within the City of Motlasana Local Municipality. The City of Motlasana is one of the four municipalities that falls under Dr. Kenneth Kaunda District Municipality and comprises the following entities:

- Klerksdorp urban area;
- Stilfontein urban area;
- Orkney urban area;
- Hartbeesfontein urban area; and
- Rural remainder (farms and mining areas).

Executive functions of the local municipality are mainly executed from Klerksdorp. Klerksdorp was founded in 1837 when the Voortrekkers settled on the banks of the Schoonspruit, which flows through the town. It is one of the oldest European (white) settlements of the former province of Transvaal. At almost the same time

gold was discovered in the Witwatersrand, gold was also discovered in the Klerksdorp region (1886). The tranquility of the town was shattered by the influx of thousands of fortune-seekers that descended on the small village. However, the nature of the gold reef demanded expensive and sophisticated equipment to mine and extract the gold, causing the majority of diggers to move away in the late 1890s and thus leading to a decline in the gold mining industry. The gold mining industry was revived by large mining companies in 1932, causing the town to undergo an economic revival, which accelerated after World War II. Today Klerksdorp is the hub of the gold and uranium mining industry of the Far West Rand *(www.yourcity.co.za).*

The town of Orkney which is closest to the proposed development was proclaimed in 1940 on the farm Witkoppen, where the owner, Simon Fraser (one_of the gold mining pioneers of the 1880s), had first started gold mining. Fraser hailed from the Orkney Islands, off the coast of Scotland, hence the name of the town *(www.tourismnorthwest.co.za; www.wikipedia.org).*

4.1.2 The study site

The proposed site is located approximately 8 km north east of Orkney within the North West Province. The study site falls within a mining area on Vaal Reefs Gold Mine (owned by Anglogold Ashanti Limited). Mines occur in a dense pattern around the site. Discard rock dumps and slimes dams of the Vaal Reef Gold Mine are located in close proximity to the development site (within 1.5km).

Infrastructure in terms of roads and power lines is well developed in the area. Roads include the N12 national road, the R502 and a number of secondary roads. The proposed development site is bordered by roads on the southern and western boundaries. At least five power lines intersect the development site, with others criss-crossing the study area in all directions. Eskom's Hermes Transmission Substation is located approximately 6 km east of the site.

4.2 Climatic Conditions

The climate is typical of the Highveld. Rainfall occurs from November to April. Mean annual rainfall is 520 mm per year. All areas with rainfall of between 400 mm and 600 mm are considered to be intermediate between dry and moist. The study area can therefore be considered to be an intermediate, summer rainfall area.

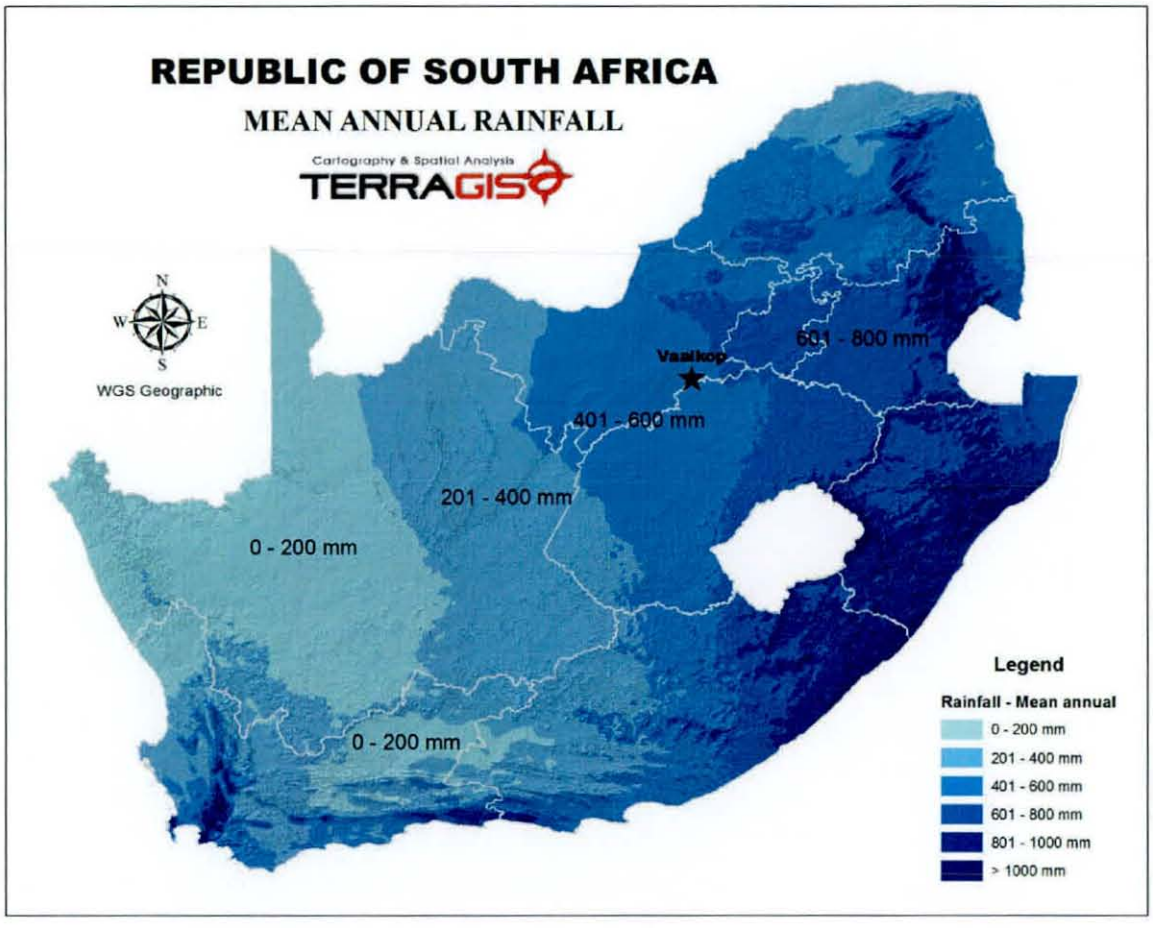

Figure 4.1: Rainfall map of South Africa indicating the location of the study site

4.3. Biophysical Characteristics of the Study Area and Surrounds

4.3.1 Topography

The topography of the study site is relatively flat. There is a slight drop in elevation towards the Vaal River and from east to west. The elevation on site varies from 1330 m to 1344 m above sea level over a distance of 1.5 km, which is a very gentle slope. There are no obvious topographical features on site nor are there any obvious drainage lines and/or wetland features (refer to Figure 4.2 below).

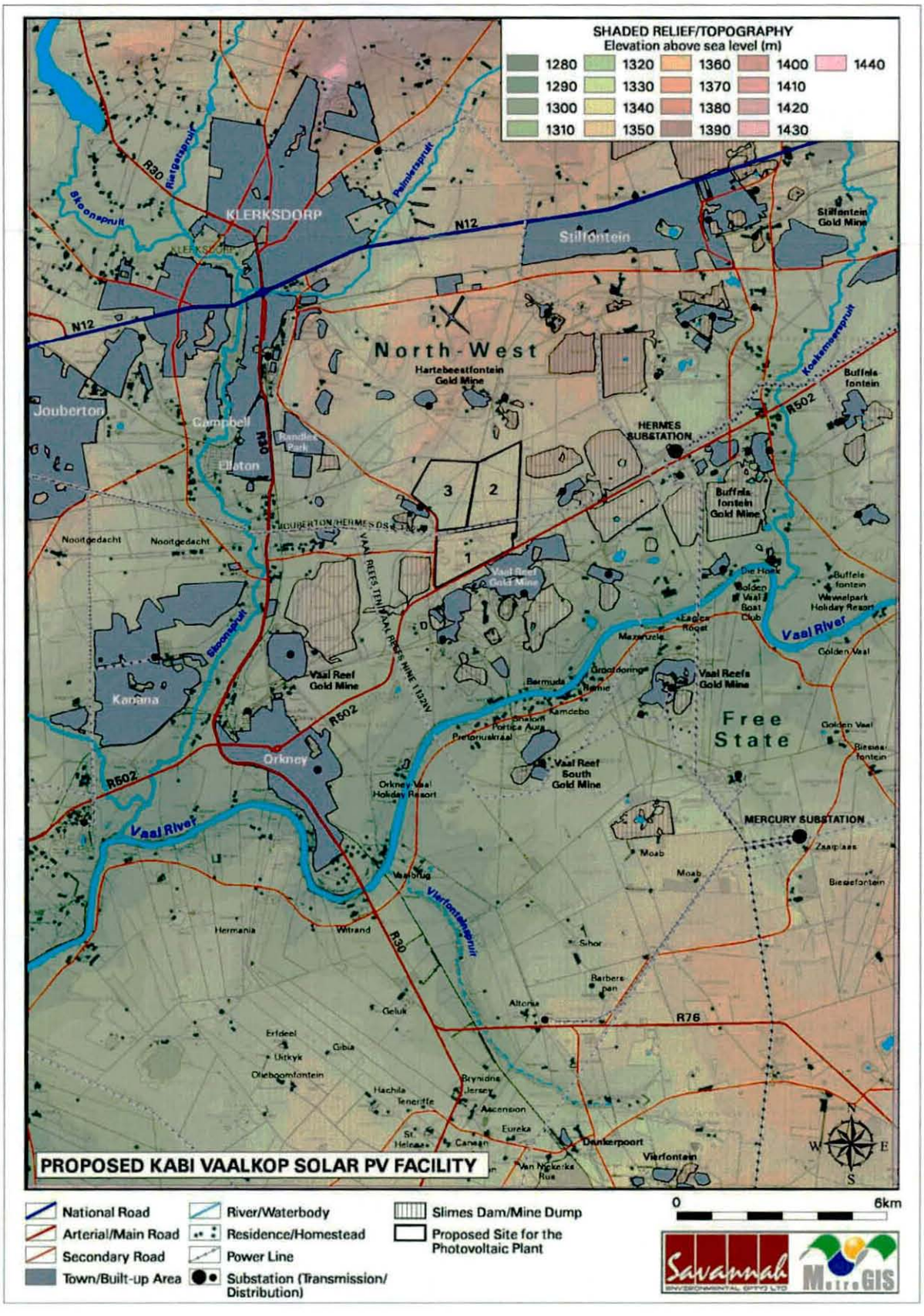

Figure 4.2: Shaded relief map (indicating the location of the proposed facility, the topography and elevation above sea level) of the broader study area

4.3.2 Land Types (Soils) and Agricultural Potential

The study site falls into the **Bc23** and **Fa13** land types (Land Type Survey Staff, 1972 - 2006). Table 4.1 summarises the land types applicable to each phase of the proposed development.

Table 4.1: Land types for the three PV Facilities development phases of the project

Project Phase	Land types
Kabi Vaalkop Solar I PV Facility	Fa13
Kabi Vaalkop Solar II PV Facility	Fa13
Kabi Vaalkop Solar III PV Facility	Fa13 and Bc23

Figure 4.3 provides the land type map of the site. It can be seen from the map that a most of the site falls within the Fa13 land type and that only a very small portion of the Kabi Vaalkop Solar III PV Facility falls within the Bc23 land type. A brief description of the land types Bc23 and Fa13 in terms of soils, land capability, land use and agricultural potential is provided below:

Land Type Bc23

Soils: Bc land types denote areas where eutrophic red apedal soils dominate the landscape. The soils in upland positions are predominantly shallow and rocky with apedal soil material occurring throughout. Lowland positions are dominated by structured soils with and without swelling properties.

Land capability and land use: Predominantly extensive grazing but due to the proximity of mining activities the land tends to lie fallow. Due to the level terrain soil erosion is not a major factor but the soils are susceptible to such if the terrain is physically disturbed.

Agricultural potential: Low potential due to the shallow nature of most of the soils. The rainfall is adequate for dryland cropping but the soils are limiting in terms of such land uses.

Land Type Fa13

Soils: Fa land types denote areas where shallow soils dominate and where lime is not encountered regularly. Due to the dominance of dolomite and chert the soils are either shallow and rocky or deep red apedal (structureless). Convex positions in the landscape tend to be dominated by the shallow soils and concave positions by the deeper red soils.

Land capability and land use: The land capability and land use is determined by the soils with the shallow soils being utilised for extensive grazing and the deeper soils occasionally being used for rainfed and irrigated crop production. Soil erosion is not

a major factor but the soils are susceptible to such if the terrain is physically disturbed.

Agricultural potential: The agriculture potential is generally low due to the dominance of shallow soils but pockets of high potential soil may occur that are then utilised for rainfed or irrigated crop production. The rainfall is adequate for dryland crop production.

The agricultural potential of the entire site (for all three PV facilities including the substation and power line) is low and limited to extensive grazing mainly due to the dominance of shallow and rocky soils. The deeper soils that occur sporadically throughout can be used for rain fed and irrigated crop production, even though these land uses do not occur regularly due to the soil constraints and human pressures (theft, traffic and urban and mining and uses). Irrigated agriculture can pose risks in the form of accelerated sinkhole formation – a distinct risk in the area.

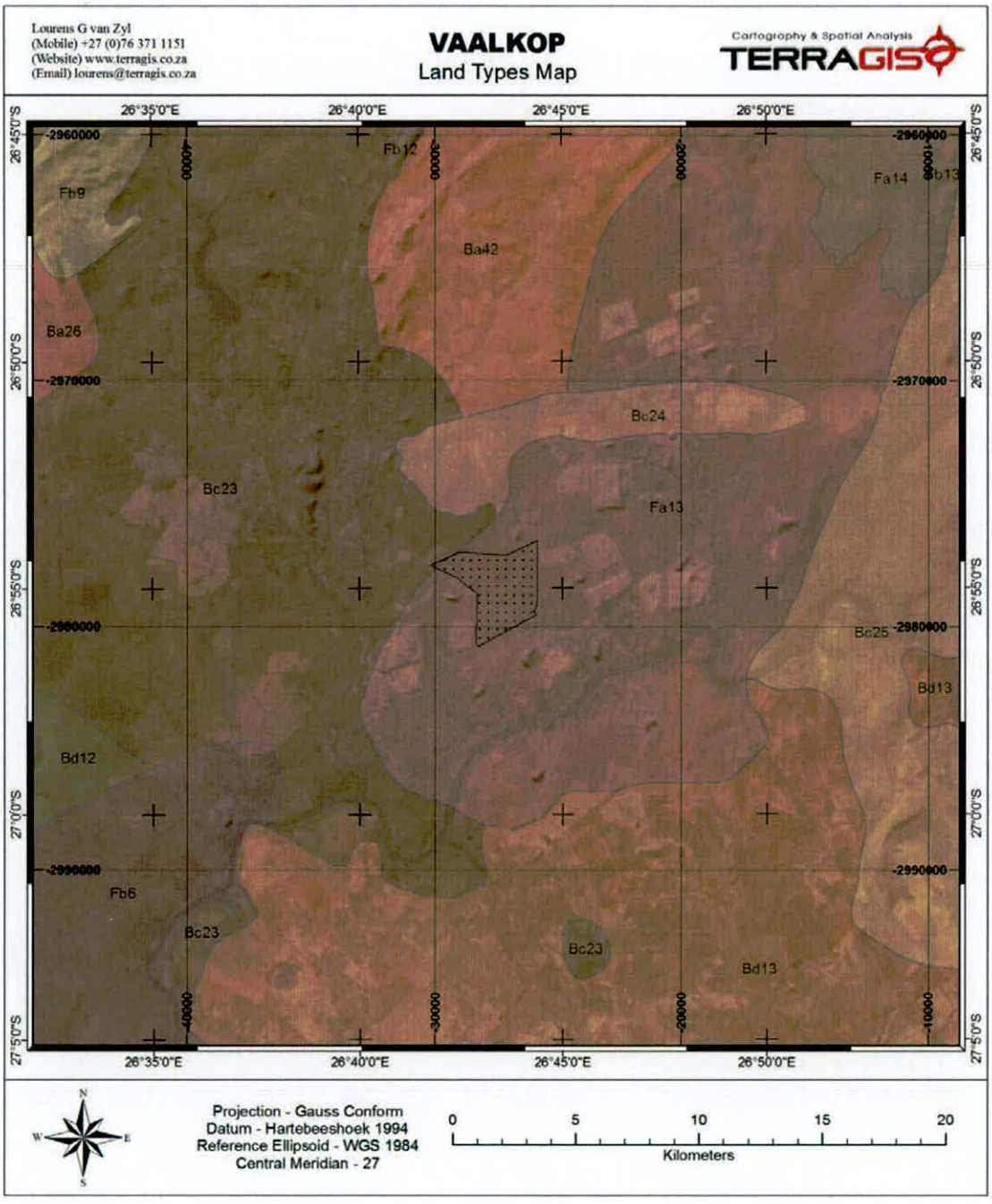

Figure 4.3: Land types map of the site, which encompasses all three project development phases and the transmission infrastructure.

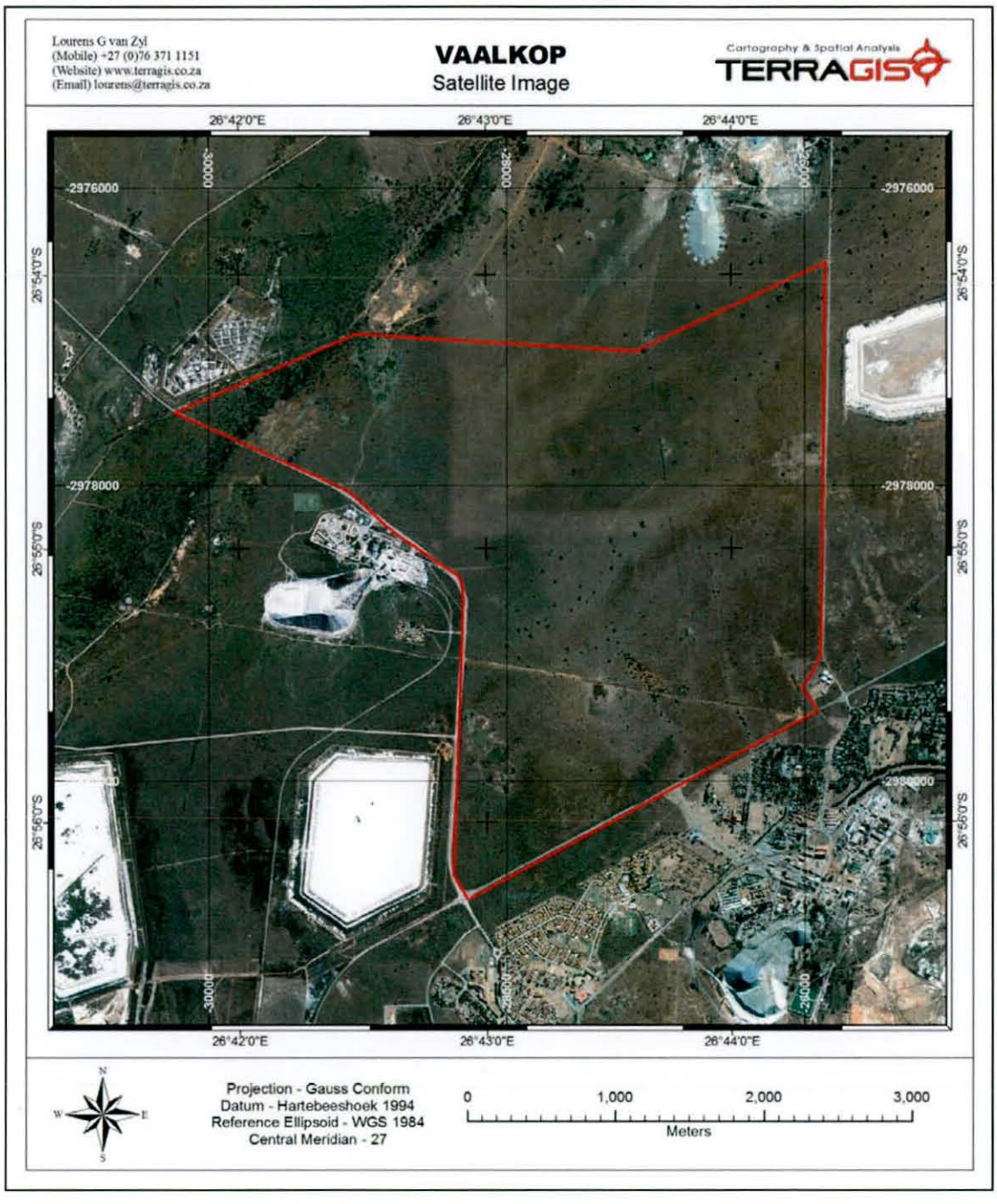

Figure 4.4: Vegetation cover on site.

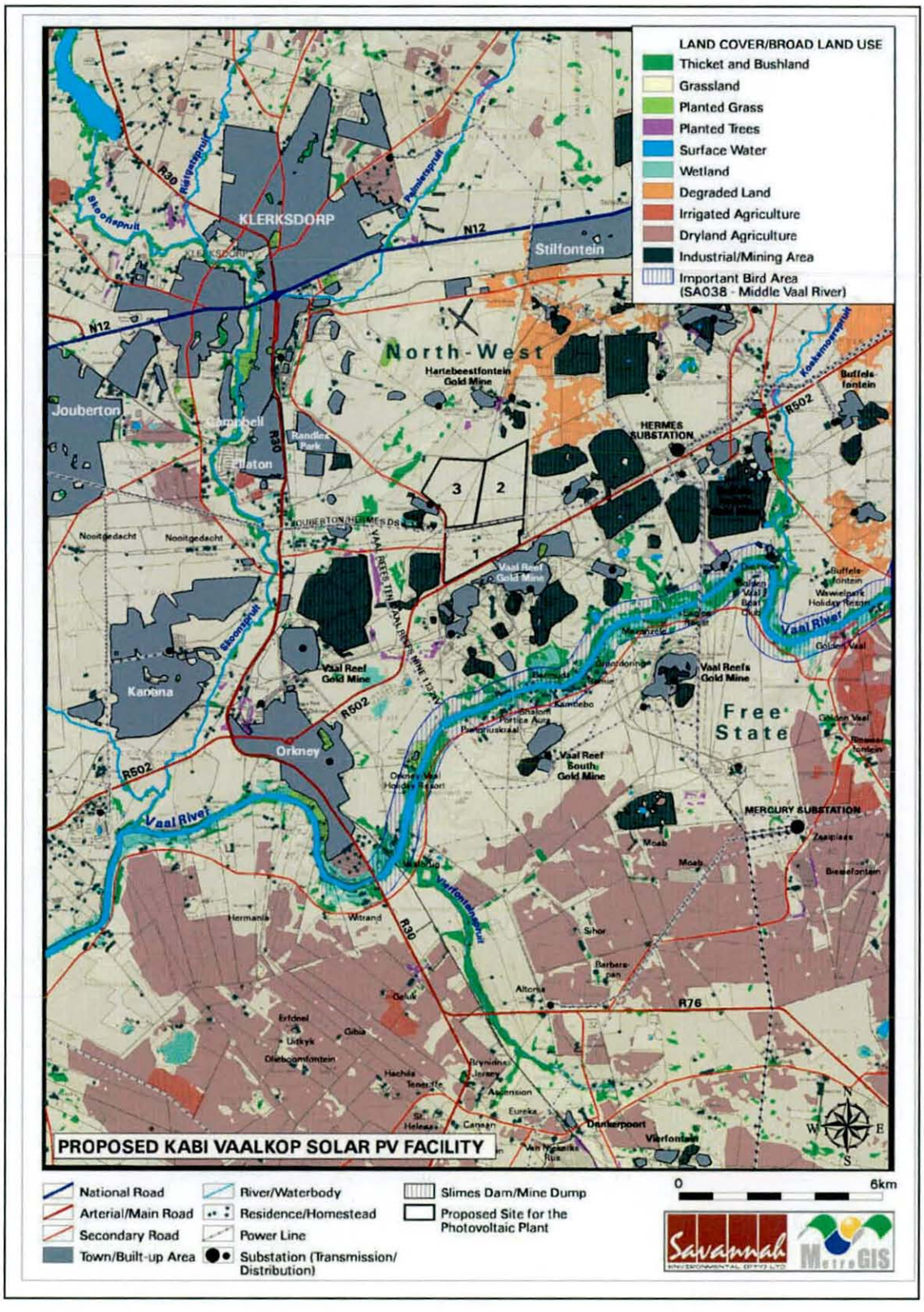

Figure 4.5: Land use map of the study site

4.3.3 Ecological Profile

Vegetation

The study site falls within the Vaal Reefs Dolomite Sinkhole Woodland vegetation type. This vegetation type occurs in a small area associated with dolomite sinkholes in and around Stilfontein and Orkney and occurs only to the north of the Vaal River. It occurs on a slightly undulating landscape that is dissected by prominent rocky chert ridges. The vegetation is a grassland-woodland complex of which the woodland is the most typical feature. This woodland occurs naturally in clumps around sinkholes, especially in places of dolomite outcrops. The vegetation type is considered to be mapped at too course a scale and requires more clear separation from Carletonville Dolomite Grassland (Mucina et al., 2006). This remark indicates that, where there is no woodland, the vegetation is grassland that could be considered to be floristically equivalent to Carletonville dolomite Grassland.

This vegetation type is however classified as Vulnerable (Driver *et al.* 2005; Mucina *et al.*, 2006). In addition, the vegetation type is not listed in the Draft National List of Threatened Ecosystems (GN1477 of 2009).

Table 4.2: Determining ecosystem status (from Driver et al. 2005).
*BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)			
	80–100	least threatened	LT
	60–80	vulnerable	VU
	*BT–60	endangered	EN
	0–*BT	critically endangered	CR

Most of the study area appears to be in a natural condition. Any highly degraded areas on site are likely to be classified as having low sensitivity and conservation value. The condition of the vegetation will be determined during detailed field surveys to be undertaken during the EIA phase of the project.

Critical Biodiversity Areas of the site

No Critical Biodiversity Areas have been identified for municipal areas of the North-West Province (bgis.sanbi.org). It is therefore not possible to identify areas of concern at a regional level in the current study area.

Red List plant species of the study area

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

Lists were compiled specifically for any species of conservation concern previously recorded in the area and any other species with potential conservation value. Historical occurrences of threatened plant species were obtained from the South African National Biodiversity Institute for the quarter degree squares within which the study area is situated. The list can be found in Appendix 1 of the Ecology Specialist Report (refer to Appendix F). Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed.

There were five species on this list, one listed as Near Threatened and four listed as Declining. The conservation categories of "declining" and "rare" are of much lower conservation importance than species classified as threatened (critically endangered, endangered or vulnerable) or near threatened.

The species, *Lithops lesliei* subsp. *lesliei*, is listed as Near Threatened. Information from the SANBI website indicates that this species has not been previously listed in the grid in which the site is located, but occurs in neighbouring grids. The site is within the species' overall distribution range. *Lithops lesliei* subsp. *lesliei* therefore has a high probability of occurring on site. This species is found primarily in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. The main threats to this species are muthi harvesting, which has recently become the biggest threat to its persistence, followed by succulent collectors and habitat destruction.

The bulb, *Crinum bulbispermum*, is listed as Declining. It is found near rivers and streams, in seasonal pans and in damp depressions. There is a moderate probability of it occurring in the wet areas that are known to occur on site.

The geophytic forb, *Pelargonium sidoides*, is listed as Declining. This species is usually found in short grassland, sometimes with occasional shrubs or trees, often in stony soils. previous surveys of the property (De Castro 2007, van Wyk & Gotze 2011) indicate that suitable conditions probably occur on site.

The bulb, *Boophane disticha*, is listed as Declining (see figure 4.6). It was found on site during previous surveys of the property (De Castro 2007, van Wyk & Gotze 2011). This species is found in dry grassland and rocky areas.

Figure 4.6: The bulb, *Boophane disticha*

The bulb, *Hypoxis hemerocallidea*, is listed as Declining (see figure 4.7). It was found on site during previous surveys of the property (De Castro 2007, van Wyk & Gotze 2011). This species may occur in a wide range of habitats, including open, rocky grassland, dry, stony, grassy slopes, mountain slopes and plateaus and is also often recorded on the footslopes adjacent to wetland areas.

Figure 4.7: The bulb, *Hypoxis hemerocallidea*

On the basis of the information presented here, it is concluded that there are no threatened plant species that are likely to occur on site, but there is one near threatened species that could occur on site, two Declining plant species that definitely occur on site and an additional two Declining plant species that could occur on site.

Protected plants in the study area

Plant species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) are listed in Appendix 5 of the Ecology Specialist Report (refer to Appendix F). There is one plant species that appears on this list that could potentially occur in the region, *Harpagophytum procumbens* (devil's claw). This species has not previously been recorded in the grid and the site is >50 km to the north-east of the known range of this species. This species is associated mainly with dry sandveld on deep Kalahari sand. It usually occupies plains, dune bases and interdunes. Soils are usually sandy but can be rocky. They are generally nutrient poor, often with lime. On the basis of distribution and substrate requirements, it is considered highly unlikely that it occurs on site.

Red List animal species of the study area

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

There are four mammal species of conservation concern that could occur in available habitats in the study area. This includes one species classified as Endangered, the White-tailed Rat, one species classified as Near Threatened (NT), the Brown Hyaena and two species classified in South Africa as Near Threatened, but globally as Least Concern (LC), the South African Hedgehog and the Honey Badger. There are an additional two mammal species that could occur on site that are not listed as of conservation concern, but which are protected. These are the Black-footed Cat and Cape Fox.

There are three threatened bird species (Blue Crane, Lesser Kestrel, White-bellied Korhaan, all VU) and two Near Threatened bird species (Lanner Falcon, Melodious Lark) that have a medium to high probability of utilising available habitats in the study area, either for foraging or breeding. These species may use the site or parts of the site primarily for foraging. Loss of a relatively small area of foraging will not affect these species significantly.

The Giant Bullfrog is the only amphibian species of conservation concern with a distribution that includes the study area and which could occur on site. This species

is classified as Least Concern globally and Near threatened in South Africa. It is, however, protected under the National Environmental Management: Biodiversity Act and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit. The Giant Bullfrog inhabits a variety of vegetation types where it breeds in seasonal, shallow, grassy pans in flat, open areas. It also utilises non-permanent vleis and shallow water on margins of waterholes and dams. It prefers sandy substrates although they sometimes inhabit clay soils. Habitats such as these probably do not occur on site. It was therefore assessed that there was a low probability of it occurring on site.

There is one reptile species of conservation concern that has a distribution that includes the study area, the Striped Harlequin Snake, listed as Near Threatened. This is a small, slender snake found in moist savannah and grassland, inhabiting deserted termite mounds or is found under stones in grassland. It is endemic to South Africa. It is a shy species that is seldom found and also lives mostly underground. It could potentially occur on site.

The threatened, near threatened and protected species of potential concern for the site are therefore as follows:

» White-tailed Rat (EN),
» Brown Hyaena (NT, protected),
» South African Hedgehog (NT/LC, protected),
» Black-footed Cat (protected),
» Honey Badger (NT/LC, protected),
» Cape Fox (protected),
» Blue Crane (VU),
» Lanner Falcon (NT),
» Lesser Kestrel (VU),
» Melodious Lark (NT),
» White-bellied Korhaan (VU),
» Striped Harlequin Snake (NT),
» Giant Bullfrog (protected).

Protected trees

Tree species protected under the National Forest Act are listed in Appendix 3 of the Ecological Specialist Report (refer to Appendix F). There are two that have a geographical distribution that includes the study area, *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi) and *Acacia erioloba* (Camel Thorn, Kameeldoring).

Boscia albitrunca occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. It is usually quite common where it is found. The site is just outside the very edge of it's distribution range.

It was not recorded on site during previous detailed floristic studies of the site (De Castro 2007, van Wyk & Gotze 2011).

The tree, *Acacia erioloba*, occurs in dry woodland along watercourses in arid areas where underground water is present as well as on deep Kalahari sands. It has been previously recorded in the grid in which the site is located, but was not recorded on site during previous detailed floristic studies of the site (De Castro 2007, van Wyk & Gotze 2011).

On the basis of the information presented here, it is concluded that, although there are two protected tree species that could occur in the geographical area that includes the site, there are no protected tree species on the site itself.

4.5. Social Characteristics of the Study Area and Surrounds

4.5.1 Economic Profile

The composition of the Dr. Kenneth Kaunda District Municipality's economy is dominated by the mining industry (refer to table 4.3). While the rest of the South African economy is increasingly less dependent on the primary sector, the district is to a large extent still dependant on this sector, which is characterized by low-skilled, resource intensive production.

Table 4.3: Economic composition of Dr Kenneth Kaunda District.

Sector	Percentage
Primary sector (mining and agriculture)	34%
Secondary sector	11%
Tertiary sector	55%

(Source: Klerksdorp SDF, 2010)

Together with Rustenburg, the City of Motlasana (and specifically Klerksdorp) forms the economic heart of North West Province. It is still one of the hubs of the South African gold mining industry, although there has been a significant decline in mining since 1996. In addition, it is expected to be a large uranium producer in the future. The district is also a major player in South African agriculture, with maize, sorghum, groundnuts and sunflowers as the most important crops cultivated here. The area is further known for its Sussex cattle herds *(www.yourcity.co.za)*. This dependence on the primary sector makes the district more volatile to the risk of an external shock in the economy than the rest of the province *(Klerksdorp SDF, 1020).*

Apart from the primary sector, Klerksdorp is also positioned as a notable medical, retail and education centre for North West Province and Northern Free State.

Shares of trade and government have increased slightly since 1996, whereas manufacturing and construction seem to have maintained a constant share over the 1996 to 2001 period.

The City of Motlasana has, however, reflected a negative growth rate of 3,65% (1996 to 2001) and is thus listed as one of the negative economic performers in the North West province. The Municipality is one of the most densely populated areas in the province with huge poverty gaps. In addition to the high in-migration levels, unemployment and large poverty gaps, other challenges that stifles economic development in the City of Motlasana include:

» Inadequate flexibility in terms of economic base (mainly dependent on primary activities such as mining and agriculture);
» A lack of innovative economic opportunities; and
» A lack of skills development and ways to uplift the population.

4.5.2 Demographic Profile

In 2003 the total population for the KOSH-area (Klerksdorp / Orkney / Stilfontein / Hartbeesfontein) was calculated at 517 781, of which 95% is spatially concentrated in urban areas. Only 4% of the population is living in rural areas (3,6% live on farms and 0,4% in rural villages) *(Klerksdorp SDF, 2010).*

The 2008 population was estimated at 555 457 and with a population growth rate of 1,125% (1,3% in the urban areas and 0,95% in rural areas) the City of Motlasana's population could today be as high as 574 415. This growth is lower than a typical African society but still implies pressure on the future economic development and infrastructure and service delivery of the area.

Despite a general decrease in the overall in-migration of the North West Province (according to the North West Spatial Development Framework, 2002), the Motlasana Municipality, and in particular Klerksdorp, proves to be the most popular attraction in the province for both local and international migrants. This trend of densification (migration and urbanisation) is characterised by poverty and unemployment due to a declining mining output.

In terms of gender profile, 34% of the population in Matlosana is either younger than 18 years or older than 65 years of age and are, in other words, economically inactive (30% are younger than 18 years of age and 4% older than 65 years). This suggests a large dependency ratio on the current labour force which ultimately implies specific challenges to be faced in the area in terms of job creation for the future (in an already declining economy together with the rise in unemployment) and the pressure on the provision of social facilities (schools, crèches, hospitals and old age homes).

Unemployment in the Greater Orkney area was estimated at 38,7% in 2001 (a 22,7% increase since 1996) and the Not Economic Active (NEA) portion of the population (persons between 15 and 65 years not actively seeking employment) has remained the same at 37% *(Census 2001)*.

4.5.3. Heritage Profile

The heritage scoping study indicates that the cultural landscape in and around Klerksdorp and Orkney is not only complex but it also has a deep time depth. The area is multi-layered with several compounding aspects:

» The town and surrounding area have a long period of development and western occupation
» Several features and events associated with the Second Boer War are known in the area
» Iron Age settlements occur in the area along or near the Vaal River
» Stone Age sites (including rock art) are known to occur in the area

Although the survey area might have been exposed to secondary impacts of the surrounding development activities, some artefacts of heritage significance have a potential of occurring on site but will be verified during the EIA phase Heritage Impact Assessment.

4.6 Description of the Environment - Summary of the Environmental characteristics of the three project development phases

Table 4.4 Summary of the characteristics of the three project development phase's environment (desktop level)

Environmental Characteristics	Vaalkop Solar I	Vaalkop Solar II	Vaalkop Solar III	Vaalkop Substation and Powerline
1. *Land Use*	Termed as possible Grazing however no grazing currently allowed due to safety reasons	Termed as possible Grazing however no grazing currently allowed due to safety reasons	Termed as possible Grazing however no grazing currently allowed due to safety reasons	Termed as possible Grazing however no grazing currently allowed due to safety reasons
2. *Climate*	Summer rainfall area	Summer rainfall area	Summer rainfall area	Summer rainfall area
3. *Topography*	Flat	Flat	Flat	Flat
4. *Land Types*	Fa13	Fa13	Fa13 and Bc23	FA13 (substation)
5. *Agricultural Potential*	Low	Low	Low	Low
6. *Vegetation types*	» Vaal Reefs Dolomite Sinkhole Woodland » Vegetation type is listed as Vulnerable	» Vaal Reefs Dolomite Sinkhole Woodland » Vegetation type is listed as Vulnerable	» Vaal Reefs Dolomite Sinkhole Woodland » Vegetation type is listed as Vulnerable	» Vaal Reefs Dolomite Sinkhole Woodland » Vegetation type is listed as Vulnerable
7. *Heritage*	Occurrence of artefacts of heritage significance considered low due to historic disturbance, but to be confirmed by Heritage Impact Assessment in EIA phase	Occurrence of artefacts of heritage significance considered low due to historic disturbance, but to be confirmed by Heritage Impact Assessment in EIA phase	Occurrence of artefacts of heritage significance considered low due to historic disturbance, but to be confirmed by Heritage Impact Assessment in EIA phase	Occurrence of artefacts of heritage significance considered low due to historic disturbance, but to be confirmed by Heritage Impact Assessment in EIA phase

8. *Social Characteristics*	The study site is located within a mining area and the local economy is dominated by the mining industry. The declining mining economy in the area has caused an increase in the unemployment levels	The study site is located within a mining area and the local economy is dominated by the mining industry. The declining mining economy in the area has caused an increase in the unemployment levels	The study site is located within a mining area and the local economy is dominated by the mining industry. The declining mining economy in the area has caused an increase in the unemployment levels	The study site is located within a mining area and the local economy is dominated by the mining industry. The declining mining economy in the area has caused an increase in the unemployment levels

SCOPING OF ISSUES ASSOCIATED WITH ALL THE THREE PHASES AND TRANSMISSSION INFRASTRUCTURE OF THE PROPOSED KABI VAALKOP SOLAR PV ENERGY FACILITY CHAPTER 5

The potential impacts of the construction and operation phases of the three proposed phases of the Kabi Vaalkop Solar PV Facility, as well as those of the grid integration infrastructure are identified, described and evaluated in this chapter. The majority of the environmental impacts are expected to occur during the construction phase for a facility of this nature.

Environmental issues associated with **construction (and decommissioning)** activities of a PV solar energy facility such as all the phases of the Kabi Vaalkop Solar PV Facility including the associated transmission infrastructure are similar and include, among others:

» Impact on fauna, flora and ecology due to site disturbance
» Impact on land use during construction of the facility
» Impact on soils and geology in terms of increase in erosion potential
» Impact on heritage resources due to site disturbance and altering of the sense of place
» Social impacts (positive and negative)

Environmental issues specific to the **operation** of the three PV solar energy facilities and associated transmission infrastructure could include, among others:

» Habitat transformation (limited to the footprint of the PV panels, access roads and power line servitude)
» Visual impacts (intrusion, negative viewer perceptions and visibility of the facility)
» Impact on heritage resources due to site disturbance and altering of the sense of place
» Social impacts (positive and negative)

Environmental issues which are not significant to this project include:

» Noise from the PV panels and inverters (this is limited to within the structures themselves and therefore the impact significance is marginal and does not require detailed investigation).
» Vibration caused from deep excavations during construction is not an issue due to excavations being fairly shallow, and no blasting is required.

The significance of impacts associated with a particular solar energy facility is dependent on site-specific factors, and therefore impacts can be expected to vary significantly from site to site.

The scoping process has involved input from specialist consultants, the project proponent, stakeholders and the public. Specialist scoping reports are included within Appendices F - J.

A desktop assessment of potential environmental and social impacts that are most likely to be applicable to all the phases of development for the solar energy facility and transmission infrastructure were identified in this chapter of the Draft Scoping Report. Due to the relatively homogenous nature of the study area within which the broader facility is located, issues associated with all aspects and phases of the project are expected to be similar. Where specific issues have been identified for a specific phase of the development, these have been highlighted. Therefore the potential impacts for each phase of the development have not been separated in this chapter of the draft Scoping Report. Table 5.1 and Table 5.2 provide a summary of the findings of the scoping study undertaken for the construction and operation phases of the proposed project respectively. Impacts of the proposed facility are evaluated, and recommendations are made regarding further studies required within the EIA phase of the process.

5.1 Methodology for Impact Assessment during the Scoping Phase

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

» Identify **potential sensitive environments** and **receptors** that may be impacted on by the proposed facility and the **types of impacts** (i.e. direct, indirect and cumulative[5]) that are most likely to occur.
» Determine the **nature and extent of potential impacts** during the construction and operational phases.
» Identify **'No-Go' areas**, if applicable.
» Summarise the potential impacts that will be **considered further** in the EIA Phase through specialist assessments.

5.2 Assumptions made during the Evaluation of Potential Impacts

While evaluating potential impacts associated with the proposed project, it was assumed that the development footprint (the area that will be affected during the operational phase), will include, *inter alia*, the footprints for the PV panels, the substation, workshop, laydown areas and the internal access roads. However, during the construction phase, the entire extent of the broader site required for the proposed facility could suffer some level of disturbance. This is referred to as the construction footprint.

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

Table 5.1: Evaluation of potential impacts associated with the **Construction Phase** (**for all phases**)

Impacts on Fauna, Flora and Ecology

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

» Land clearing
» Construction of access roads
» Laying of cabling in trenches
» Establishment of borrow pits and spoil areas (if deemed necessary)
» Chemical contamination of the soil by construction vehicles and machinery
» Operation of temporary construction camps and storage of materials required for construction

There is one major vegetation type that occurs in the study area, namely Vaal Reefs Dolomite Sinkhole Vegetation, classified as Vulnerable and also has a restricted distribution and extent. The remaining natural vegetation across most of the site is therefore considered, from this perspective, to have moderately high conservation status. The site does not occur within any Centre of Floristic Endemism. Previous studies indicate that the overall vegetation in the study area is an estimated moderate to poor veld condition.

Local factors that may lead to parts of the study area having high ecological sensitivity are the potential presence of some animal species of conservation concern, the known presence of two plant species of conservation concern and the potential presence of three additional plant species of conservation concern.

There are a number of animal species of conservation concern and protected animal species that may occur in habitats within the broad study area. This includes four mammal species of conservation concern (White-tailed Rat, Brown Hyaena, Honey Badger and South African Hedgehog) and five protected mammal species (Brown Hyaena, Black-footed Cat, Honey Badger, Cape Fox, South African Hedgehog), three threatened bird species (Blue Crane, Lesser Kestrel, White-bellied Korhaan, all VU) and two Near Threatened bird species (Lanner Falcon, Melodious Lark). The protected Giant Bullfrog could also occur on site. Habitat requirements for **these** species are provided in the Ecological Scoping report (see appendix F).

There are two protected tree species that have a geographical distribution that includes the study area, *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi) and *Acacia erioloba* (Camel Thorn, Kameeldoring), but neither species is known to occur on site.

There are five plant species of conservation concern that have a likelihood of occurring in available habitats in the study area. One of these is listed as

Near Threatened (*Lithops lesliei* subsp. *lesliei*) and four as Declining (*Pelargonium sidoides*, *Boophane disticha*, *Hypoxis hemerocallidea* and *Crinum bulbispermum*). Two of these species (*Boophane disticha* and *Hypoxis hemerocallidea*) are known to occur on site.

There is one plant species protected according to the National Environmental Management: Biodiversity Act (Act No 10 of 2004) that occurs in the general area, *Harpagophytum procumbens* subsp. *procumbens*, but on the basis of habitat requirements, it is considered unlikely that it occurs on site.

The study area appears to be in a mostly natural condition. From the project point of view, these are areas where infrastructure should only be placed with caution or mitigation measures must be implemented to minimize impacts (refer to Figure 5.1).

A risk assessment was undertaken which identified eight main potential negative impacts on the ecological receiving environment. The identified potential impacts are the following:

- Loss or fragmentation of indigenous natural vegetation
- Loss of individuals of threatened plants
- Loss of individuals of protected tree species
- Loss of individuals of other protected plants
- Loss of habitat for threatened animals
- Collisions of individuals of threatened bird species with overhead power lines
- Damage to watercourses and drainage areas
- Establishment and spread of declared weeds and alien invader plants.

The significance of these impacts will be assessed during the EIA phase after collection of relevant field data. An initial assessment indicates that some of these impacts may be significant or that there is a legislative benefit to establishing whether they will occur or not

- **Impacts on indigenous natural vegetation (terrestrial)**

  Construction of infrastructure may lead to direct loss of vegetation. This may lead to localised or more extensive reduction in the overall extent of vegetation. There are factors that may aggravate this potential impact. For example, where this vegetation has already been stressed due to degradation and transformation at a regional level, the loss may lead to increased vulnerability (susceptibility to future damage) of the habitat and a change in the conservation status (current conservation situation). Consequences of the potential impact of loss of indigenous natural vegetation occurring may include:

  - Negative change in conservation status of habitat (Driver et al. 2005);

- Increased vulnerability of remaining portions to future disturbance;
- General loss of habitat for sensitive species;
- Loss in variation within sensitive habitats due to loss of portions of it;
- General reduction in biodiversity;
- Increased fragmentation (depending on location of impact);
- Disturbance to processes maintaining biodiversity and ecosystem goods and services; and
- Loss of ecosystem goods and services.

The vegetation type on site is Vaal Reefs Dolomite Sinkhole Vegetation, which is classified as Vulnerable. Most of the site is still in a natural state.

- **Impacts on threatened plants**

Plant species are especially vulnerable to infrastructure development due to the fact that they cannot move out of the path of the construction activities, but are also affected by overall loss of habitat.

Threatened species include those classified as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened plant species, loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences may include:

- Fragmentation of populations of affected species;
- Reduction in area of occupancy of affected species; and
- Loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chance of survival of the species.

Two Declining plant species are known to occur on site. In addition, there is the potential for one Near threatened and two more Declining plant species to occur on site.

- **Impacts on protected tree species**

There are a number of tree species that are protected according to Government Notice no. 1012 under section 12(I)(d) of the National Forests Act, 1998 (Act No. 84 of 1998). In terms of section1 5(1) of the National Forests Act, 1998 "no person may cut, disturb, damage or destroy any protected

tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated".

Two species have a geographic distribution that includes the study area, *Boscia albitrunca* and *Acacia erioloba*, but neither species has been previously recorded on site.

» **Impacts on protected plant species**

There is one plant species that is protected according to National Environmental Management: Biodiversity Act (Act No. 10 of 2004). According to this Act, "*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7*". Such activities include any that are "*of a nature that may negatively impact on the survival of a listed threatened or protected species*". This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

One species has a geographic distribution that includes the study area, *Harpagophytum procumbens*, but suitable habitat conditions for this species on the proposed development site do not occur, and the species has not been previously recorded on site.

» **Impacts on threatened animals and birds**

Threatened animal species are indirectly affected primarily by the overall loss of habitat, since direct construction impacts can often be avoided due to movement of individuals from the path of construction. Animals are generally mobile and, in most cases, can move away from a potential threat.

Threatened species include those classified as critically endangered, endangered or vulnerable. For any other species a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include:

- Fragmentation of populations of affected species;
- Reduction in area of occupancy of affected species; and
- Loss of genetic variation within affected species.

These may all lead to a negative change in conservation status of the affected species, which implies a reduction in the chances of the species overall survival chances.

There are four mammal species of conservation concern that could occur in available habitats in the study area. This includes one species classified as Endangered, i.e. the White-tailed Rat; one species classified as Near Threatened (NT), i.e.the Brown Hyaena; and two species classified in South Africa as Near Threatened, but globally as Least Concern (LC), i.e. the South African Hedgehog and the Honey Badger. There are an additional two mammal species that could occur on site that are not listed as of conservation concern, but which are protected. These are the Black-footed Cat and Cape Fox. There are four mammal species of conservation concern that could occur in available habitats in the study area (i.e. White-tailed Rat, Brown Hyaena, Honey Badger and South African Hedgehog) and two protected mammal species that could occur there (i.e. Black-footed Cat, Cape Fox). The Brown Hyaena, Honey Badger and South African Hedgehog are also protected.

There are three threatened bird species (i.e. Blue Crane, Lesser Kestrel, White-bellied Korhaan, all listed as Vulnerable) and two Near Threatened bird species (i.e. Lanner Falcon, Melodious Lark) that have a medium to high probability of utilising available habitats in the study area, either for foraging or breeding.

There is one reptile species of conservation concern that has a distribution that includes the study area, i.e. the Striped Harlequin Snake, listed as Near Threatened. It is considered possible that this species occurs on site, but individuals are difficult to locate.

The protected Giant Bullfrog (not listed as threatened) could occur on site, but it is considered unlikely.

» **Impacts on wetlands or drainage areas**

There do not appear to be any wetland features on site, but this must be confirmed during the field survey of the site to be undertaken in the EIA phase of the process.

» **Collisions of individuals of threatened birds with overhead power lines**

Threatened bird species may be directly affected by collisions with overhead power lines. Cranes, bustards, flamingos, waterfowl, shorebirds, gamebirds and falcons are among the most frequently affected (Jenkins et al. 2010). Ludwig's Bustard is especially affected by collisions with overhead power lines.

There are three threatened bird species (Blue Crane, Lesser Kestrel, White-bellied Korhaan, all VU) and two Near Threatened bird species (Lanner Falcon, Melodious Lark) that have a medium to high probability of utilising available habitats in the study area, either for foraging or breeding.

» **Establishment and spread of declared weeds and alien invader plants**

Major factors contributing to invasion by alien invader plants includes *inter alia* high disturbance (such as clearing for construction activities) and

negative grazing practices (Zachariades *et al.* 2005). Exotic species are often more prominent near infrastructural disturbances than further away (Gelbard & Belnap 2003, Watkins *et al.* 2003). Consequences of this may include:

- Loss of indigenous vegetation;
- Change in vegetation structure leading to change in various habitat characteristics;
- Change in plant species composition;
- Change in soil chemical properties;
- Loss of sensitive habitats;
- Loss or disturbance to individuals of rare, endangered, endemic and/or protected species;
- Fragmentation of sensitive habitats;
- Change in flammability of vegetation, depending on alien species;
- Hydrological impacts due to increased transpiration and runoff; and
- Impairment of wetland function.

Potential invasive weeds with a distribution centred on this part of the country include *Melia azeradach*, *Sesbania punicea*, *Opuntia ficus-indica*, *Opuntia imbricata*, *Prosopis glandulosa*, *Populus x canescens*, *Salix babylonica*, *Morus alba*, *Gleditsia triacanthos*, *Agave americana*, *Datura ferox*, *Datura stramonium*, *Arundo donax* and *Nicotiana glauca*. vMany of these species invade riverbeds, riverbanks and drainage lines. There is therefore the potential for alien plants to spread or invade following disturbance on site.

The preliminary sensitivity assessment undertaken at a desk-top level identifies those parts of the study area that could possibly have high conservation value or that may be sensitive to disturbance. Areas of potentially high sensitivity are shown in Figure 5.1. Areas containing untransformed natural vegetation of conservation concern, high diversity or habitat complexity, Red List organisms or systems vital to sustaining ecological functions are considered potentially sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to potentially have low sensitivity. The information provided in the preceding sections was used to evaluate sensitivity of natural habitats and areas important for maintaining ecological processes in the study area. There are a number of features that need to be taken into account in order to evaluate sensitivity in the study area. These include the following:

- Potential occurrence of populations of Red List or protected organisms, including flora and fauna, that have been evaluated as having a probability of occurring within natural habitats within the study area. The species of potential concern for the site are listed in a section above.

These factors have been taken into account in evaluating sensitivity within the study area. Indications are that any natural area on site could potentially be classified as sensitive. It must be emphasised that this is a preliminary map (Figure 5.1), based on a desktop scoping level assessment. It is therefore