

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT EIA REPORT

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

DRAFT FOR PUBLIC REVIEW
18 May 2012 to 18 June 2012

Prepared for:

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2024



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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 Draft EIA Report.

1. General Site

No.	Information	Provided / Reference
1.1	Descriptions of all affected farm portions	Refer to Chapter 2 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: <ul style="list-style-type: none"> * 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 and Appendix M for project Maps

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 5.1 for land cover/land use map
	2.4.1 Buildings and other structures	Also shown on Figure 5.1
	2.4.2 Agricultural fields	<i>The entire site fall within mining land there are no agricultural activities.</i>

No.	Information	Provided
	2.4.3 Grazing areas	<i>Grazing is currently restricted on site due to safety reasons. However, some livestock still find their way to the site.</i>
	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 5.6 (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 5 and Appendix E
	2.4.6 Bare areas which may be susceptible to soil erosion	<i>No Identified</i>
	2.4.7 Cultural historical sites and elements	Non Identified
	2.4.8 Rivers, streams and water courses	Non identified
	2.4.9 Ridgelines and 20m continuous contours with height references in the GIS database	See Figure 5.3
	2.4.10 Fountains, boreholes, dams (in-stream as well as off-stream) and reservoirs	<i>No identified on site</i>
	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): <ul style="list-style-type: none"> • 500m from any irrigated agricultural land • 1km from residential areas • Indicate isolated residential, tourism facilities on or within 1km of the site 	<i>Non Required</i>
2.5	A site development proposal map(s)/layer(s) that indicate:	<i>Facility Layout attached in Appendix M</i>
	2.5.1 Position of solar facility	
	2.5.2 Foundation footprint	
	2.5.3 Permanent laydown area footprint	
	2.5.3 Construction period laydown footprint	
	2.5.4 Internal road indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible)	
	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	

No.	Information	Provided
	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: <ul style="list-style-type: none"> * 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 utilized during the construction and operational phases * Critical Biodiversity Areas and Ecological Support Areas * Critically Endangered and Endangered vegetation areas * Agricultural fields * Irrigated areas * An indication of new road or changes and upgrades that must be done to existing roads in order to get equipment onto the site including cut and fill areas and crossings of rivers and streams 	Refer to Appendix M – Project maps

INFORMATION REQUIRED TO BE INCLUDED IN THE EIA REPORT AS PER EIA REGULATIONS

NEMA REGULATION 543, SECTION 31 REQUIREMENTS FOR THE CONTENT OF EIA REPORTS	CROSS REFERENCE IN THIS EIA REPORT
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out an environmental Impact Assessment.	Section 1.5
(b) a description of the proposed activity	Chapter 2
(c) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is— (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken	Section 1.1 and Chapter 2
(d) a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity	Chapter 5
(e) details of the public participation process conducted in terms of sub regulation (1) including	
(i) Steps undertaken in accordance with the plan of study	Section 4.3.
(ii) A list of persons, organisations and organs of state that were registered as interested and affected parties	Appendix C
(iii) A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and	Appendix D
(iv) Copies of any presentations and comments received from registered interested and affected parties	Will be included in Appendix D of the Final report
(f) a description of the need and desirability of the proposed activity	Section 2.3
(g) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	Section 2.4
(h) an indication of the methodology used in determining the significance of potential environmental impacts	Section 4.3.4

NEMA REGULATION 543, SECTION 31 REQUIREMENTS FOR THE CONTENT OF EIA REPORTS	CROSS REFERENCE IN THIS EIA REPORT
(i) a description and comparative assessment of all alternatives identified during the environmental impact assessment process.	Section 2.4
(j) a summary of the findings and recommendations of any specialist report or report on specialised processes.	Vaalkop 1: Chapter 6 Vaalkop 2: Chapter 7 Vaalkop 3: Chapter 8 Vaalkop substation and power line 4: Chapter 9
(k) a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures.	Vaalkop 1: Chapter 6 Vaalkop 2: Chapter 7 Vaalkop 3: Chapter 8 Vaalkop substation and power line 4: Chapter 9
(l) an assessment of each identified potentially significant impact, including— (i) cumulative impacts (ii) the nature of the impact (iii) the extent and duration of the impact (iv) the probability of the impact occurring (v) the degree to which the impact can be reversed (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated.	Vaalkop 1: Chapter 6 Vaalkop 2: Chapter 7 Vaalkop 3: Chapter 8 Substation and power line 4: Chapter 9
(m) a description of any assumptions, uncertainties and gaps in the knowledge	Section 4.3.5
(n) a reasonable opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Vaalkop 1: Chapter 13 Vaalkop 2: Chapter 14 Vaalkop 3: Chapter 15 Substation and power line: Chapter 16
(o) an environmental impact statement which contains – (i) a summary of the key findings of the environmental impact assessment; and (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives.	Vaalkop 1: Chapter 13 Vaalkop 2: Chapter 14 Vaalkop 3: Chapter 15 Substation and power line: Chapter 16
(p) the draft environmental management programme containing the aspects contemplated in regulation 33	Vaalkop 1: Appendix L1 Vaalkop 2: Appendix L2 Vaalkop 3: Appendix L3 Substation and power line 4: Appendix L4
(q) copies of any specialist reports and reports on specialised processes complying with regulation 32	Appendix F-K
(r) any specific information that may be required by the	Refer to Page i-vi for

NEMA REGULATION 543, SECTION 31 REQUIREMENTS FOR THE CONTENT OF EIA REPORTS	CROSS REFERENCE IN THIS EIA REPORT
competent authority; and	information requested by DEA
(s) any other matters required in terms of section 24 (4)(a) and (b) of the Act	Refer to Page i-vi for information requested by DEA

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 Environmental Impact Assessment Report:
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MetroGIS
- Client** : Kabi Solar (Pty) Ltd
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INVITATION TO COMMENT ON THE DRAFT EIA REPORT

This **Draft EIA Report** has been made available for public review at the following places, which lie in the vicinity of the proposed project area from **18 May 2012 – 18 June 2012**

- » Orkney Public Library
- » Klerksdorp Public Library

The report is also available for download on:

- » www.savannahsa.com

Please submit your comments to
Marchelle Terblanche of Index PO Box 26275, Monument Park, 0105 Tel: 012 346 5307 Fax: 086 644 1160 Email: admin.index@iafrica.com
The due date for comments on the Draft Scoping Report is 18 June 2012

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

PUBLIC MEETING

In order to further facilitate comments on this Draft EIA Report and to provide feedback on the findings of the specialist scoping studies, a public feedback meeting will be held during the review period. All interested and affected parties are invited to attend a public meeting to be on:

Date: **13 June 2012**

Time: **17:00**

Venue: **Orkney Library, Cnr Partmore & Shakespeare Roads, Orkney.**

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 **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. The **Vaalkop Substation and power line** to connect to the Eskom grid will be comprised of the following:

- » A new **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new **overhead 132 kV power line** approximately 6 km long (with a servitude of 31 m wide) to connect directly to the Eskom Hermes Substation via the new on site substation. The power line will follow an existing corridor of 5 power lines feeding into Hermes Substation. The corridor of the new power line and the existing power lines becomes wedged between an old slimes dam and the R502 arterial road. The new power line is to be used to evacuate the power from the Kabi Vaalkop Solar I and Kabi Vaalkop Solar III PV facilities.

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.

As these proposed phases form part of a larger solar energy facility development, a consolidated EIA process¹ has been undertaken with a single EIA report being produced to assess the potential environmental impacts associated with the larger development, as well as the potential cumulative impacts of all the seven proposed phases. The following key phases have been involved thus far in the EIA Process:

» *Notification Phase* - organs of state, stakeholders, and interested and affected parties (I&APs) were notified of the proposed project using adverts, site notices, background information documents, and stakeholders letters. Details of registered

¹ The approach to undertake one consolidated EIA process has been accepted by DEA

parties have been included within an I&AP database for the project.

- » *Scoping Phase* – potential issues associated with the proposed project and environmental sensitivities (i.e. over the broader study site), as well as the extent of studies required within the EIA Phase were identified.
- » *EIA Phase* – potentially significant biophysical and social impacts² and identified feasible alternatives put forward as parts of the project have been comprehensively assessed. Appropriate mitigation measures have been recommended as part of a draft Environmental Management Programme (EMP).

The following potentially significant environmental impacts have been identified through the EIA Phase for the **Kabi Vaalkop Solar I-III PV Facilities** as well as the **substation and power line**:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on the social environment.

The positive implications of establishing a solar energy facility including the substation and power line include on the identified site include:

² Direct, indirect, cumulative that may be either positive or negative.

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.
- » The project is anticipated to have positive social and health related impacts through the “greener” technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.
- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed **Kabi Vaalkop Solar I-III PV Facility including**

the Substation and power line conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within **Appendix L**

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

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

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F to K should be implemented to limit the negative

- impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix L of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.
 - » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
 - » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
 - » Alien invasive plants should be controlled on site.
 - » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
 - » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes
 - » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

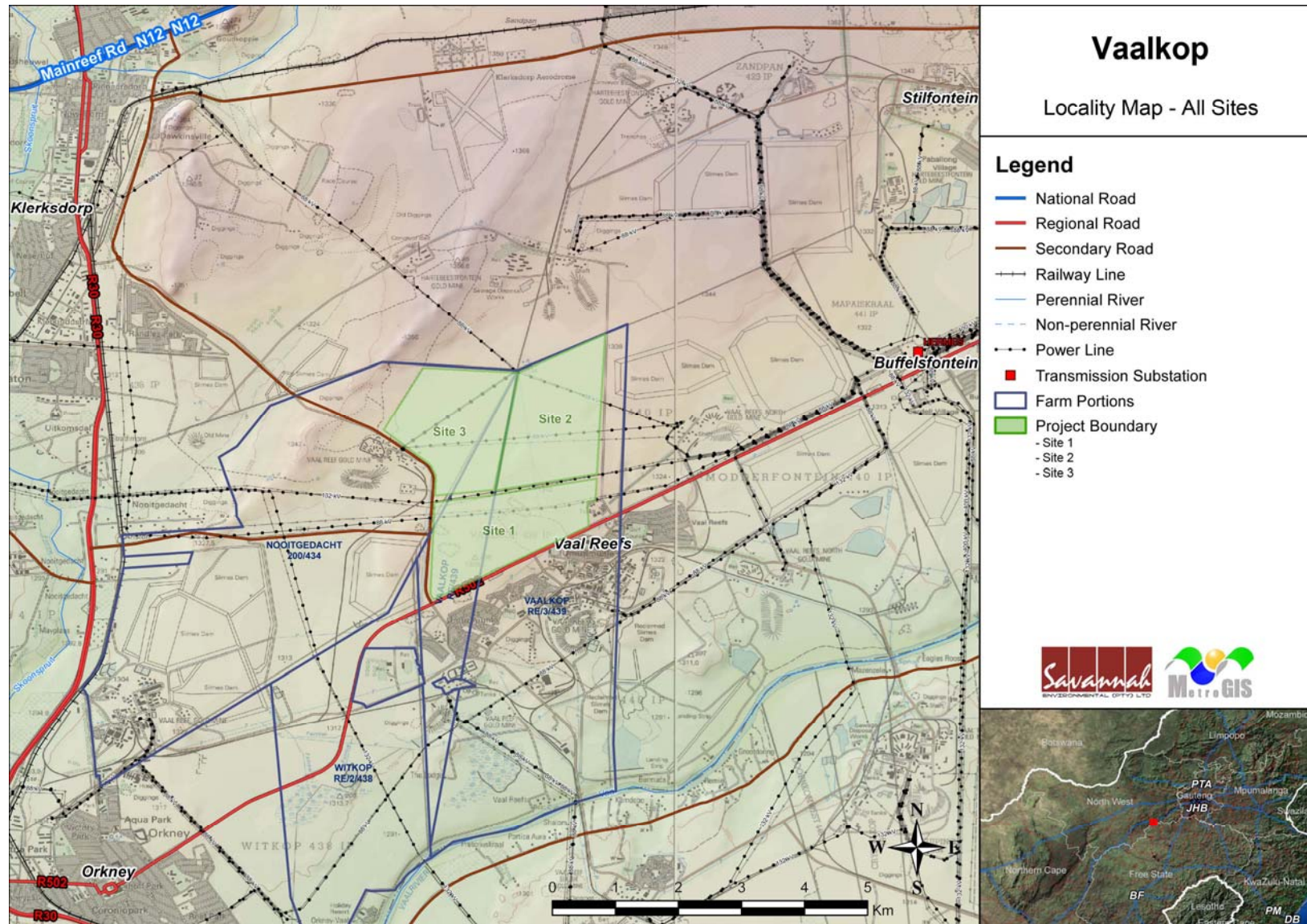


Figure 1: Locality Map

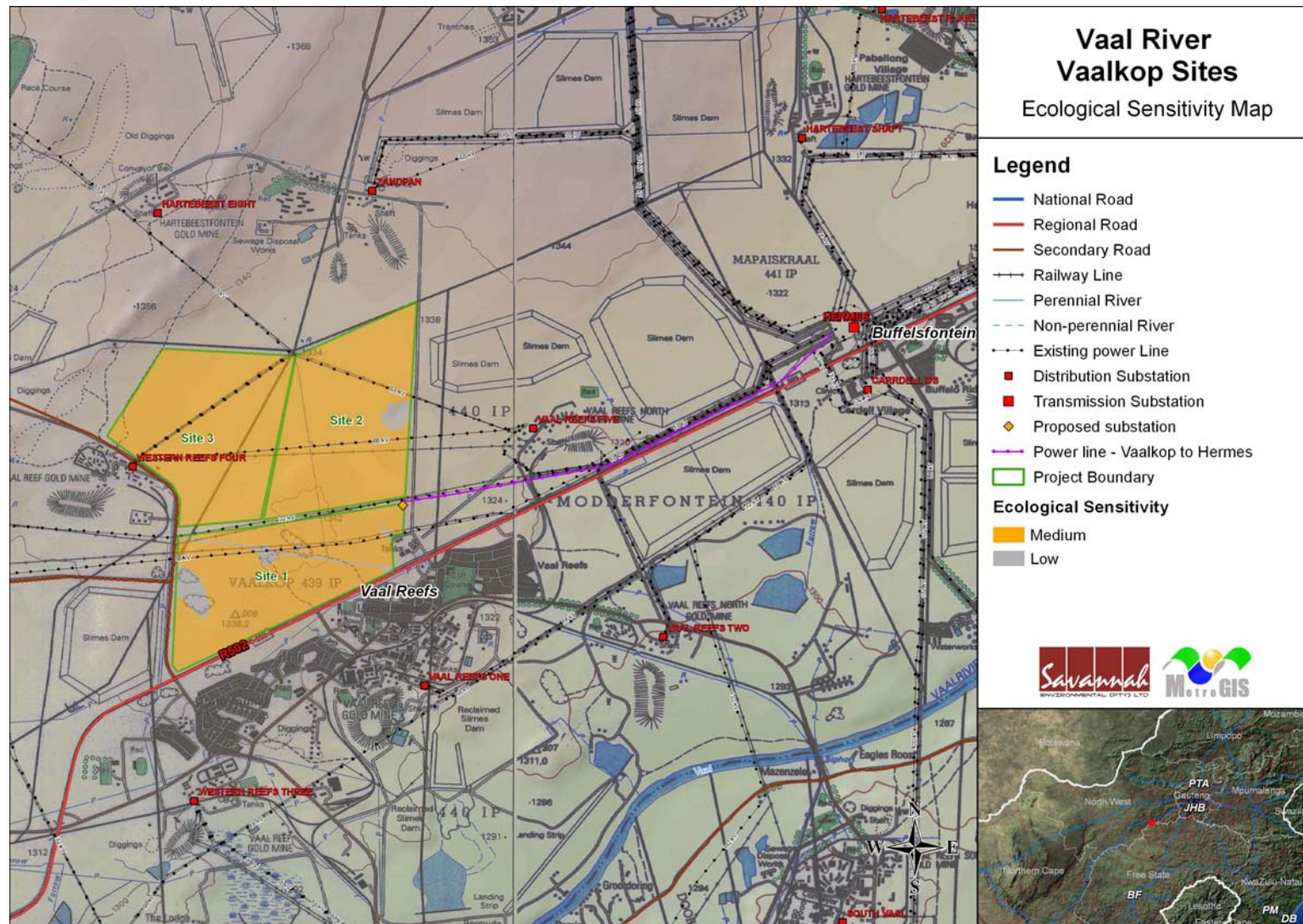


Figure 2: Potentially sensitive areas within the study area

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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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 total generating capacity of up to **225 MW**. The Kabi Vaalkop facility is proposed to 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). Therefore, in order to accommodate the end-requirement that each SPV receive an Environmental Authorisation for their respective phase (i.e. in order to accommodate the requirements the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa) the proposed development has been split into the following phases:

1. **Kabi Vaalkop Solar I PV Facility** (75 MW)
2. **Kabi Vaalkop Solar II PV Facility** (75 MW)
3. **Kabi Vaalkop Solar III PV Facility** (75 MW)
4. **Kabi Vaalkop Substation and power line to connect to the Eskom grid**

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 Environmental Impact Assessment (EIA) 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 Nootgedacht 434 IP near Orkney, North West Province. The site is bordered to the south by the R502 from Orkney with Eskom's Hermes Transmission Substation located approximately 6 km east of the site (refer to Figure 1.1). A broader study area of approximately 803 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.

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.

Further details of infrastructure proposed is given in Chapter 2 of this report. 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 process³ has been 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 is being undertaken to consider all four phases/projects of the 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.

³ The approach to undertake one consolidated EIA process has been accepted by DEA.

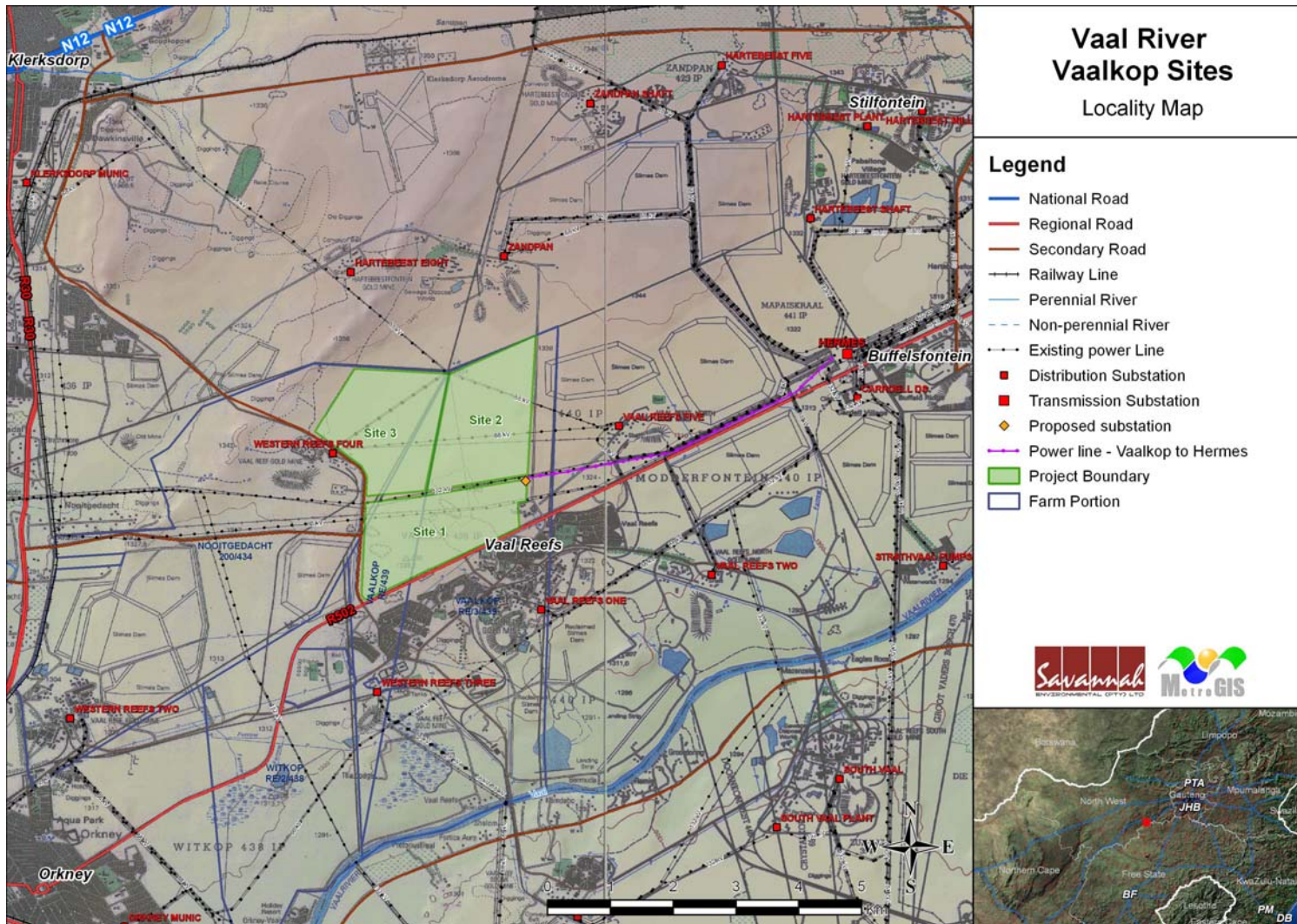


Figure 1.1: Locality map showing the Portion 200 of Farm Nooitgedacht 434 IP, a portion of Portion 3 of the Farm Vaalkop 439 IP and on a portion of Farm Vaalkop 439 IP, the proposed site for the establishment of the solar facility, as well as the position of the 3 phases of the proposed 225MW PV solar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

1.2. Conclusions from the Scoping Phase

The broader study area (i.e. the farm portions in their entirety) was evaluated within the scoping study. It was found that some sections of the study area appear to be in a mostly natural condition even though there are within a mining area. From the project point of view, it was therefore recommended that infrastructure should only be placed with caution or mitigation measures must be implemented to minimise impacts in the areas perceived to be in natural condition. No environmental fatal flaws were identified to be associated with the site. In addition, due to the nature of the site (its location within a mining area), no areas of potential high environmental sensitivity were identified at the scoping stage. However, as recommended, care has been taken in designing the different components of the facility during the EIA Phase.

1.3. 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 power line and substation as the proposed project includes the following "listed activities" in terms of GN R544, GN545 and R546 (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 ⁴	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 substation and 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	Construction of buildings within 32m of a watercourse

⁴ 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
		such construction will occur behind the development setback line.	
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
GN545 ⁵	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 with a capacity of up to 225MW (to be developed in three phases of 75 MW each). 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 for: (i) Linear development activities. (ii) Agriculture or afforestation where activity 16 in this schedule will apply.	The footprint of physical alteration will exceed 20ha.

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

⁵ Activities requiring a Scoping and EIA Study

1.4. Objectives of the EIA Process

The Scoping Phase which was completed in March 2012 (i.e. with the acceptance of scoping in May 2012) served to identify potential impacts associated with the proposed project and to define the extent of studies required within the EIA Phase. The Scoping Phase included input from the project proponent, specialists with experience in the study area and in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

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

1.5. Details of the Environmental Assessment Practitioner

Savannah Environmental was contracted by 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 6 year of 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 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 all phases 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. Description of the Proposed Solar Energy Facility

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 2.1):

- » **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 to connect to the Eskom grid**

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 with a width less than 6 m; 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.

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.

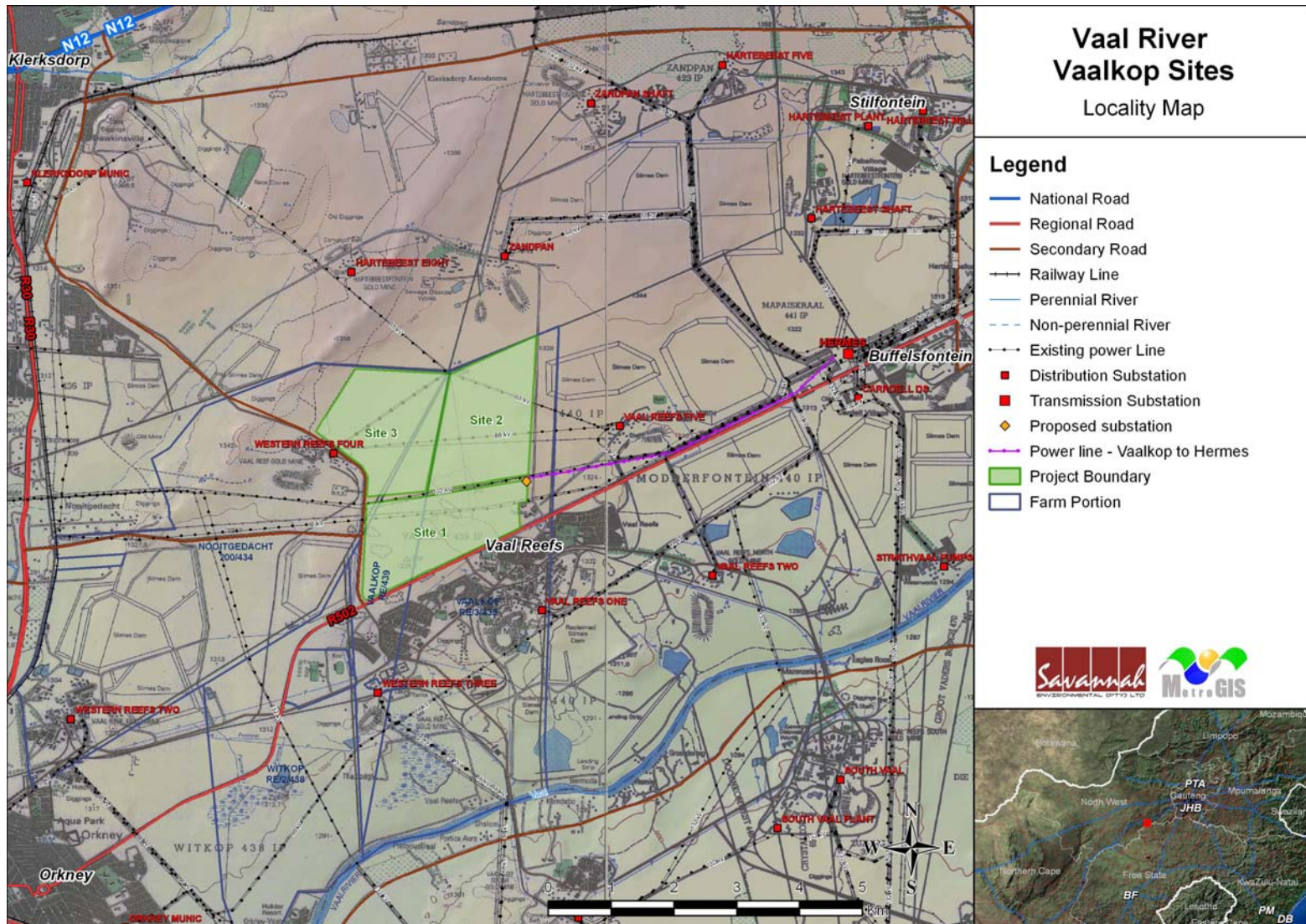


Figure 2.1: Locality map showing all the phases of the proposed Kabi Vaalkop Solar PV Facility. Individual layout plans for each site are attached as Appendix M (projects maps)

Table 2.1: Proposed phases and associated infrastructure

Development and Applicant	Phase	DEA Number	Ref:	Capacity	Facility Footprint	Farm Portions	21 Digit Numbers and Co-ordinates	Associated infrastructure
<p>Kabi Vaalkop Solar I PV Facility</p> <p>Applicant: Kabi Solar (Pty) Ltd</p> <p>Contact Person: Mike Levington</p>		12/12/20/2513/1		75 MW	250 Ha	<ul style="list-style-type: none"> • a portion of Portion 200 of Farm Nooitgedacht 434 IP, • a portion of Portion 3 of the Farm Vaalkop 439 IP and • a portion of Farm Vaalkop 439 IP 	<p>21 Digit Numbers:</p> <ul style="list-style-type: none"> • TOIP00000000043400200 • TOIP00000000043900003 • TOIP00000000043900000 <p>Co-ordinates: 26°55'36.84"S, 26°43'29.58"E</p>	<ul style="list-style-type: none"> » 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 with a width of less than 6 m; and » Workshop area for maintenance and storage » On-site substation (100m x 100m) to be shared by all three phases » A new overhead 132 kV power line approximately 6 km long (with a servitude of width 31 m) to connect directly to the Eskom Hermes Substation via the new on site substation (the power line is to be shared with the Kabi Vaalkop Solar III PV Facility)
<p>Kabi Vaalkop Solar II PV Facility</p> <p>Applicant: Vaal River Solar 1 Proprietary Limited</p> <p>Contact Person:</p>		12/12/20/2513/2		75 MW	268 Ha	<ul style="list-style-type: none"> • a portion of Portion 3 of the Farm Vaalkop 439 IP 	<p>21 Digit Numbers:</p> <ul style="list-style-type: none"> • TOIP00000000043900003 <p>Co-ordinates: 26°54'45.14"S, 26°43'56.60"E</p>	<ul style="list-style-type: none"> » 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 with a width

Development and Applicant	Phase	DEA Number	Ref:	Capacity	Facility Footprint	Farm Portions	21 Digit Numbers and Co-ordinates	Associated infrastructure
Mike Levington								less than 6 m; and » Workshop area for maintenance and storage » New on-site substation (100m x100m) to be shared by all three phases » A new 132 kV power line to turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via the new on-site substation. The proposed onsite substation is to be constructed near the existing Jouberton - Hermes 132 kV power line
Kabi Vaalkop Solar III PV Facility Applicant: Kabi Solar (Pty) Ltd Contact Person: Mike Levington		12/12/20/2513/3		75 MW	281Ha	<ul style="list-style-type: none"> a portion of Portion 200 of Farm Nooitgedacht 434 IP and a portion of Farm Vaalkop 439 IP 	21 Digit Numbers: <ul style="list-style-type: none"> TOIP00000000043400200 TOIP00000000043900000 Co-ordinates: 26°54'43.46"S, 26°43'6.57"E	» 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 with a width less than 6 m; and » Workshop area for maintenance and storage » New on-site substation (100m X 100m) to be shared with all three phases » A new overhead 132 kV power line 1 approximately 6 km long (with a

Development and Applicant	Phase	DEA Number	Ref:	Capacity	Facility Footprint	Farm Portions	21 Digit Numbers and Co-ordinates	Associated infrastructure
								servitude width of 31 m) to connect directly to the Eskom Hermes Substation to be shared with the Kabi Vaalkop Solar I PV Facility via the new onsite substation.
Vaalkop Substation and power line Applicant: Kabi Solar (Pty) Ltd Contact Person: Mike Levington		12/12/20/2513/4				<ul style="list-style-type: none"> 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 power line to traverse 2 properties (a portion of Portion 3 of the Farm Vaalkop 439 IP and Portion 4 of farm Modderfontein 440) 	21 Digit Numbers: <ul style="list-style-type: none"> TOIP00000000043900000 TOIP00000000043900003 Substation Co-ordinates: 26°55'15.1"S, 26°44'15.5"E	» The new substation (100 m x 100 m) is to be shared by all three phases. » Phase II of the proposed development will turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via this new substation » A new power line to Hermes Substation will be required for Phase I 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 (with a servitude width of 31 m) 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

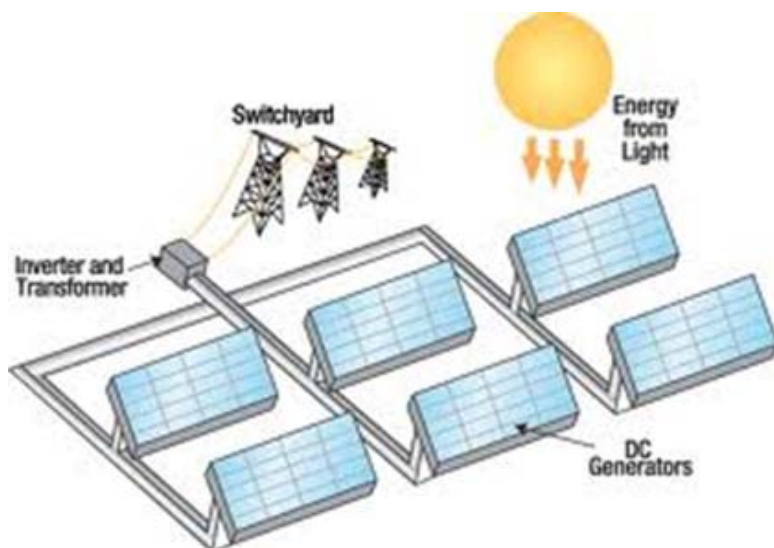


Figure 2.3: Schematic diagram of a PV plant (Sourced from: <http://www.solar-green-wind.com/archives/tag/solar-cells>)

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.

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

- » Direct connection for a 75MW phase into the Jouberton-Hermes 132 kV line which traverses the site.
- » Close proximity to Eskom's Hermes Transmission Substation located approximately 6 km east of the site. While Kabi Vaalkop PV II will connect directly (via the proposed Vaalkop Substation) into the Jouberton-Hermes 132 kV line, the development of the Kabi Vaalkop PV I 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. Minimal earth works would be required on the site.
- » Parts of the site are relatively degraded due to mining activities.
- » At present the majority of the site is vacant and fallow and is not suitable for agriculture or other developments, such as township establishment. The establishment of a renewable energy project is one of the few viable uses for the subject site.

2.4. Project Alternatives

In accordance with the requirements of the EIA Regulations⁶, alternatives are required to be considered within the EIA process, and may refer to any of the following:

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

⁶ GNR543 27(e) calls for the applicant to identify feasible and reasonable alternatives for the proposed activity.

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 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 the construction of facilities of this nature. For example, an area of 780 ha will be required for a 225 MW facility (all three PV facilities). The extent of the proposed site is 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. While there is sufficient capacity for one 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 AngloGold Ashanti Limited). At present the majority of the site is vacant and fallow and is not suitable for agriculture or other developments, such as township establishment. The change in land use is thus regarded as a positive impact over the long-term, as the establishment of a renewable energy project is one of the few viable uses for the subject site.

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. Activity Alternatives

No activity alternatives were assessed because the site has been identified by Kabi Solar as being highly desirable for the establishment of a photovoltaic plant and not any other development or renewable technologies such as wind or concentrated solar power (CSP).

- » Wind energy installations were not considered as a feasible and reasonable alternative as the proposed developmental area does not have the required wind resource.
- » CSP installations were not considered as a feasible and reasonable alternative as they require a large amount of water for cooling, unlike PV where water is only required for cleaning purposes. PV is also relatively easier to construct as opposed to CSP.

Therefore, a PV facility is considered by Kabi Solar to be the only feasible activity for the proposed site.

2.4.3. Design or Layout Alternatives

This alternative was not assessed in the EIA Phase, however technical, social and environmental issues were considered, prior to the layout design/micro-siting exercise. The rationale for not considering alternatives in this category is explained below.

- » *PV panels positioning* – space is a restricting factor on site considering the proposed generating capacity of the facility. In order to meet the proposed generating capacity within the proposed development area and maximise all available space after considering environmental, technical and social issues as identified in the Scoping phase, 98% (approximately 790 ha of a 803 ha site) of the available space will be utilised for all phases of the proposed facility
- » *Site access* - the study site is accessible via existing access points off the R502 from Orkney on the southern border of the site and another access point off an existing tarred secondary road on the western border of the site. Therefore, no other feasible or reasonable alternative access was available for consideration for access to the site.
- » *Site office and laydown areas* – the site offices and laydown areas for all phases will be located within the broader area proposed for development. The site offices and laydown areas will be located in areas that will eventually be covered by the PV panels. Therefore, no area will be unnecessarily disturbed for the site

offices and laydown areas. No reasonable or feasible alternative were therefore identified by Kabi Solar in this regard.

- » *Power line to Hermes Substation:* A new overhead 132 kV power line will be constructed to connect directly to the Eskom Hermes Substation via the new substation. The power line will follow an existing corridor of power lines feeding into Hermes Substation. The proposed new power line will join a corridor of 5 existing power lines that provide electricity to several mines in the area. The corridor on the new power line and the existing power lines becomes wedged between an old slimes dam and the R502 arterial road. Since this corridor already has power lines, the new power line will therefore have a very low visual and environmental impact. No reasonable or feasible alternative were therefore identified by Kabi Solar in this regard.
- » *Location of Vaalkop substation:* The proposed substation is to be shared by all three phases of the proposed development. From a technical point of view it is therefore required that the substation be located in such a way that it is accessible from all three phases and also located near the existing Jouberton - Hermes 132 kV power line that crosses the site. The substation will be located as close as possible to the existing Jouberton - Hermes 132 kV power line that crosses the site such that only a short power line will be required to turn into this existing power line. No reasonable or feasible alternative were therefore identified by Kabi Solar for the location of this substation.

2.4.4. Technology Alternatives

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

2.4.5. Operating Alternatives

No operational alternatives were assessed as no feasible and reasonable operational alternatives were identified.

2.4.6. No-go 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 CO₂ 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.

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, with each phase having an installed capacity of 75MW. In addition, grid infrastructure (including an on-site substation and overhead power line) will be constructed to connect two phases of the proposed development 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 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 on the southern border of the site, and also via a

secondary road on the western border of the site. 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 with a width of less than 6 m 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 extent of earthworks and compaction required in the upgrade or construction of the access roads will be established through the detailed geotechnical study which will be undertaken as part of the design phase.

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 be 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)⁷ 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,

⁷ A permit will be required for the transportation of these abnormal loads on public roads.

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 temporary construction equipment camp will need to be established within the developmental footprint. 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. No dedicated construction equipment camp or laydown areas are proposed. However, as construction proceeds different section of the site will be used as laydown and construction equipment storage areas. These areas will eventually be covered by solar panels. 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

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 4 m from ground level.

The establishment of 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.

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.



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

Construct on-site substation

An on-site substation of approximately 100 m 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 levelling of the site (where necessary), 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

Should the project receive preferred bidder status and a Power Purchase Agreement (PPA) received as part of the Department of Energy's IPP procurement process, the Power Purchase Agreement associated with the solar PV plant will be for a period of approximately 20 years. 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.

3.1 Policy and Planning Context

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

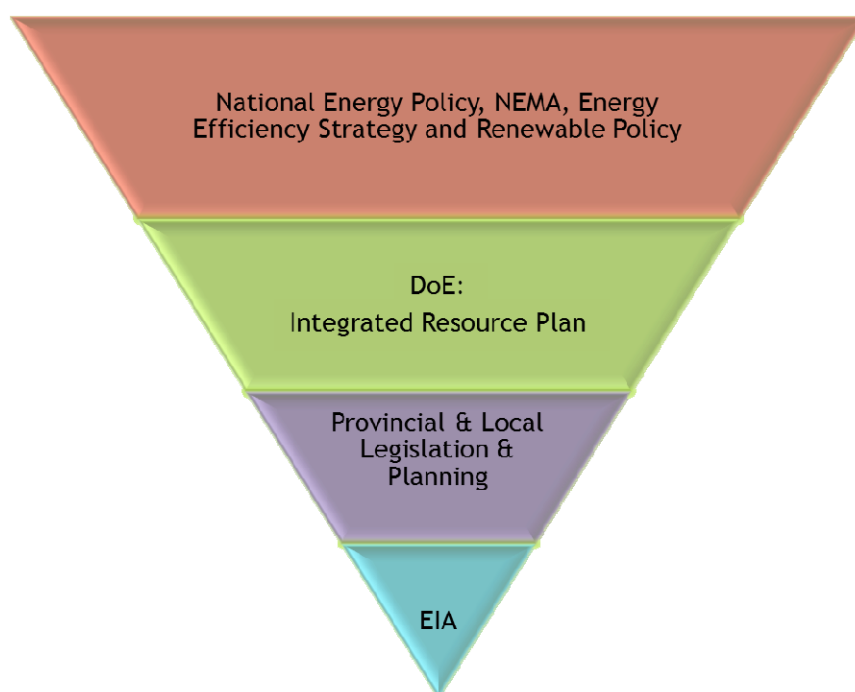


Figure 3.1: Hierarchy of electricity policy and planning documents

3.1.1 White Paper on the Energy Policy of South Africa, 1998

Development within the South African energy sector is governed by the White Paper on a National Energy Policy (DME, 1998). The White Paper identifies key objectives for energy supply, such as increasing access to affordable energy services, managing energy-related environmental impacts and securing energy supply through diversity.

As such, investment in renewable energy initiatives is supported, based on an understanding that renewable energy sources have significant medium - long-term commercial potential and can increasingly contribute towards a long-term sustainable energy future.

3.1.2 Renewable Energy Policy in South Africa, 1998

The White Paper on Renewable Energy (DME, 2003) supplements the Energy Policy, and sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. Government policy on renewable energy is therefore concerned with meeting economic, technical and other constraints on the development of the renewable industry.

In order to meet the long-term goal of a sustainable renewable energy industry, the South African Government has set the following 10-year target for renewable energy: *"10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1 667 MW) of the estimated electricity demand (41 539 MW) by 2013"* (DME, 2003).

The White Paper on Renewable Energy states *"It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having profound impacts on our planet. Solar energy is a clean, renewable resource and should be developed in South Africa on the basis of national policy as well as provincial and regional guidelines."*

3.1.3 Final Integrated Resource Plan, 2010 - 2030

The Energy Act of 2008 obligates the Minister of Energy to develop and publish an integrated resource plan for energy. Therefore, the Department of Energy (DoE), together with the National Energy Regulator of South Africa (NERSA) has compiled the Integrated Resource Plan (IRP) for the period 2010 to 2030. The objective of the IRP is to develop a sustainable electricity investment strategy for generation capacity and transmission infrastructure for South Africa over the next twenty years. The IRP is intended to:

- » Improve the long term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development;
- » Ascertain South Africa's capacity investment needs for the medium term business planning environment;
- » Consider environmental and other externality impacts and the effect of renewable energy technologies;

- » Provide the framework for Ministerial determination of new generation capacity (inclusive of the required feasibility studies).

The objective of the IRP is to evaluate the security of supply, and determine the least-cost supply option by considering various demand side management and supply-side options. The IRP also aims to provide information on the opportunities for investment into new power generating projects.

The outcome of the process confirmed that coal-fired options are still required over the next 20 years and that additional base load plants will be required from 2010. The first and interim IRP was developed in 2009 by the Department of Energy. The initial four years of this plan was promulgated by the Minister of Energy on 31 December 2009, and updated on 29 January 2010. The Department of Energy released the Final IRP in March 2011, which was accepted by Parliament at the end of March. This Policy-Adjusted IRP is recommended for adoption by Cabinet and subsequent promulgation as the final IRP. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9.6 GW of nuclear; 6.3 GW of coal; 17.8 GW of renewables (including 8,4GW solar); and 8.9 GW of other generation sources.

3.1.4 Electricity Regulation Act, 2006

Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of Amendment, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by licence to Independent Power Producers (IPPs). NERSA has recently published a request for qualification and proposals for new generation capacity under the IPP procurement programme, and is in the process of updating and developing its process in relation to the awarding of electricity generation licences.

3.2. Regulatory Hierarchy for Energy Generation Projects

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

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 renewable 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).
- » *Department of Mineral Resources (DMR)*. This Department is responsible for the regulation of exploitation of mineral resources.

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 have been 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.

3.3 Relevant Legislation and Guidelines

The following legislation and guidelines have informed the scope and content of this EIA 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 June 2010
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
 - * Public Participation in the EIA Process (DEA, 2010)
- » International guidelines – the Equator Principles and the International Finance Corporation

Several other acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows:

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

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

	duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.		
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs Department of Environment and Nature Conservation Local Authorities	Noise impacts are expected to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation. On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource - Sections 21a and b. Non-consumptive water uses may include	Department of Water Affairs Provincial Department of Water Affairs	Water use will need to be licensed (water use as defined in terms of S21 of the NWA).

	impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.		
National Water Act (Act No 36 of 1998)	In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	Department of Water Affairs Provincial Department of Water Affairs	This section of the Act will apply with respect to the potential impact on drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.
Atmospheric Pollution Prevention Act (Act No 45 of 1965)	In terms of S27, the Minister may declare certain areas dust control areas. Part V of Act regulates pollution generated by vehicle fumes.	Department of Environmental Affairs	The project study area has not been declared a dust control area. Although there is no legal obligation relating to the activities to be undertaken best practice measures should be used to prevent dust generation from the roads and excavations during construction.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas." Declaration of controlled emitters (Part 3 of	Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation. The Act provides that an air quality

	Act) and controlled fuels (Part 4 of Act) with relevant emission standards.		officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.
National Heritage Resources Act (Act No 25 of 1999)	<p>S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including:</p> <ul style="list-style-type: none"> » The construction of a road, powerline, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent. <p>Stand alone HIAs are not required where an EIA Process is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>	South African Heritage Resources Agency	<p>A permit may be required should any cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p> <p>A HIA has been undertaken as part of the EIA Process to identify heritage sites.</p>
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152	Department of Environmental Affairs	<p>As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard.</p> <p>Specialist flora and fauna studies have</p>

	<p>in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p>		<p>been undertaken as part of the EIA Phase. As such the potentially occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>	<p>Department of Agriculture Forestry and Fisheries</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998)</p>	<p>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</p>	<p>Department of Agriculture, Forestry and Fisheries (DAFF)</p>	<p>While no permitting or licensing requirements arise from this legislation, this act will find application during the construction and operational phase of the project.</p>

	In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.		
Hazardous Substances Act (Act No 15 of 1973)	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance</p> <p>Group IV: any electronic product; and</p> <p>Group V: any radioactive material.</p> <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.
Development Facilitation	Provides for the overall framework and	Local Municipality	The applicant must submit a land

<p>Act (Act No 67 of 1995)</p>	<p>administrative structures for planning throughout the Republic.</p> <p>S(2 - 4) provide general principles for land development and conflict resolution.</p>	<p>District Municipality</p>	<p>development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.</p>
<p>Subdivision of Agricultural Land Act (Act No 70 of 1970)</p>	<p>Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province</p>	<p>Local Municipality District Municipality</p>	<p>Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.</p>
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of this Act (GN 718), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities.</p> <p>Any person who stores waste must at least</p>	<p>National Department of Water and Environmental Affairs</p> <p>Provincial Department of Environmental Affairs (general waste)</p>	<p>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP (refer to Appendix J).</p> <p>The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).</p>

	<p>take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented. 		
Promotion of Access to Information Act (Act No 2 of 2000)	All requests for access to information held by state or private body are provided for in the Act under S11.	Department of Environmental Affairs	No permitting or licensing requirements.
Promotion of Administrative Justice Act (Act No 3 of 2000)	<p>In terms of S3 the government is required to act lawfully and take procedurally fair, reasonable, and rational decisions.</p> <p>Interested and affected parties have right to be heard.</p>	Department of Environmental Affairs	No permitting or licensing requirements.

APPROACH TO UNDERTAKING THE EIA PHASE

CHAPTER 4

An EIA Process is dictated by the EIA Regulations which involves the identification and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project. The EIA process which comprises a **Scoping** and an **EIA Phase** culminates in the submission of an EIA Report, including an Environmental Management Programme (EMP) to the competent authority for decision-making.



Figure 4.1: Phases within the EIA Process

The EIA Phase for the proposed Kabi Vaalkop Solar PV Facility has been undertaken in accordance with the EIA Regulations published in Government Notice GN33306 of 18 June 2010, in terms of Section 24(5) of NEMA (Act No. 107 of 1998). The environmental studies for this proposed project were undertaken in two phases, in accordance with the EIA Regulations.

4.1. Scoping Phase

The Scoping Report aimed at detailing the nature and extent of the proposed facility, identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA Phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and I&APs. In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives were investigated for consideration within the EIA process. However, no feasible and reasonable alternatives were identified for some aspects of the project. Details of alternatives considered and reasons for not considering some of the alternatives is detailed in Chapter 2.

The Scoping Phase also provided interested and affected parties (I&APs) with the opportunity to receive information regarding the proposed project, to participate in

the process and to raise issues or concerns. To further facilitate this, the draft Scoping Report was made available for public review and comment at the Orkney Public Library and on the Savannah Environmental website (www.savannahSA.com) between 03 February and 05 March 2012.

All the comments, concerns, and suggestions received during the Scoping Phase and the review period were included within the Final Scoping Report, which was submitted to the National Department of Environmental Affairs (DEA) for acceptance, together with a Plan of Study for the EIA Phase. The Scoping Phase concluded in May 2012 with the acceptance of the final Scoping Report. In terms of this acceptance, an EIA was required to be undertaken for the proposed project as per the accepted plan of study. In addition, it is required that comments from the relevant organs of state are submitted with the Final Environmental Impact Report (EIR), and that the EIR report is to contain a construction operational phase Environmental Management Programme (EMPr).

4.2. Environmental Impact Assessment Phase

The EIA Phase aimed to achieve the following:

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

The EIA addresses potential environmental impacts and benefits associated with all phases of the project including design, construction, operation, and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

4.3. Overview of the EIA Phase

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

- » Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
- » Undertaking a public participation process throughout the EIA process in accordance with Regulation 54 of GN R543 of 2010 in order to identify any additional issues and concerns associated with the proposed project.
- » Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 57 of GN R543 of 2010).
- » Undertaking of independent specialist studies in accordance with Regulation 32 of GN R543 of 2010.
- » Preparation of a Draft EIA Report in accordance with the requirements of the Regulation 31 of GN R543 of 2010.

These tasks are discussed in detail below.

4.3.1 Authority Consultation

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

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

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

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

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

4.3.2 Public Involvement and Consultation

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

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

Below is a summary of the key public participation activities conducted during the EIA 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 4.1 below).

Table 4.1: Key stakeholder groups identified during the EIA Process

Stakeholder Group	Department
National and Provincial Authorities and Organs of State	<ul style="list-style-type: none"> » National Department of Environmental Affairs » North West Department of Economic Development Environment, Conservation and Tourism » Department of Energy » Department of Water Affairs » Department of Agriculture, Forestry and Fisheries » South African Heritage Resources Agency » South African National Roads Agency Limited » Department of Mineral Resources
Municipalities	<ul style="list-style-type: none"> » City of Matlosana Local Municipality » Dr. Kenneth Kaunda District municipality
Public stakeholders	<ul style="list-style-type: none"> » Adjacent and surrounding landowners » Orkney residents and local business owners
Parastatals & service providers	<ul style="list-style-type: none"> » Eskom Distribution

NGOs/Business forums » Wildlife Society of South Africa

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

» **Newspaper Advertisements**

As part of the EIA phase a newspaper advert was placed in the Klerksdorp Record to:

- to notify and inform the public of the proposed project and invite members of the public to register as I&APs
- to inform the public of the public meeting and the review period for the Draft Scoping Report

» **Stakeholder Engagement**

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

- **Focus group meetings** (stakeholders invited to attend)
- **Public feedback meeting** (public invited to attend)
- One-on-one **consultation meetings** where required (for example with directly affected or surrounding landowners)
- **Telephonic consultation** sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants)
- Written, faxed or e-mail **correspondence**.

The public meeting will serve to provide feedback on the findings of the EIA studies undertaken. Stakeholders are invited to attend the public meeting to be held on:

Date: 13 June 2012

Time: 17:00

Venue: Orkney Library, Cnr Partmore & Shakespeare Roads, Orkney

Records of all consultation undertaken during the EIA phase will be included within Appendix D.

4.3.3 Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into Comments and Response Reports (refer to Appendix D for the Comments and Response Reports compiled from the EIA Process to date).

The Comments and Response Report includes responses from members of the EIA project team and/or the project proponent. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

4.3.4 Assessment of Issues Identified through the Scoping Process

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

Table 4.1: Specialist studies undertaken within the EIA Phase

Specialist	Area of Expertise	Refer Appendix
David Hoare Consulting cc	Ecology, flora and fauna	Appendix F
Terrasol 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

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

- » The **nature**, a description of what causes the effect, what will be affected, and how it will be affected
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high)
- » The **duration**, wherein it is indicated whether:
 - * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1
 - * The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2
 - * Medium-term (5–15 years) – assigned a score of 3
 - * Long term (> 15 years) - assigned a score of 4
 - * Permanent - assigned a score of 5

- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment
 - * 2 is minor and will not result in an impact on processes
 - * 4 is low and will cause a slight impact on processes
 - * 6 is moderate and will result in processes continuing but in a modified way
 - * 8 is high (processes are altered to the extent that they temporarily cease)
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood)
 - * Assigned a score of 3 is probable (distinct possibility)
 - * Assigned a score of 4 is highly probable (most likely)
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- » The **status**, which is described as either positive, negative or neutral
- » The degree to which the impact can be reversed
- » The degree to which the impact may cause irreplaceable loss of resources
- » The degree to which the impact can be mitigated

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

As the project developer has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A draft EMP is included as Appendix L for each project phase (Appendix L1 to L4).

4.3.5 Assumptions and Limitations

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

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

Refer to the specialist studies in Appendices F – J for specialist study specific limitations.

4.3.6 Public Review of Draft EIA Report

This Draft EIA report has been made available for public review from **18 May 2012 to 18 June 2012** at the following locations:

- » www.savannahSA.com
- » Orkney Public Library
- » Klerksdorp Public Library

All registered I&APs were notified of the availability of the report and public meeting by letter. An advert has been placed in the Klerksdorp Record, a local newspaper to inform the public and I&APs of the availability of the Draft Environmental Impact Report (EIR) for review and invite I&APs to attend the public meeting (refer to Appendix D).

4.3.7 Final Environmental Impact Assessment (EIA) Report

The final stage in the EIA Phase will entail the capturing of responses from I&APs on the Draft EIA Report in order to refine the EIA report. The Final EIA report will

be submitted to the decision-making Authorities, and it is this Final report upon which a decision will be made regarding the proposed project.

DESCRIPTION OF THE RECEIVING ENVIRONMENT

CHAPTER 5

This section of the Draft Environmental Impact Assessment Report provides a description of the environment that may be affected by all the three phases of the proposed Kabi Vaalkop Solar PV Facility including the substation and power line required for grid connection of the 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 reports contained within Appendices F - K. 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.

5.1. Regional Setting and the Study Area

5.1.1 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).

5.1.2. 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, refer to Figure 5.1). It can therefore be seen from figure 5.1 that the main land use around the study site is mining.

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 transect 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.

5.2 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.

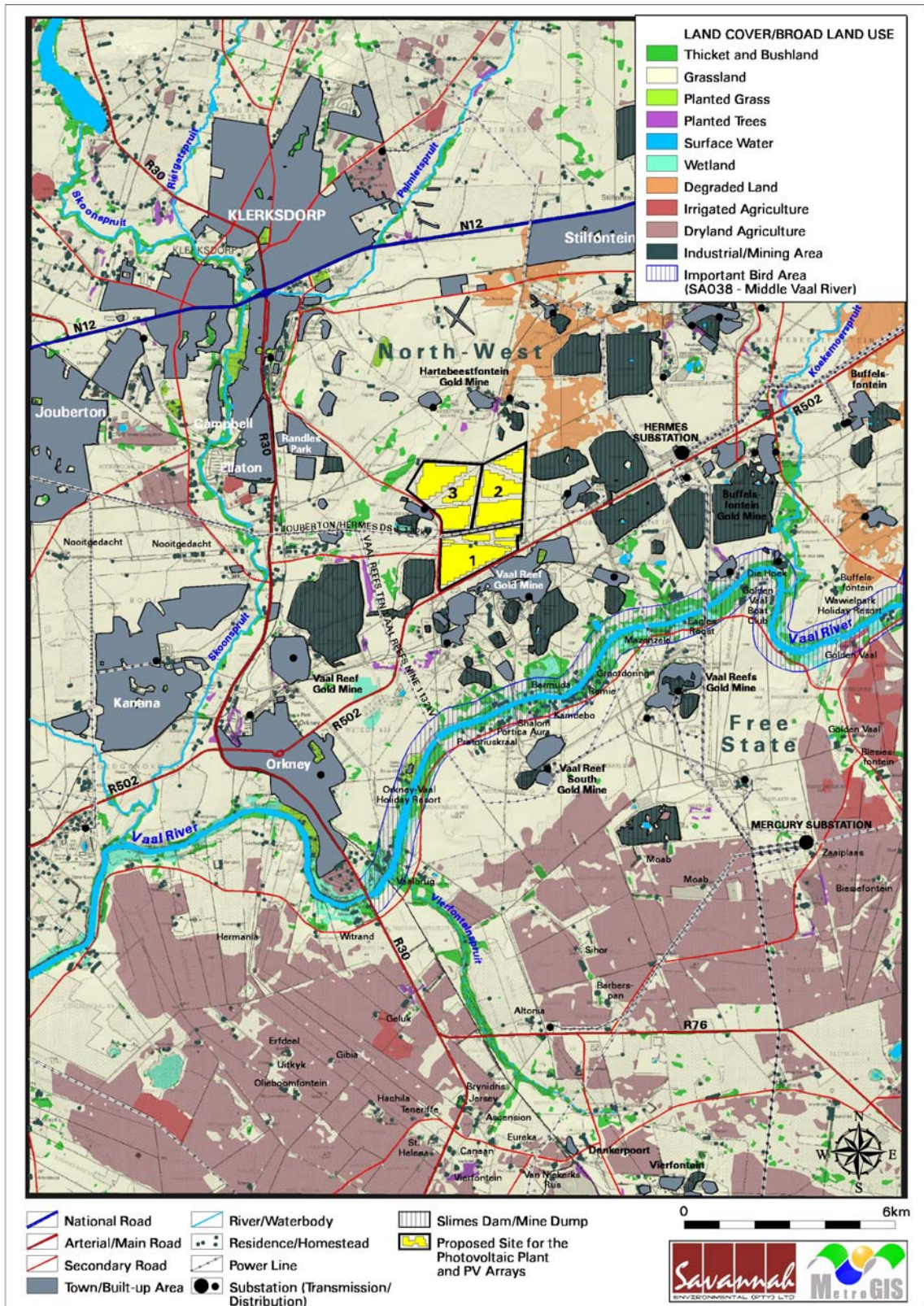


Figure 5.1: Land cover, indicating large scale mining activity and township development in the study area.

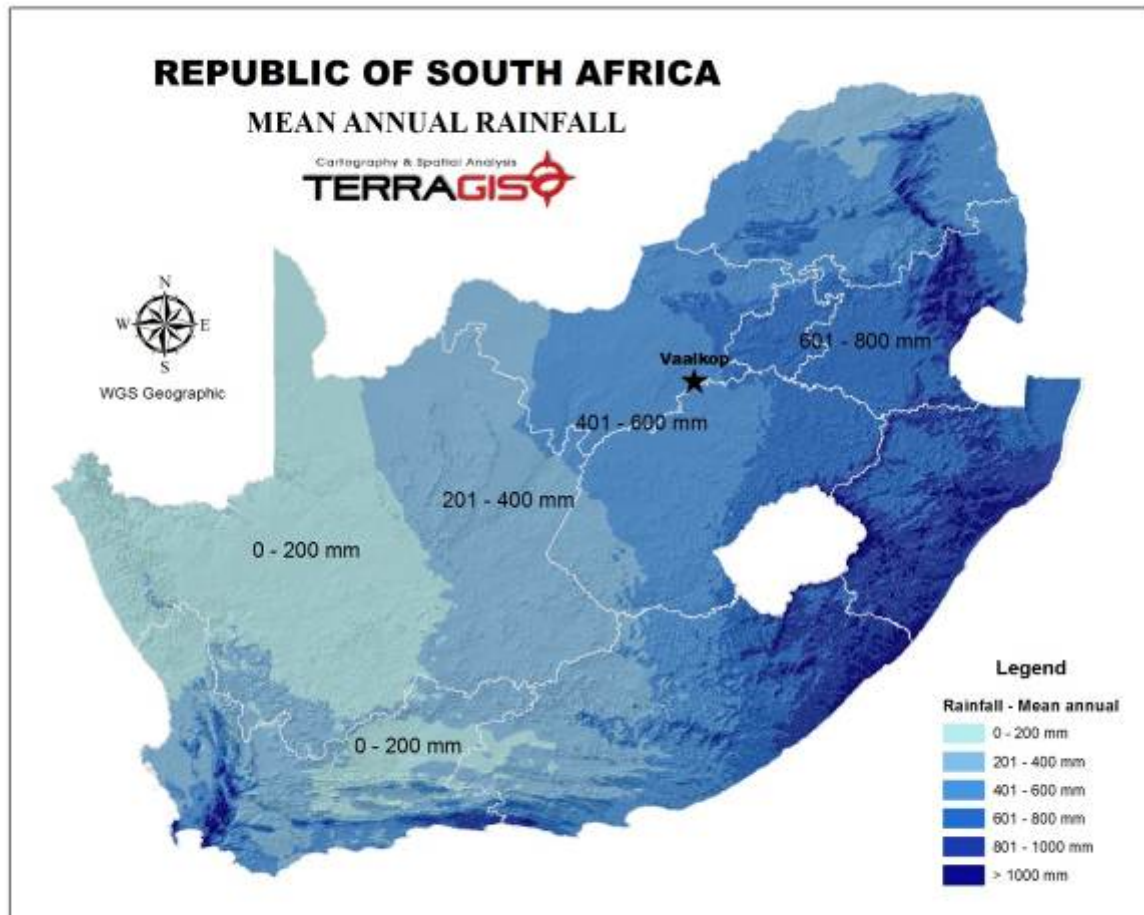


Figure 5.2: Rainfall map of South Africa indicating the location of the study site

5.3. Biophysical Characteristics of the Study Area and Surrounds

5.3.1 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 5.3 below). Figure 5.3 shows that although the topography of the site is relatively flat mine dumps in the area have a very prominent height. The Vaal River which is the most prominent hydrological feature in the region is over 3 km from the site (with different types of mining infrastructure between the Vaal River and the site).

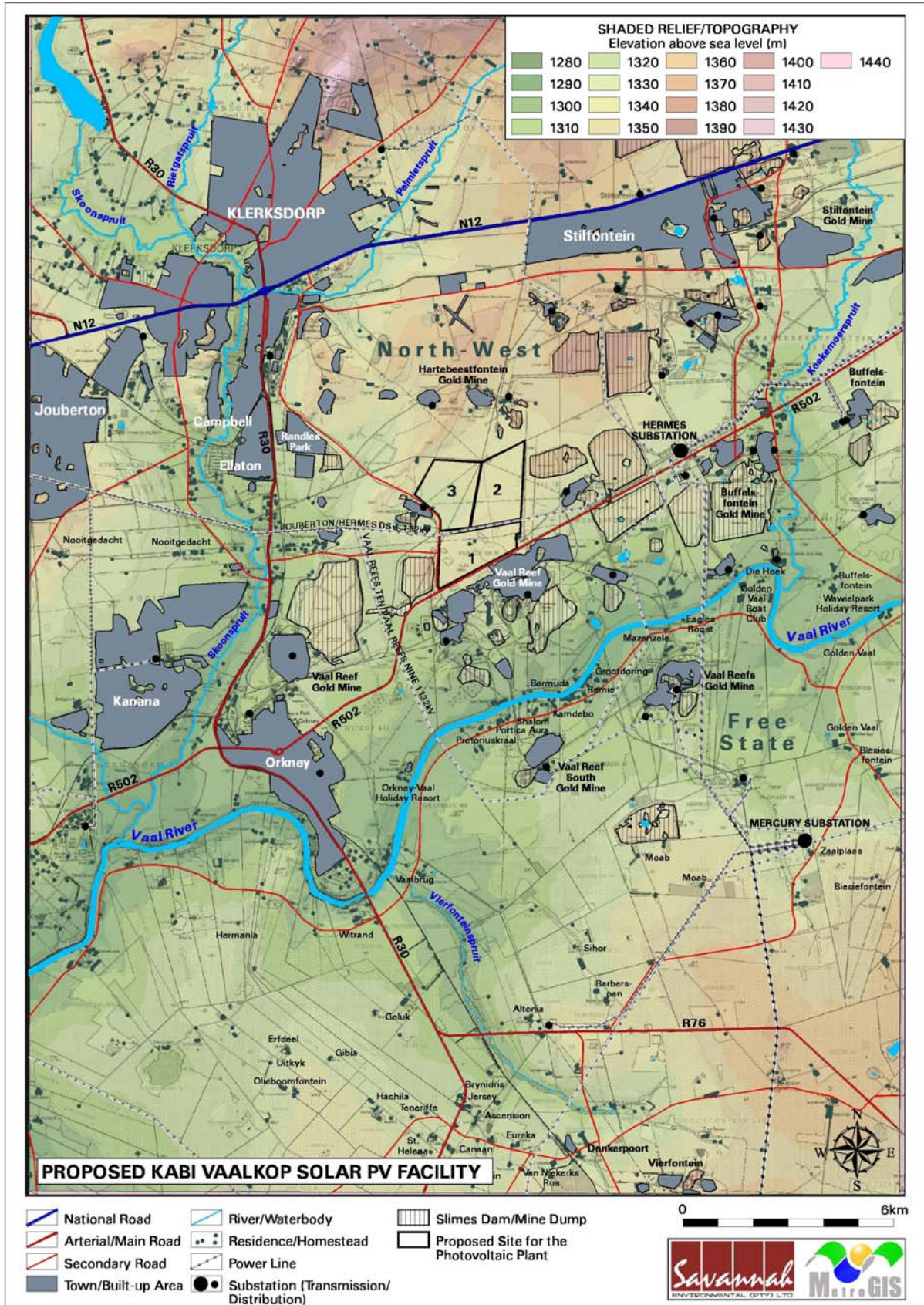


Figure 5.3: Shaded relief map (indicating the location of the proposed facility, the topography and elevation above sea level) of the broader study area

5.3.2 Land Types (Soils) and Agricultural Potential

The study site falls into the **Bc23** and **Fa13** land types (Land Type Survey Staff, 1972 - 2006). Table 5.1 summarises the land types applicable to each phase of the proposed development.

Table 5.1: 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 5.5 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.



Figure 5.4: Rocky soils on site

Agricultural potential:

The agricultural potential of the entire site (for all three PV facilities including the substation and power line) is low due to the dominance of shallow and rocky soils. The fact that the site is underlain by dolomite means that the grazing potential is high but this type of land use will require adequate fencing and protection of livestock against theft as there is considerable traffic (vehicle and pedestrian) around and through the site. Although the inherent soil properties make the soils suitable for irrigation the underlying geology poses a risk in terms of sinkhole formation if that water regime in the landscape is altered. The conclusion is therefore that the site is generally of low agricultural potential with limitations regarding the land use options.

Soil Erosion

The erosion potential of the site is low due to the inherent well-drained nature of the soils (even the rocky and shallow soils) and impacts due to erosion are not expected. The most significant risks on the site are potentially the formation of sinkholes under conditions where stormwater ponds, or where this water finds preferential flow paths into the underlying weathering and hard rock. Such aspects should be investigated in detail by a geohydrologist and geotechnical engineer.

Wetlands

Even though the topographic wetness index (TWI) map for the site indicated areas of preferential surface flow of water, no signs of wetland soil conditions could be found on site. The reasons are that the soils are well-drained and that ponding does not occur naturally for long periods, as well as the presence of high levels of Manganese (Mn) in the soils. The Mn poises the redox conditions in such soils to the point where hydromorphism as expressed in Iron depletions and accumulations (redox morphology) is not evident.

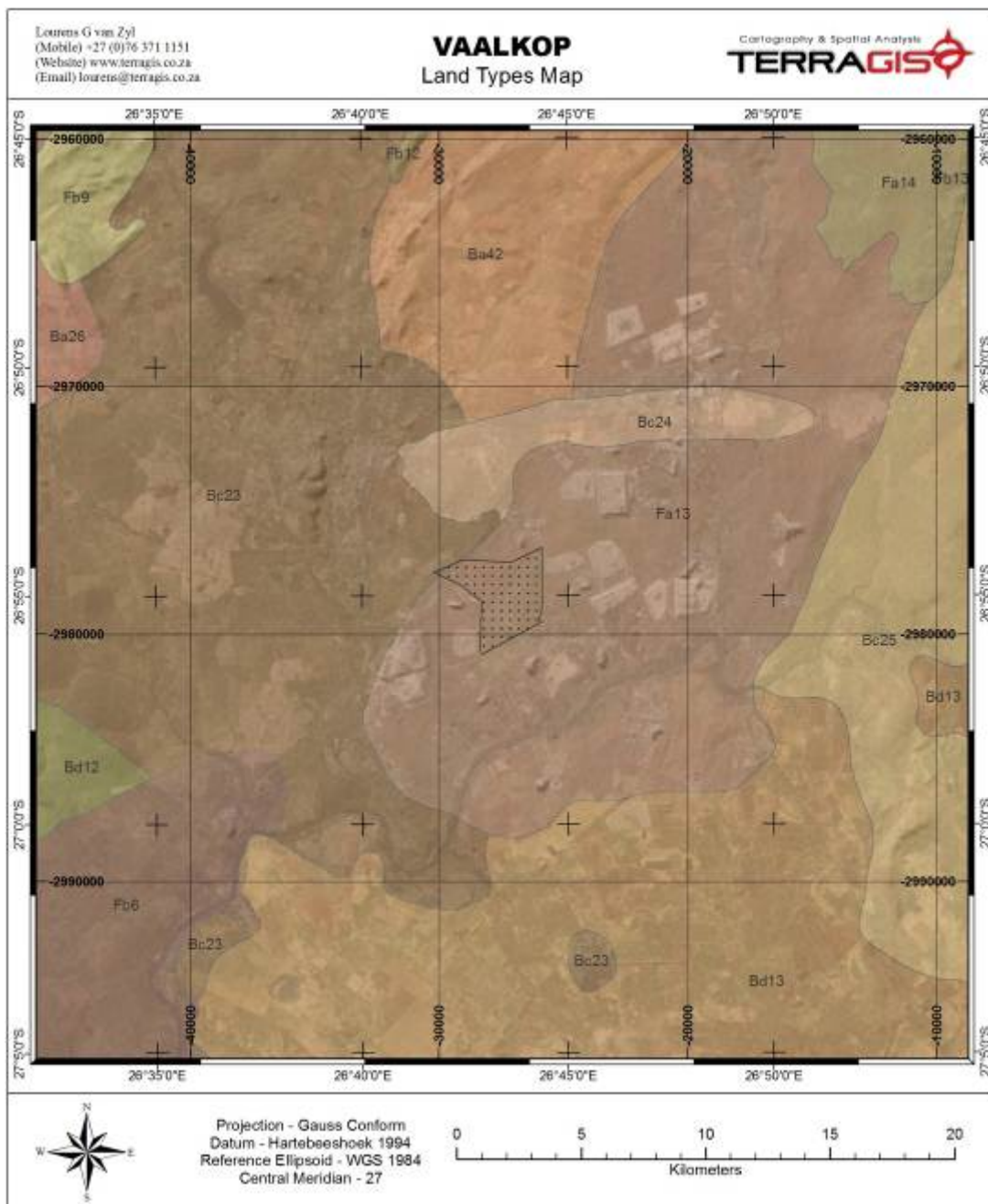


Figure 5.5: Land types map of the site, which encompasses all three project development phases and the transmission infrastructure.



Figure 5.6: Aerial photograph showing the land use of the study site (study site currently vacant), which encompasses all three project development phases and the substation.

5.3.3 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 coarse 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 5.2: 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

Some parts of the study area are in a natural condition, however some areas have been degraded by previous activities in those areas. Any highly degraded areas on site are likely to be classified as having low sensitivity and conservation value.

Critical Biodiversity Areas of the site

No Critical Biodiversity Areas have been identified for municipal areas of the North-West Province (bgis.sanbi.org).

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 in the area that includes the 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. Suitable habitat occurs on site, but no individuals were seen on site.

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 occur on site. The field survey for this project confirmed that suitable conditions occur on site, although no individuals were seen on site.

The bulb, *Boophane disticha*, is listed as Declining (Figure 5.7). 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. No individuals were

seen during the field survey for this project, but habitat on site is definitely suitable for this species.



Figure 5.7: The bulb, *Boophane disticha*

The bulb, *Hypoxis hemerocallidea*, is listed as Declining (see Figure 5.8). 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. No individuals were seen during the field survey for this project, but habitat on site is definitely suitable for this species.



Figure 5.8: 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 also 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. No individuals were seen during the field survey and no suitable habitat is considered to occur there.

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 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),

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 its distribution range. It was not recorded on site during previous detailed floristic studies of the site (De Castro 2007, van Wyk & Gotze 2011) nor was it seen during the field survey for the current project.

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). No individuals were seen on site during the field survey for the current project.

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.

5.5. Social Characteristics of the Study Area and Surrounds

5.5.1 Economic Profile

The composition of the Dr. Kenneth Kaunda District Municipality's economy is dominated by the mining industry (refer to Table 5.3). 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 characterised by low-skilled, resource intensive production.

Table 5.3: 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.

5.5.2 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 the Matlosana Municipality 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*).

5.5.3. Heritage Profile

No objects or features of heritage significance were found on site. Findings of the heritage study are summarized below:

Stone Age settlements

No Early, Middle or Later Stone Age tools were noted during the survey and no manufacturing or basecamp sites were identified.

Iron Age settlements

No Iron Age artefacts, structures, features or settlements were identified during the survey.

Graves

No graves (including grave bases and headstones) were recorded during the survey.

Historical structures

No historically significant structures were recorded. However the demolished remains of two square brick structures were found. They were not older than 60 years and are therefore not protected by the National Heritage Resources Act (Act No 25 of 1999).

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

Table 5.4 Summary of the characteristics of the three project development phases environment (desktop level)

Environmental Characteristics	Vaalkop Solar I	Vaalkop Solar II	Vaalkop Solar III	Vaalkop Substation and Powerline
1. <i>Land Use</i>	Termed as possible Grazing however no grazing currently allowed due to safety reasons and current land use (mining)	Termed as possible Grazing however no grazing currently allowed due to safety reasons and current land use (mining)	Termed as possible Grazing however no grazing currently allowed due to safety reasons and current land use (mining)	Termed as possible Grazing however no grazing currently allowed due to safety reasons and current land use (mining)
2. <i>Climate</i>	Summer rainfall area	Summer rainfall area	Summer rainfall area	Summer rainfall area
3. <i>Topography</i>	Flat	Flat	Flat	Flat
4. <i>Land Types</i>	Fa13	Fa13	Fa13 and Bc23	FA13 (substation)
5. <i>Agricultural Potential</i>	Low	Low	Low	Low
6. <i>Vegetation types</i>	» 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. <i>Heritage</i>	No sites of heritage significance identified	No sites of heritage significance identified	No sites of heritage significance identified	No sites of heritage significance identified
8. <i>Social Characteristics</i>	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

ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED KABI VAALKOP SOLAR I PV FACILITY: CHAPTER 6

This chapter serves to determine the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) associated with the development of the proposed **Kabi Vaalkop Solar I PV Facility**, as well as for all of the facility's components. (Project development phases Kabi Vaalkop Solar II, Kabi Vaalkop Solar III and the proposed power line and substation are assessed in the chapters that follow).

The **Kabi Vaalkop Solar I PV Facility** will be comprised of the following components:

- » An array of **photovoltaic panels** with a generating capacity of up to **75 MW**.
- » **Support structures** to mount the photovoltaic panels. 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 4 m from ground level.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between the project components, to be laid underground where practical.
- » New **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new **overhead 132 kV power line** approximately 6 km long (with a servitude of 31 m wide) to connect directly to the Eskom Hermes Substation via the new on site substation (the power line is to be shared with the Kabi Vaalkop Solar III PV Facility).
- » Temporary **laydown** and **storage areas** within the site. The laydown areas are proposed in an area that will eventually be covered by the PV panels.

The development of the Kabi Vaalkop Solar I PV Facility will comprise the following phases:

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.
- » *Operation* – will include operation of the facility and the generation of electricity.

- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately and in further detail within this chapter.

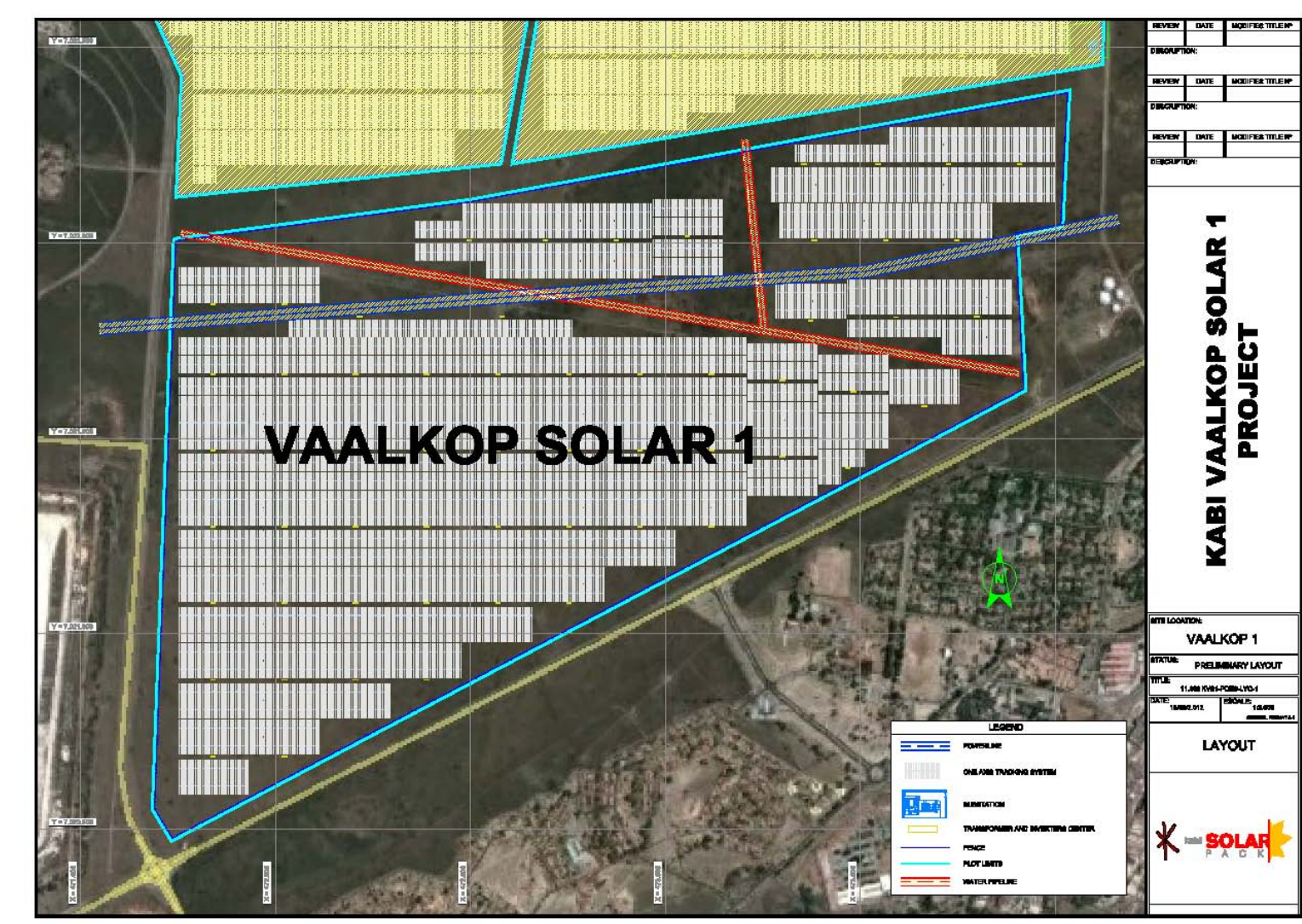


Figure 6.1: Preliminary layout of the proposed Kabi Vaalkop Solar I PV Facility and associated infrastructure

6.1. Areas of Sensitivity

The broader study site of 803 ha in extent (i.e. the entire site proposed Kabi Vaalkop Solar PV Facility) was evaluated within the scoping study (Savannah Environmental, March 2012). No environmental fatal flaws were identified to be associated with the Kabi Vaalkop Solar PV Facility site. It was found that some sections of the study area appear to be in a mostly natural condition even though they are within an area historically affected by mining and construction of water pipelines and power lines across the site. From the project point of view, it was therefore recommended that infrastructure should only be placed with caution or mitigation measures must be implemented to minimise impacts in the areas perceived to be in a natural condition. No environmental fatal flaws were identified to be associated with the site. In addition, due to the nature of the site (its location within a mining area), no areas of potential high environmental sensitivity were identified at the scoping stage. However, as recommended, care has been taken in designing the different components of the facility during the EIA Phase. These and other environmental issues have been assessed during the EIA Phase. No areas of high sensitivity were identified in the EIA phase (see figure 6.1 for the sensitivity map).

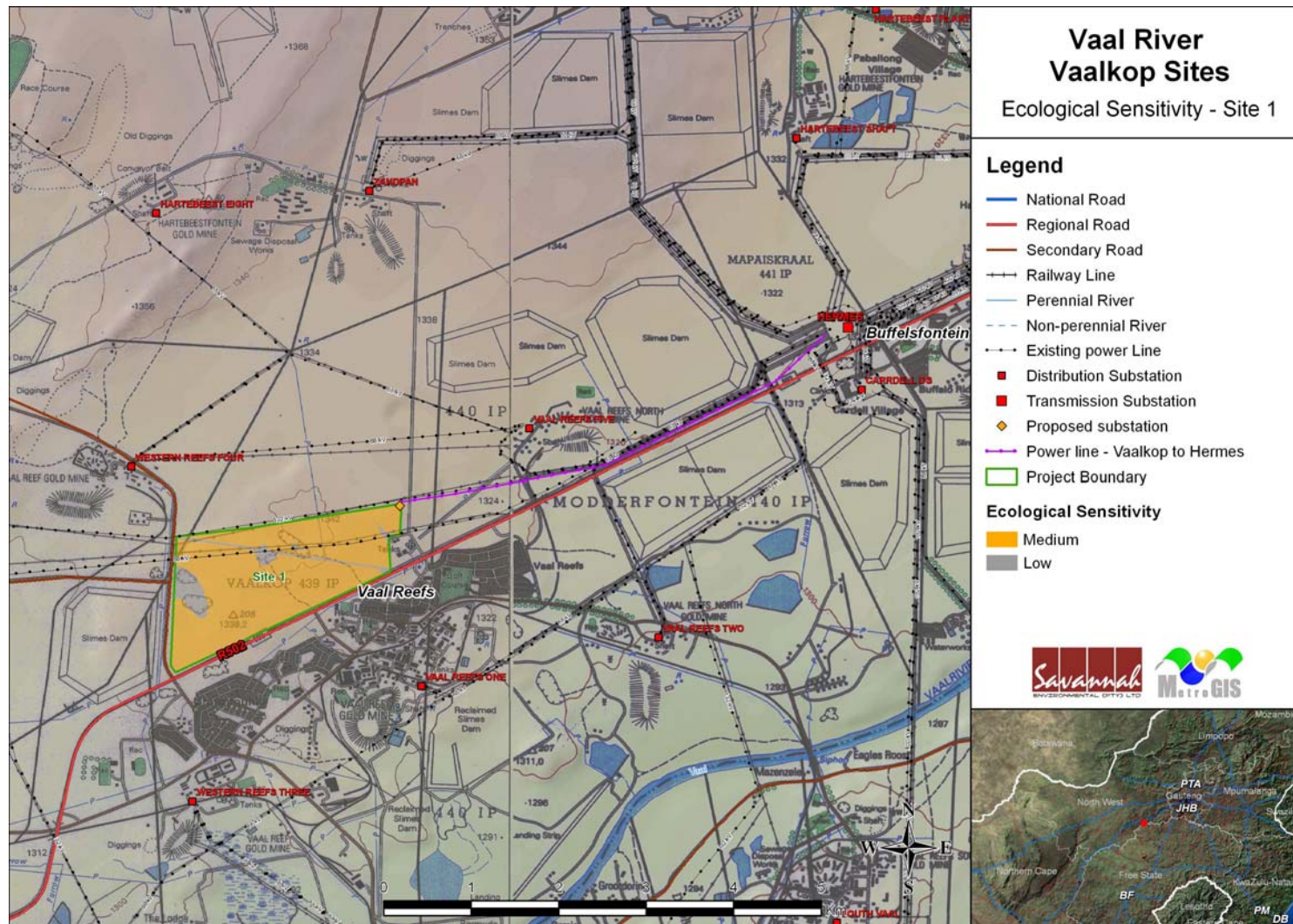


Figure 6.2: Sensitivity map illustrating ecologically sensitive areas across the site for the proposed development

6.2. Issues raised as part of the Public Participation Process

The opportunity to comment on the proposed project has been provided through the EIA process. This has included the use of stakeholder letters, a Background Information Document (BID), newspaper advertisements, site notices, and public and focus group meetings held in both the Scoping and EIA Phases. Comments raised to date in the process have included the following:

- » *Social* - employment opportunities and socio-economic impacts,

6.3. Methodology for the assessment of Potentially Significant Impacts

A broader site of 255 ha (i.e. the entire site proposed Kabi Vaalkop Solar I PV Facility) was identified by the project developer for the purpose of establishing the proposed Kabi Vaalkop Solar I PV Facility. However, the development footprint will cover an area of approximately 250 ha in extent (for Kabi Vaalkop Solar I PV Facility only), which has been sited considering the identified environmental sensitivities and technical preferences. The site is likely to suffer disturbance, particularly during the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The Kabi Vaalkop Solar I PV Facility forms the first phase of the broader development proposed to be developed in three phases under separate Special Purpose Vehicles (SPVs). Therefore, in order to accommodate the end-requirement that each SPV receive an Environmental Authorisation for their respective phase (i.e. in order to accommodate the requirements of the Request for Proposal (RfP) issued by the Department of Energy), the different phases were registered as separate projects to be assessed within one EIA report. The Kabi Vaalkop Solar I PV Facility was therefore issued with DEA reference number **12/12/20/2513/1**. The assessment of potential impacts that follows therefore only considers the impacts associated with Kabi Vaalkop Solar I PV Facility. The assessment of potential impacts associated with the other phases of the development (Kabi Vaalkop Solar II PV Facility, Kabi Vaalkop Solar III PV Facility and the proposed substation and power line) is considered in Chapter 7 – 9 of this report respectively.

The assessment of potential impacts has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The revised Comments and Response Report included within Appendix D lists these issues and the responses given by the EAP during the Scoping Phase.

6.4. Assessment of the Potential Impacts associated with the Construction and Operation Phases of the proposed Kabi Vaalkop Solar I PV Facility

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed **Kabi Vaalkop Solar I PV Facility** on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.3.4). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

In order to assess the potential impacts associated with the proposed facility, it was necessary to quantify the extent of the permanently and temporarily affected areas. This includes the area required for the photovoltaic panels and associated infrastructure, as well as the linear infrastructure (i.e. access roads) (refer to the table below).

Permanent Component	Approximate extent (in ha)
PV panels including associated infrastructure	250
TOTAL (ha)	(a total area of 250 ha of 255 ha) ~ 98% of site

There will be no permanent laydown areas on site. As construction progresses different sections of the site will be used as temporary laydown areas. These areas will eventually be covered by the PV panels.

6.4.1 Potential Impacts on Ecology

Solar energy facilities require relatively large areas of land for placement of infrastructure. The major expected negative impact will be due to loss of habitat which may have direct or indirect impacts on individual organisms.

Potential impacts and the relative significance of the impacts are summarised below (refer to Appendix F for more details):

- » Loss or fragmentation of indigenous natural vegetation (terrestrial) – assessed to be of **medium** significance.
- » Loss of individuals of plant species of conservation concern - assessed to be of **medium** significance.
- » Impacts on threatened animals - assessed to be of **low** significance.
- » Loss of habitat for threatened animals - assessed to be of **low** significance.
- » Bird collisions with powerlines - assessed to be of **low** significance.

- » Establishment and spread of declared weeds and alien invader plants - assessed to be of **low** significance.

The overall impacts of the proposed project on ecology have been assessed as being of **low to medium** significance.

Impact tables summarising the significance of ecological impacts (with and without mitigation)

The proposed PV array is in an area of natural vegetation identified as being of medium sensitivity in the scoping phase. The impacts of potential concern are therefore on natural vegetation, habitat for threatened birds, protected plants and the potential establishment and spread of alien plants.

<i>Nature: Loss or fragmentation of indigenous natural vegetation</i>		
The study site falls within the Vaal Reefs Dolomite Sinkhole Woodland vegetation type which is classified as Vulnerable. Development of the solar facility will lead to loss of a significant proportion of the natural habitat on site.		
	Without mitigation	With mitigation
<i>Extent</i>	Local (1)	Local (1)
<i>Duration</i>	Permanent (5)	Permanent (5)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Definite (5)	Definite (5)
<i>Significance</i>	Medium (60)	Medium (55)
<i>Status (positive or negative)</i>	Negative	Negative
<i>Reversibility</i>	Not reversible	Not reversible
<i>Irreplaceable loss of resources?</i>	Yes	Yes
<i>Can impacts be mitigated?</i>	No, but can be limited in extent	
<i>Mitigation:</i> Avoid unnecessary impacts on natural vegetation surrounding infrastructure. Impacts should be contained, as much as possible, within the footprint of the array.		
<i>Cumulative impacts:</i> Alien invasions may lead to additional loss of habitat that could exacerbate this impact.		
<i>Residual Impacts:</i> Some loss of this vegetation type will occur, but this is insignificant relative to the total extent of the vegetation type.		

<i>Nature: Impacts on plant species of conservation concern</i>		
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. Due to the almost complete coverage of the site with proposed infrastructure, it is almost certain that two Declining plant species will be affected.		
	Without mitigation	With mitigation
<i>Extent</i>	local (1)	local (1)

Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	medium (32)	medium (32)
Status (positive or negative)	negative	negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some degree	
Mitigation: None.		
Cumulative impacts: Further impacts on these species due to mining activities		
Residual Impacts: None		

Nature: Loss of habitat for threatened animals

There is a low likelihood of any threatened or near threatened animal species being affected by the proposed project. Birds and other animals that could potentially occur on site are relatively mobile and will move away during construction. The footprint of the solar facility is moderate relative to the overall availability of habitat in the general area. The sites are also within a relatively disturbed landscape, with mining activity occurring in high density in surrounding areas. The potential impact on them due to a loss of a small area of habitat is therefore not considered to be serious.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible to some degree	Reversible to some degree
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not required	
Mitigation: None required		
Cumulative impacts: Further loss of habitat due to mining activities and the proposed facility		
Residual Impacts: None likely		

Nature: Establishment and spread of declared weeds and alien invader plants		
There are very few concentrations of alien plants on site. Potential invasive weeds with a distribution centred on this part of the country include <i>Melia azeradach</i> , <i>Sesbania punicea</i> , <i>Opuntia ficus-indica</i> , <i>Opuntia imbricata</i> , <i>Prosopis glandulosa</i> , <i>Populus x canescens</i> , <i>Salix babylonica</i> , <i>Morus alba</i> , <i>Gleditsia triacanthos</i> , <i>Agave americana</i> , <i>Datura ferox</i> , <i>Datura stramonium</i> , <i>Arundo donax</i> and <i>Nicotiana glauca</i> . Construction of the solar facility will require the total clearing of vegetation within the footprint and this will probably be maintained as clear areas for the lifetime of the project. It is possible that there will be some invasion by aliens along the margins of disturbed areas. This could lead to general invasion of surrounding vegetation, especially along watercourses.		
	Without mitigation	With mitigation
Extent	Site & surroundings (2)	Site & surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	medium (6)	minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (48)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation surrounding facility to a minimum » Rehabilitate disturbed areas as quickly as possible following completion of construction activities in an area » Do not translocate soil stockpiles from areas with alien plants » Control any alien plants immediately to avoid establishment of a soil seed bank that would take decades to remove » Establish an on-going monitoring programme to detect and quantify any aliens that may become established 		
Cumulative impacts:		
Other disturbance to parts of the site could lead to similar impacts.		
Residual Impacts:		
Will probably be very low if control measures are effectively applied		

Implications for Project Implementation

- » The development footprints will not impact on any ecological "no go" habitats or areas.
- » A permit will be required for the damage or removal of protected plant species.

6.4.2 Potential Impacts on Soils and Agricultural Potential

The most important direct impact is soil degradation including erosion from the area of construction activity. The erosion potential of the site is low due to the inherent well-drained nature of the soils (even the rocky and shallow soils) and impacts due to erosion are not expected. The most significant risks on the site are potentially the formation of sinkholes under conditions where stormwater ponds or where this water finds preferential flow paths into the underlying weathering and hard rock.

In terms of agricultural potential, the potential significance was rated as having a predominately low significance. The agricultural potential of the site is low due to the dominance of shallow and rocky soils. The fact that the site is underlain by dolomite means that the grazing potential is high but this type of land use will require adequate fencing and protection of livestock against theft as there is considerable traffic (vehicle and pedestrian) around and through the site. Although the inherent soil properties make the soils suitable for irrigation the underlying geology poses a risk in terms of sinkhole formation if that water regime in the landscape is altered. The conclusion is therefore that the site is generally of low agricultural potential with limitations regarding the land use options.

Impact tables summarising the significance of impacts on soils and agricultural potential (with and without mitigation)

Nature: Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure		
This activity entails the construction of buildings and other infrastructure with the associated disturbance of soils and existing land use.		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit footprint to the immediate development area. Rehabilitation possible after removal of infrastructure due to the low agricultural potential baseline of the development area.		

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

Nature: Disturbance of soils and impacts on existing land use due to construction of roads

This activity entails the construction of roads with the associated disturbance of soils and existing land use.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	

Mitigation:

» Limit footprint to the immediate development area and keep to existing roads as far as possible.

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

Nature: Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles

This activity entails the operation of vehicles on site and their associated impacts in terms of spillages of lubricants and petroleum products.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (20)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	No	No

Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Maintain vehicles, prevent and address spillages.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed.		
Residual Impacts:		
» None		

Nature: Impact of dust generation on site		
This activity entails the operation of vehicles on site and their associated dust generation. Generated dust can impact large areas depending on environmental and climatic conditions.		
	Without mitigation	With mitigation
Extent	Local (2)	Site (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (24)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit vehicle movement to absolute minimum, construct appropriate roads for access.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed but can have widespread impacts if ignored.		
Residual Impacts:		
» None		

Nature of Impact: Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.		
	Without mitigation	With mitigation
Extent	Low (1) – Site	Low (1) – Site
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance*	Low (32)	Low (32)
Status (positive or negative)	Negative	Negative

Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some extent	No
Mitigation: The loss of agricultural land is a long-term loss and there are no mitigation measures that can be put in place to combat this loss. In the case of low agriculture potential, soil impacts can be rehabilitated afterwards if infrastructure is removed.		
Cumulative impacts: Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.		
Residual Impacts: The loss of agricultural land is a long term loss. This loss extends to the post-construction phase. The agricultural potential for the area is very low though.		

Implications for Project Implementation

- » The proposed development of a photovoltaic facility on the site will not have large impacts due to the low agricultural potential of the area proposed for development.
- » It is imperative that adequate stormwater management measures be put in place as the underlying rock strata are prone to the formation of sinkholes.

6.4.3 Assessment of Potential Impacts on Heritage Sites

No sites of heritage significance were identified during the survey. However, due to the nature of some heritage resources, there is potential to expose and/ damage unknown artefacts during construction. The potential impact on surface and/or sub-surface artefacts is however rated to be low.

Impact tables summarising the significance of impacts on heritage resources (with and without mitigation)

Nature: Impacts on heritage resources During the construction and operational phases of the project various activities will impact on surfaces and/or subsurface which may destroy, damage, alter or remove from its original position archaeological and palaeontological structures or artefacts.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	Low (9)	8 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: Although no sites were recorded during the field survey please note that if any archaeological or palaeontological material is uncovered during construction or operation a qualified archaeologist must be contacted to assess the remains. Mitigation measures can then be activated which will include a permit from SAHRA and documentation and sampling.		
Cumulative impacts: Cultural heritage sites are a non-renewable resource and any impacts on them is regarded as permanent and destructive.		
Residual Impacts: Destruction of heritage sites results in the depletion of known or unknown sites..		

Implications for Project Implementation

- » From an archaeological perspective, no sites of heritage significance were identified.
- » Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner so that an investigation and evaluation of the finds can be made.

6.4.4 Assessment of Potential Visual Impacts

The visibility analysis was undertaken from PV panel positions at an offset of 4 m above average ground level (i.e. the maximum height of the metal frames) in order to simulate a worst case scenario. The viewshed analysis indicates areas from which the PV panels would be visible (any number of panels with a minimum of one).

The potential visibility of the Kabi Vaalkop Solar I PV Facility development area extends primarily south, west and north with intermittent visual exposure due to the topography and the occurrence of mine related structures. Vaal Reef Gold Mine village and sections of the R502 road will experience high levels of exposure, due to the close proximity of facility structures in the southern parts of the development area. Moderate to high exposure is expected in these areas.

Visual exposure to the west affects the area south of Jouberton and the eastern fringes of Orkney. Visual exposure south of the Vaal River affects mostly farmsteads and roads, such as the R30 and R76 main roads. The anticipated impacts are not considered a fatal flaw from a visual perspective

Potential visual impact assessment –visual impact index

The results of analyses including visibility analysis / exposure (Figure 6.3); observer proximity to the facility (refer to Figure 6.4); viewer incidence / viewer perception; and visual absorption capacity (VAC) are merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in order to judge the severity of each impact (refer to Figure 6.5).

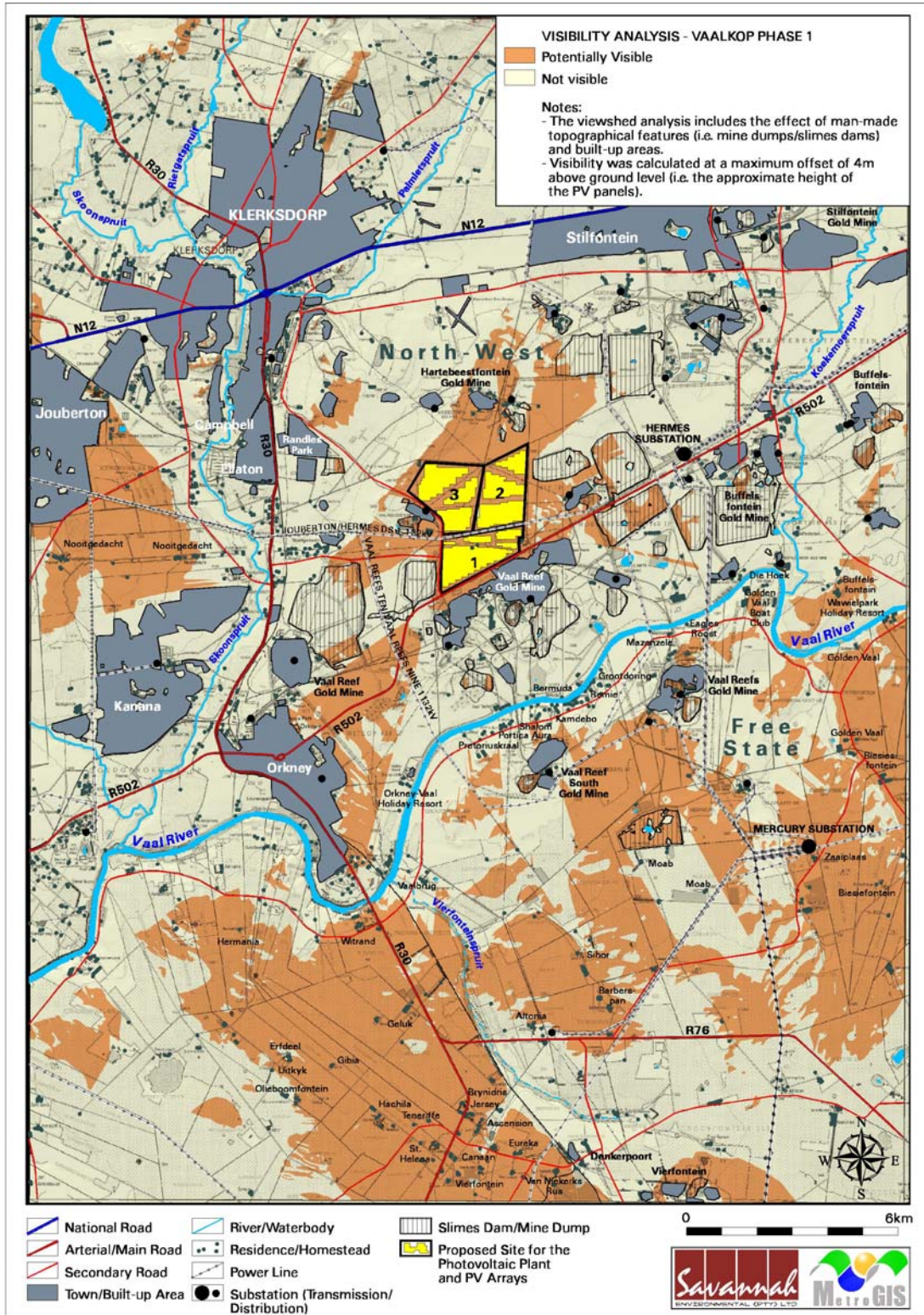


Figure 6.3: Potential visual exposure of the Kabi Vaalkop Solar I PV Facility
The potential visual exposure as illustrated is a theoretical representation of where visual receptors would be able to see the facility from. This does not take into consideration local factors such as vegetation, orientation of structures and views, and localised topographical features.

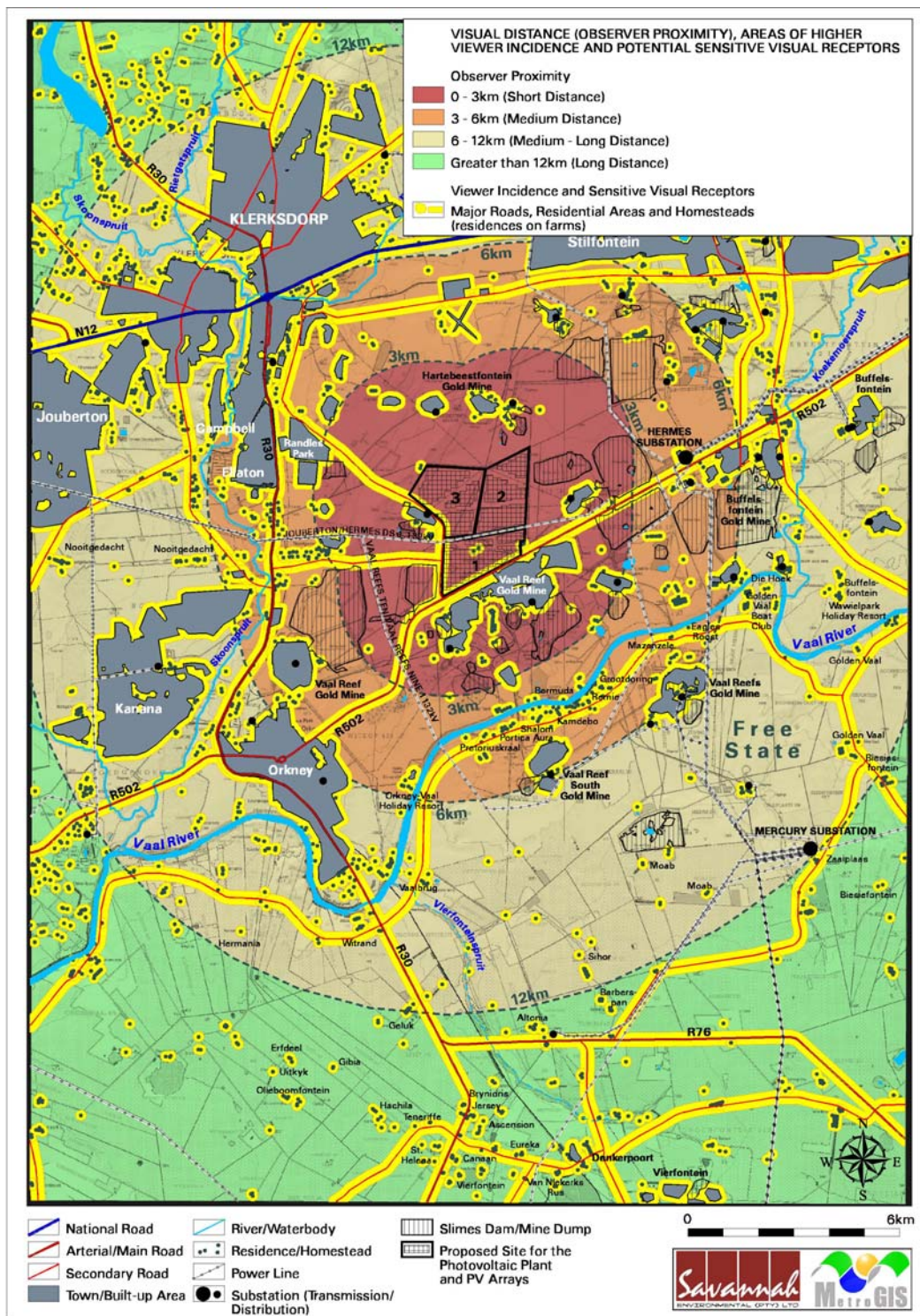


Figure 6.4: Observer Proximity, Areas of High Viewer Incidence and Potential Sensitive Visual Receptors

Results of the Visual Assessment

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed solar energy facility are displayed on **Figure 6.5**.

The quantitative analyses of possible impact have been integrated as a visual impact index. The sum of values assigned for each visual impact parameter is used to identify and visualise areas of high, moderate and low visual impact. Typically a location with close proximity to the proposed facility, a high viewer incidence, a predominantly negative perception and high visual exposure would have a high value on the index, thereby signifying a high visual impact.

The following is of relevance:

- » The proposed facility has a small area of moderate to high visual impact within 3km around the site. Affected areas of possible high sensitivity are the Vaal Reef Gold Mine village and the R502 arterial road.
- » Visual impact in the medium distance (i.e. between 3km and 6km), is low and will only affect isolated locations. The section of the R502 towards Orkney, as well as the eastern fringes of the town may, however, experience moderate visual impacts.
- » Beyond 6 km from the proposed solar PV development area the visual impact is expected to be very low, becoming negligible from 12 km.

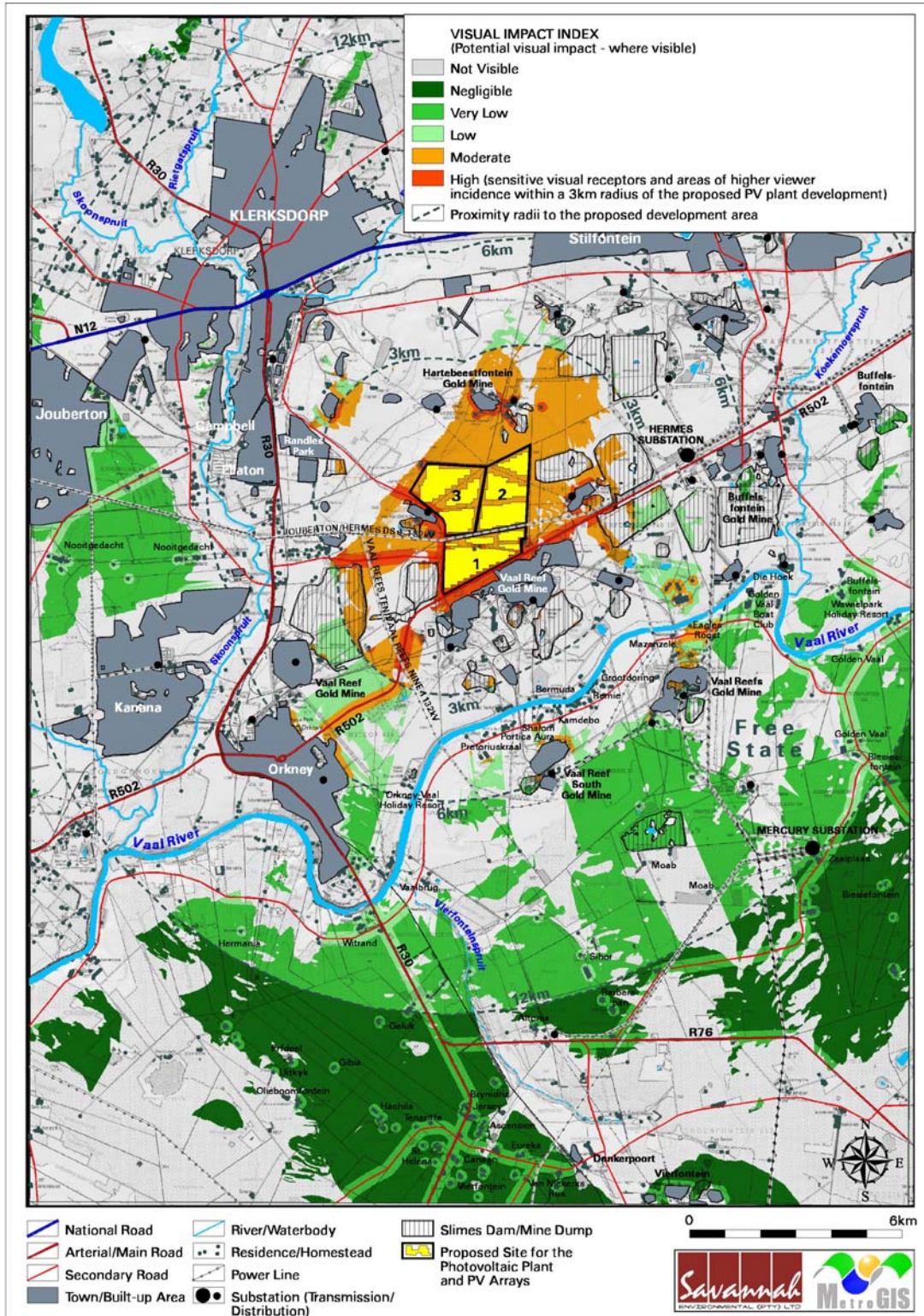


Figure 6.5: Visual impact index of the proposed Kabi Vaalkop Solar PV Facility

It should be noted that the visual impact index does not take into account visual clutter and structures that obstruct long distance views within built-up areas. For this reason it can be assumed that the solar energy facility would have a higher visual prominence from the outskirts of built up areas than from within these areas.

Impact tables summarising the significance of visual impacts (with and without mitigation)

Nature: Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.		
Potential visual impact on users of the R502 and secondary roads in close proximity of the proposed solar energy facility (i.e. within 3 km).		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (5)
Magnitude	High (8)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (48)	Medium (36)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Create a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on visual impact on towns and residential areas affected by visual exposure.		
It is envisaged that the facility may have a visual impact on residents of the Vaal Reef Gold Mine village, which is situated less than 500 m south of the proposed development area. Residents in the eastern parts of Orkney, approximately 6 km west of the proposed Phase 1 development area, may experience visual impacts.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (5)
Magnitude	High (8)	Low (2)
Probability	Highly Probable (4)	Probable (3)
Significance	Medium (64)	Medium (36)
Status (positive or negative)	Negative	Negative

Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Retain a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.		
Visual impacts may occur to a small number of holiday resorts and leisure facilities along the Vaal river (e.g. Eagles Roost and the Golden Vaal Boat Club). Activities are mostly associated with water sport, such as fishing, sailing, skiing, etc, as is evident from a number of jetties along the river bank.		
	Without mitigation	With mitigation
Extent	Local (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (3)	N/A
Significance	Low (30)	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Yes	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	N/A
Mitigation:		
<ul style="list-style-type: none"> » None 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility		
The immediate area south of Phase 1 has a relatively high incidence of possible sensitive receptors, owing to the location of the R502 and the Vaal Reef Gold Mine village south of the development area. Light trespass and glare from security and night time operational lighting may have negative impacts for visual receptors in close proximity, especially traffic on the R502 and residents in the northern area of the mine village.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: Planning & Operation: » Limiting mounting heights of lighting fixtures. » Making use of downward directional lighting. » Making use of minimum lumen or wattage in fixtures. » Making use of Low Pressure Sodium lighting or other types of low impact lighting. » Making use of motion detectors. This will allow the site to remain in relative darkness, until lighting is required for security or operational purposes.		
Cumulative impacts: The existing urban areas in the region generate lighting impact at night. The impact of the Solar Energy Facility will contribute to a regional increase in lighting impact		
Residual Impacts: None. The visual impact will be removed after decommissioning, provided all sources of lighting are removed.		

Nature: Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.
Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc) play a significant role.
A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. Specific aspects contributing to the sense of place of this region include un-impacted picturesque landscapes, dramatic mountains and isolation.

The visual impact on the visual character of the landscape and sense of place of the region is expected to be of low significance, due to the large degree of transformation of the natural environment, and the establishment of visual impacts by virtue of urban and mining development. No mitigation is possible.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low (24)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » None		
Cumulative impacts: The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Implications for Project Implementation

- » The anticipated visual impacts of the facility will be low given the already existing infrastructure and the number of potential receptors around the site. Therefore, the visual impacts are not considered to be a fatal flaw for the proposed solar energy facility.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

6.4.5 Assessment of Potential Social Impacts

Construction of the proposed solar facility is labour-intensive and it is estimated that it would take place over a time-period of between 18 and 24-months. Activities associated with construction include:

- » Site establishment;
- » Perimeter fence construction;

- » Civil works, including concrete foundations, installation of steel footings, installation of trackers, mounting of PV modules on trackers, installation of electrical cabling; establishment of perimeter trenches, lighting and security, establishment of internal trenches for low voltage (LV) cabling to the PV modules and establishment of the inverter and transformer shelter foundations;
- » Electrical works, such as installation of medium voltage (MV) loop, installation of LV lines and auxiliary services, installation and connection of inverters and AC/DC boxes; and
- » Installation of intrusion prevention system, PV module monitoring system and the weather station.

Each of the potential impacts associated with the construction phase is described and rated in the following impact tables.

Impact tables summarising the significance of social impacts during the construction and operational phases (with and without mitigation)

Nature: Influx of jobseekers		
Even though the developer's employment policy gives preference to the employment of local labour (especially with regards to lower and semi-skilled positions), the potential influx of 'outsiders' cannot be disregarded. The municipality indicated that a large influx of people attracted by infrastructure developments has not occurred in their area of jurisdiction in the past. However, the potential issue needs to be addressed pro-actively.		
	<i>Without Mitigation</i>	<i>With Enhancement</i>
<i>Extent</i>	Local (3)	Local (3)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Moderate (6)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (3)
<i>Significance</i>	Medium (33)	Medium (30)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	
<i>Enhancement :</i>		
<ul style="list-style-type: none"> » Stipulate the employment of local labour and enterprises in the tender documents to ensure the maximum use of a local labour force, especially with regards to lower and semi-skilled positions. Locals are, in this instance, defined as the nearest communities or people that reside within a 50 km radius from the project. » The developer, contractor and Community Liaison Officer (CLO) should formulate and implement a recruitment strategy to ensure that a suitable labour force is sourced. Tap 		

- into the LM's HR Department's skills database and do a skills audit.
- » The number and extent of the employment opportunities must be communicated to the local community to avoid that unrealistic expectations be created.
 - » Prior to construction commencing representatives of the local community, SAPS, the neighbouring residents and landowners should be informed of details of the construction company, the construction schedule and size of the workforce.
 - » Due to safety and security risks, recruitment of temporary workers at the access to the construction site should not be allowed. The CLO should work in consultation with the Ward Councillors and community representatives to establish labour desks at the most suitable localities within the local communities where workers are sourced.
 - » The area where workers are recruited should not be near schools or other sensitive receptors where a large influx of people could cause safety and security impacts for the residents and other sensitive receptors. Provide sufficient sanitation and refuse facilities.

Cumulative impacts:

- » The implementation of all five phases of the Kabi Vaalkop and other projects in the region would increase the likelihood of an influx of jobseekers, increasing the likelihood of conflict and would place pressure on the Local Municipality (LM) in terms of services and housing.
- » Should all four Kabi projects be implemented, it is expected that the available LM labour force would be able to provide the required local labour quota.

Residual impacts:

Should jobseekers remain in the LM area, an increase in the available workforce in the City of Motlasana would increase the local unemployment rate and place further pressure on the Municipality to provide jobs and services.

Nature: Employment opportunities and employment equity

Job creation is a positive impact during the construction phase. The construction team would consist of approximately 80% unskilled labour, 10% semi-skilled and 10% skilled temporary employees. Between 1 000 and 1 240 employment opportunities would emerge for each phase. The Department of Energy (DOE) requires that a minimum of 35% (with a target of 60%) of the project consist of local content and local labour would fulfil a large proportion of this quota.

	Without Mitigation	With Enhancement
Extent	Local (3)	Local municipal area (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly improbable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	N/A	N/A

<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	
<i>Enhancement :</i>		
<ul style="list-style-type: none"> » Work in collaboration with the LM's HR Department to do a skills audit of the available workforce and minimise the workers to be brought in from other areas. » The recruitment strategy should clearly reflect the percentage of workers to be sourced from the local labour force. » Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project. » A policy regarding employment equity of minority groups (women, youth and the disabled) should be formulated and implemented wherever possible 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> » Should construction of the Kabi Vaalkop Phase I and projects in the region overlap, 2 000 to 2 500 employment opportunities would emerge. » Should all five phases of the Kabi Witkop and Vaalkop Solar projects be approved, skills development would be advantageous for the LM. 		
<i>Residual impacts:</i>		
<ul style="list-style-type: none"> » Positive social and economic impacts for employees their families and the LM, as high unemployment is prevalent. » Skills development and capacity building that would enable the workers to seek employment on similar projects in future. 		

Nature: Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions

Although the exact level and type of skills training is not known at this stage, it could be expected that some form of skills development and capacity building would take place. The tasks to be performed by unskilled labour are those activities usually associated with a construction site and would typically not require prior experience and extensive training. However, the semi- and highly skilled positions (20% of the temporary labour force) would require a higher level of training and skills development, as the technologies to be implemented in this project are still relatively new and unfamiliar to the South African labour market.

	<i>Without Enhancement</i>	<i>With Enhancement</i>
<i>Extent</i>	Regional (4)	Regional (4)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	low (4)	Moderate (6)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	Medium (30)	Medium (36)

Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Do a skills audit of the local workforce to determine what skills are available locally, and to reduce the number of workers and specialists that are brought in from other areas. The recruitment process and strategy should include local businesses, enterprises and SMME's to allow them to become part of the tender process. » Co-ordinate with the LM and use the existing skills data base of the HR Department as a point of departure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Should all four phases Kabi Solar project be approved and implemented, the collective skills development and capacity building will enhance the employability of the labour force with positive economic advantages for the LM. 		
Residual impacts:		
<ul style="list-style-type: none"> » Workers that obtain skills would be able to use it on similar construction projects in future. » Through skills development and government initiatives an environment could be established that enables upcoming SMME's to compete in the market, albeit on a smaller scale, such as the construction and erection of rooftop solar plants. 		

Nature: Impacts on the local economy

Positive impacts and economic spin-offs on the local economy could manifest in a number of ways during the construction phase.

	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly Probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (56)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » It is required from the developer to formulate a local procurement strategy to increase 		

the local content of the project to the maximum
Cumulative impacts:
» Demand might exceed local supply forcing the developer to procure goods and services from the broader region and overseas
Residual impacts:
» Materialisation of innovative economic opportunities in the local and district municipalities.
» With careful and strategic planning small groups, SMME's and other small businesses could break into this market and gain from future renewable energy projects in the area.

Nature: Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)		
Local procurement of goods and services could stimulate local and regional manufacturing, thereby increasing its contribution to the secondary sector over the short-term		
	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (20)	Medium (30)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
» Formulation of a procurement strategy that maximises local content.		
» Government should identify upcoming and potential SMME's and strategically plan their involvement in the renewable energy sector.		
Cumulative impacts:		
» New manufacturing industries that evolve to supply renewable energy products to the southern African markets		
Residual impacts:		
» Less dependency on the primary sector.		

Nature: Disruption in daily living and movement patterns

Approximately 1 500 trucks would travel on the local roads, over a 500-day construction period, to transport equipment and material such as the modules, trackers, cables, electrical frames, tubes and cement to the construction site. On-site construction vehicles and equipment would include excavators, trucks, graders, compaction equipment and cement trucks.

Road safety issues and intrusion impacts could emerge for surrounding residents in Vaal Reef and road users on the R502 and Four Shaft / Randles Park Road (west of the site), causing short-term disruptions and safety hazards.

	Without Mitigation	With Enhancement
Extent	Study area (2)	Study area (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (24)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » The verification of appropriate access roads to the sites has to take good visibility for motorists into consideration.
- » Put up clear signboards along the access roads indicating the accesses to the construction site.
- » Impose penalties for reckless drivers as a way to enforce compliance to traffic rules.
- » Limit heavy vehicle movement through residential areas (Orkney and Vaal Reefs), especially avoiding peak times.
- » Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and unroadworthy vehicles that could lead to accidents.
- » Display a contact number on the construction vehicles where motorists can report bad driving.
- » No heavy vehicles to be parked outside the designated construction area where it could obstruct motorists' views.
- » No informal traders to be allowed on or near the construction site.
- » Set up the labour desk in a secure and suitable area, preferably in the communities where workers are being sourced, to discourage the gathering of temporary workers at the gates of the construction site where it could affect road users.
- » Mitigation measures for intrusion impacts (noise, visual, air and dust pollution) are addressed in greater detail in the SIA report (refer to Section 5.12 of the SIA report, Appendix ??).

Cumulative impacts:

- » New manufacturing industries that evolve to supply renewable energy products to the southern African markets

Residual impacts:

Even with the implementation of mitigation measures to soften the impacts, impacts on living and movement patterns due to an increase in traffic and heavy vehicles is a reality. However, it would be of short duration, without major long-term consequences if the construction process is managed adequately.

Nature: Potential health risks for workers and surrounding communities due to poor management of the construction process

Health issues for surrounding residents and workers during the construction phase could manifest through air / dust pollution, poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. The most vulnerable people are the elderly, the very young and those with existing heart and lung conditions. Detrimental health impacts are not confined to the construction site and could affect the health of people living and working in the surrounding area.

	Without Enhancement	With Enhancement
Extent	Municipal areal (3)	Municipal areal (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Low (27)	Low (18)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » The contractor should recognize his responsibility towards social / soft issues and should embark on an HIV/AIDS awareness campaign amongst the workers. A strategy to appoint a local labour force as far as possible will limit the spread of diseases.
- » Appoint a Health and Safety Officer and comply with the Occupational Health and Safety Management System's requirements. The contact details of this person should be made available to the local community and procedures to lodge complaints set out.
- » Provide adequate drinking water and appropriate sanitation facilities to the workers. Sanitation facilities to be cleaned and serviced on a regular basis.
- » Dispose of rubble and other household waste appropriately and on a regular basis.

- » Identify the waste types that are likely to be produced and aim to reduce the amount of waste as much as possible, through identifying routes to reuse or recycle materials. Label all waste storage and skips, detailing the type of waste.
- » Store any materials away from sensitive locations in fenced off areas.
- » Spray gravel / sand surfaces regularly with water to suppress dust.
- » Avoid the establishment of a construction camp to house workers on the site.
- » Security guards should be the only people allowed to stay overnight on the site. Their accommodation and facilities should comply with health and safety standards.
- » Regularly inspect the site area for spillages and clean spillages using agreed wet handling methods.
- » Inform the LM and emergency services if harmful substances are spilled.

Cumulative impacts:

- » The construction of the Kabi Vaalkop Solar PV facility and other renewable energy projects in the area would increase the likelihood of an influx of jobseekers. Dissolute sexual behaviour, temporary relationships with local women and unwanted pregnancies could increase.
- » An influx of jobseekers is associated with the spreading of diseases and HIV/AIDS.
- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.

Residual impacts:

- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.
- » Employees that do not attend work on a regular basis and a high staff turnover, with financial and administrative implications for the Contractor.

Nature: Impacts on the 'sense of place'

Intrusion impacts (noise, visual and dust pollution) and safety and security issues could impact on the 'sense of place' as experienced by residents, tourists and visitors in the area. The site is surrounded by old mining land and the Vaal Reefs residential area is located south of the site. The R502 could act as a buffer to soften potential intrusion impacts. No sensitive receptors are in close proximity to the site.

	Without Enhancement	With Enhancement
Extent	Study area (2)	Study area (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (12)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

<p>Mitigation:</p> <ul style="list-style-type: none"> » Nightlights (security lights) should be directed away from residences and the surrounding roads to limit nuisances and safety hazards for motorists.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Possible devaluation of property prices if the 'sense of place' of the local community is negatively affected by numerous construction developments
<p>Residual impacts:</p> <ul style="list-style-type: none"> » None

Impact tables summarising the significance of social impacts during the operational phase of the facility

Nature: Job creation during the operational phase of the project		
	Without Enhancement	With Enhancement⁸
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement: The significance of the impact will increase if skilled local operators as well as local employees are sourced to perform the duties associated with the operational phase.</p>		
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » An increase in employment opportunities with economic advantages for the local economy and workforce » New local service providers that emerge with the increase of opportunities. » Increasing competition amongst service providers, resulting in a more favourable pricing structure for services. » Skills development and capacity building of the local workforce. » It would increasingly become more difficult to fill higher and semi-skilled positions with locals if other renewable energy projects in the area are also implemented 		
<p>Residual impacts:</p>		

⁸ This assumes the establishment of some form of Community Trust.

- » An increase in salaries and spending power with economic advantages for individual families and the local economy.
- » Skills development and capacity building

Nature: Skills development and capacity building during the operational phase		
Skills development and capacity building would result as on-site training is likely. Also, skilled local operators responsible for the maintenance of the plant would be trained in Spain on existing similar plants.		
An important outcome of skills development and training is that employees would be in a position to source work on similar plants once their contracts expire. A skilled labour force is more likely to find employment, resulting in economic advantages for the local economy over the long-term.		
	Without Enhancement	With Enhancement⁹
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Source locals for employment positions as far as possible, to enhance the advantages of skills development and training for the LM area. » Implement measures (bonuses or other financial benefits) for highly skilled staff to minimize the negative impacts associated with a high staff turnover. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Trained employees could leave and source work at similar plants that are being constructed in other parts of the country. The developer would need to train additional employees, resulting in time and money losses 		
Residual impacts:		
<ul style="list-style-type: none"> » Economic advantages for the local economy, as the labour force are better skilled, thus affecting employability in a positive way 		

⁹ This assumes the establishment of some form of Community Trust

Nature: <i>Impacts associated with a change in land use</i>		
The project site is located on land that belongs to AngloGold Ashanti and a lease agreement with the developer will be concluded at a later stage. At present the majority of the site is vacant and fallow and is not suitable for agriculture or other developments, such as township establishment. The change in land use is therefore regarded as a positive impact over the long-term, as the establishment of a renewable energy project is one of the few viable uses for the subject site.		
	Without Enhancement	With Enhancement¹⁰
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Medium (35)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: No enhancement is required.		
Cumulative impacts: None		
Residual impacts: Once decommissioned, the land zoning will be restored to the current zoning and rehabilitation of the site would be required.		

Nature: <i>Impacts on the 'sense of place' for the local community</i>		
Extensive dust, noise and traffic impacts during the operational phase are highly unlikely, although visual impacts and safety and security issues, should they occur, has the potential to impact on the local community's 'sense of place', specifically residents in Vaal Reefs, as there are no other sensitive receptors in the direct vicinity of the site.		
	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	low (4)	Minor (2)

¹⁰ This assumes the establishment of some form of Community Trust.

Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Low (16)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Apply all the mitigation measures as proposed by the Visual Impact Assessment. » Ensure that residents in Vaal Reefs are aware of the procedures to lodge complaints. » Implement all safety and security measures, as proposed by the developer, to combat potential crime.. 		
Cumulative impacts:		
An increase in criminal activities could place additional pressure on the local SAPS and affect service delivery.		
Residual impacts:		
Hostility towards the project and developer.		

Nature: <i>Security related impacts during the operational phase</i>		
An increase in activity in and around the proposed development during the operational phase could increase security related concerns for the residential area of Vaal Reefs. Potential theft, vandalism and related criminal activities at the Solar PV facilities are also a concern for the Developer.		
	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Medium (30)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Extend the benefits of the project to the local community by employing local 		

<p>people as far as possible, allocating a percentage of the turnover of the project for community and socio-economic upliftment projects and allocate shares in the project to a community Trust or similar entity.</p> <ul style="list-style-type: none"> » Implement all the proposed security measures, such as 24-hour security and access control, electric fencing, CCTV cameras and night lights where possible. » Maintain good relationships with neighbours, discuss security issues and measures and make the contact details of the Operations Manager available should complaints be lodged
<p>Cumulative impacts: Increasing activities and potential security concerns with the establishment of additional solar plants in and around the study area</p>
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Impacts on the 'sense of place' for the local community. » Hostility between the local community and the developer if security concerns are not addressed adequately

<p>Nature: <i>Impacts of the proposed facility on national electricity supply and positive impacts on the environment</i></p>		
	Without Enhancement	With Enhancement
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (75)	High (75)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement: Not required</p>		
<p>Cumulative impacts: Eskom's intention to purchase 3 750MW of electricity from renewable energy projects over the next few years, would contribute significantly to environmental advantages.</p>		
<p>Residual impacts: The increase of electricity tariffs by Eskom to accommodate renewable energy projects.</p>		

Implications for Project Implementation

- » The findings of the SIA undertaken for the proposed **Kabi Vaalkop Solar I PV Facility** indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project.
- » Potential negative impacts can be reduced to low significance.

6.5. Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that, in itself, may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area¹¹. The subsequent phases of the proposed development will add to the cumulative impacts of the proposed development.

These proposed developments, in addition to the already existing infrastructure (i.e. the Hermes and associated power lines, slimes dams and mine shafts), will increase the cumulative visual impact of industrial type infrastructure within the region. The cumulative impacts in this regard will be of low significance as the area is industrial in its nature. From an ecological point of view uncontrolled soil erosion from all the proposed phases may lead to establishment of alien invasive plants and loss of habitat for indigenous natural vegetation. From an agricultural potential point of view the cumulative impact of this activity will be small as it is constructed on land with low agricultural potential. These impact can however be mitigated if mitigation measures as recommended in this report and attached EMP are implemented.

The negative cumulative impacts of the proposed developments are offset by the positive cumulative impacts. The proposed developments (all phases) have the potential to result in significant positive cumulative impacts, specifically with regards to employment creation. The proposed developments will reduce the pressure on the electricity grid in the North West Province by injecting an additional 225 MW of energy.

Cumulative effects have been considered within the detailed specialist studies, where applicable (refer to Appendices F – K).

¹¹ Definition as provided by DEA in the EIA Regulations.

ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED KABI VAALKOP SOLAR II PV FACILITY: CHAPTER 7

This chapter serves to determine the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) associated with the development of the proposed **Kabi Vaalkop Solar II PV Facility**, as well as for all of the facility's components. (Project development phases Kabi Vaalkop Solar III and the proposed power line and substation are assessed in the chapters that follow).

The **Kabi Vaalkop Solar II PV Facility** will be comprised of the following components:

- » An array of **photovoltaic panels** with a generating capacity of up to **75 MW**.
- » **Support structures** to mount the photovoltaic panels. 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 4 m from ground level.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between the project components, to be laid underground where practical.
- » New **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new 132 kV **power line** to turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via the new on-site substation. The proposed onsite substation is to be constructed near the existing Jouberton - Hermes 132 kV power line.
- » Temporary **laydown** and **storage areas** within the site. The laydown areas are proposed in an area that will eventually be covered by the PV panels.

The development of the Kabi Vaalkop Solar II PV Facility will comprise the following phases:

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.
- » *Operation* – will include operation of the facility and the generation of electricity.

- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately and in further detail within this chapter.

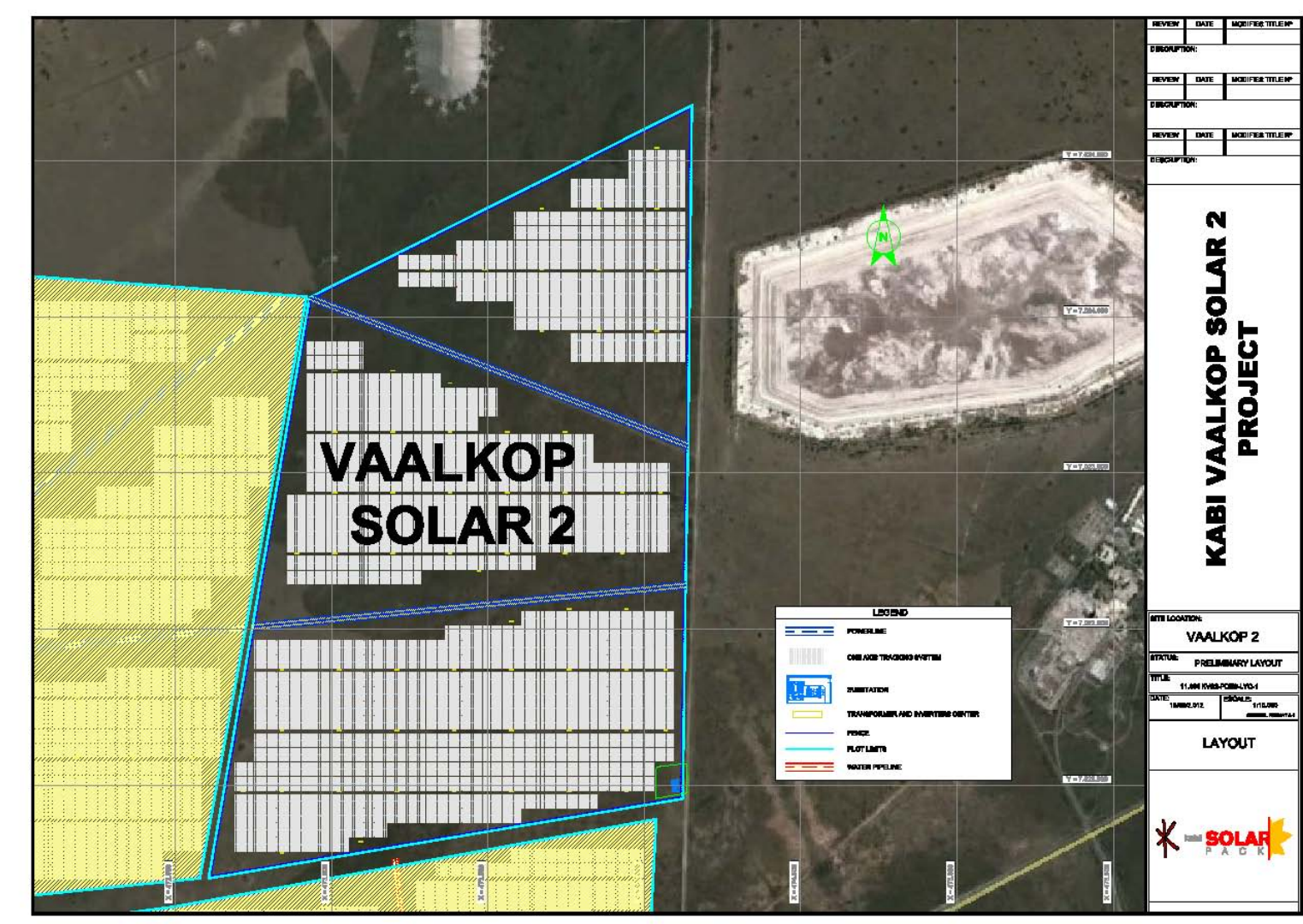


Figure 7.1: Preliminary layout of the proposed Kabi Vaalkop Solar II PV Facility and associated infrastructure

7.1. Areas of Sensitivity

The broader study site of 803 ha in extent (i.e. the entire site proposed for all three phases of the Kabi Vaalkop Solar PV Facility) was evaluated within the scoping study (Savannah Environmental, March 2012). No environmental fatal flaws were identified to be associated with the Kabi Vaalkop Solar PV Facility site. It was found that some sections of the study area appear to be in a mostly natural condition even though they are within an area historically affected by mining and construction of water pipelines and power lines across the site. From the project point of view, it was therefore recommended that infrastructure should only be placed with caution or mitigation measures must be implemented to minimise impacts in the areas perceived to be in a natural condition. No environmental fatal flaws were identified to be associated with the site. In addition, due to the nature of the site (its location within a mining area), no areas of potential high environmental sensitivity were identified at the scoping stage. However, as recommended, care has been taken in designing the different components of the facility during the EIA Phase.

These and other environmental issues have been assessed during the EIA Phase. No areas of high sensitivity were identified in the EIA phase (see figure 7.1 for the sensitivity map).

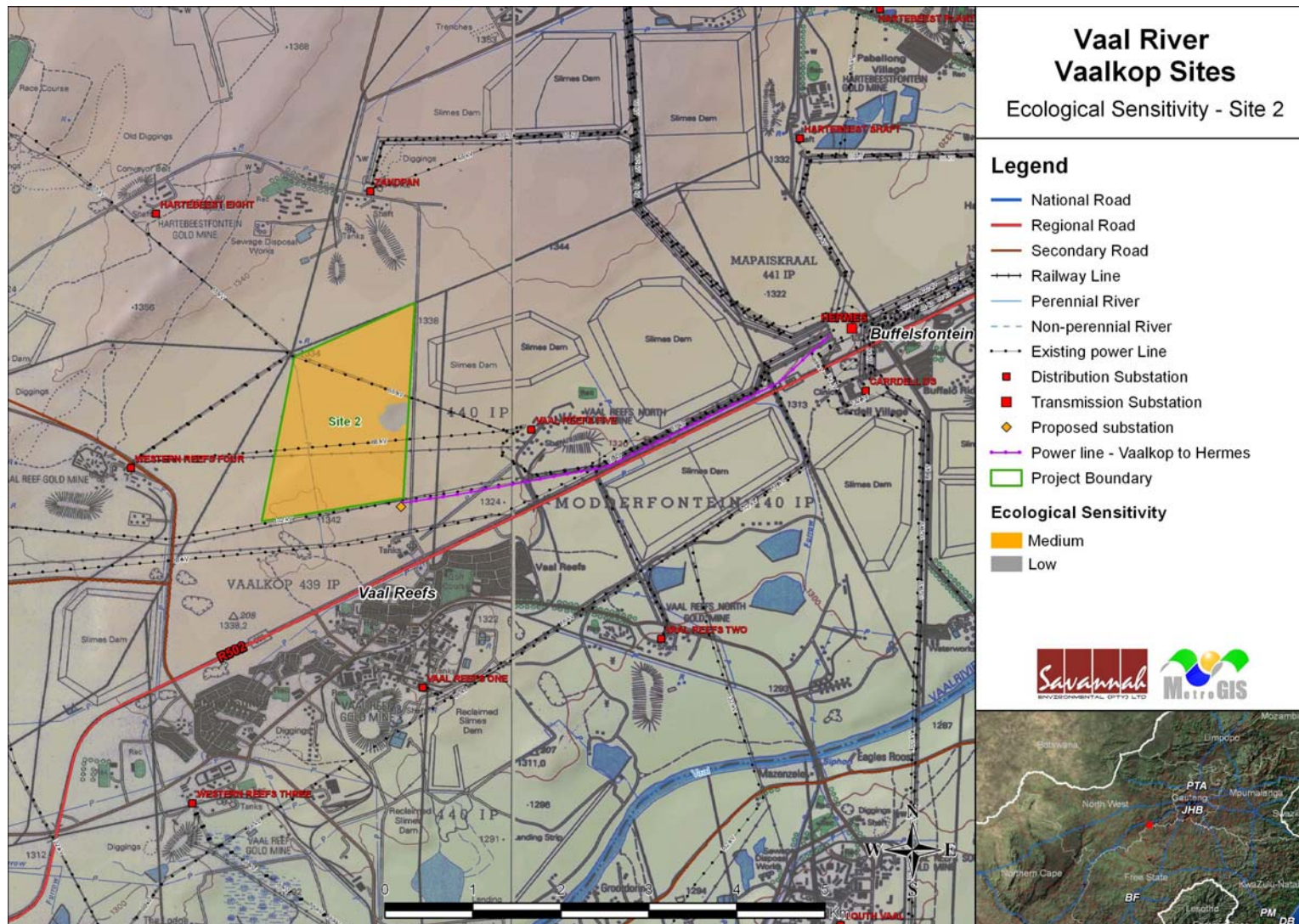


Figure 7.2: Sensitivity map illustrating ecologically sensitive areas across the site for the proposed development

7.2. Issues raised as part of the Public Participation Process

The opportunity to comment on the proposed project has been provided through the EIA process. This has included the use of stakeholder letters, a Background Information Document (BID), newspaper advertisements, site notices, and public and focus group meetings held in both the Scoping and EIA Phases. Comments raised to date in the process have included the following:

- » *Social* - employment opportunities and socio-economic impacts,

7.3. Methodology for the assessment of Potentially Significant Impacts

A broader site of approximately 268 ha (i.e. the entire site proposed **Kabi Vaalkop Solar II PV Facility**) was identified by the project developer for the purpose of establishing the proposed Kabi Vaalkop Solar II PV Facility. However, the development footprint will cover an area of approximately 267 ha in extent (for Kabi Vaalkop Solar II PV Facility only), which has been sited considering the identified environmental sensitivities and technical preferences. The site is likely to suffer disturbance, particularly during the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The Kabi Vaalkop Solar II PV Facility forms the second phase of the broader development proposed to be developed in phases under separate Special Purpose Vehicles (SPVs). Therefore, in order to accommodate the end-requirement that each SPV receive an Environmental Authorisation for their respective phase (i.e. in order to accommodate the requirements of the Request for Proposal (RfP) issued by the Department of Energy), the different phases were registered as separate projects to be assessed within one EIA report. The Kabi Vaalkop Solar II PV Facility was therefore issued with DEA reference number **12/12/20/2513/2**. The assessment of potential impacts that follows therefore only considers the impacts associated with Kabi Vaalkop Solar II PV Facility. The assessment of potential impacts associated with the other phases of the development (Kabi Vaalkop Solar III PV Facility and the proposed substation and power line) is considered in Chapter 8 and 9 of this report respectively.

The assessment of potential impacts has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The revised Comments and Response Report included within Appendix D lists these issues and the responses given by the EAP during the Scoping Phase.

7.4. Assessment of the Potential Impacts associated with the Construction and Operation Phases of the proposed Kabi Vaalkop Solar II PV Facility

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed **Kabi Vaalkop Solar II PV Facility** on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.3.4). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

In order to assess the potential impacts associated with the proposed facility, it was necessary to quantify the extent of the permanently and temporarily affected areas. This includes the area required for the photovoltaic panels and associated infrastructure, as well as the linear infrastructure (i.e. access roads) (refer to the table below).

Permanent Component	Approximate extent (in ha)
PV panels including associated infrastructure	268
TOTAL (ha)	(a total area of 268 ha of 268 ha) ~ 100% of site

There will be no permanent laydown areas on site. As construction progresses different sections of the site will be used as temporary laydown areas. These areas will eventually be covered by the PV panels.

7.4.1 Potential Impacts on Ecology

Solar energy facilities require relatively large areas of land for placement of infrastructure. The major expected negative impact will be due to loss of habitat which may have direct or indirect impacts on individual organisms.

Potential impacts and the relative significance of the impacts are summarised below (refer to Appendix F for more details):

- » Loss or fragmentation of indigenous natural vegetation (terrestrial) – assessed to be of **medium** significance.
- » Loss of individuals of plant species of conservation concern - assessed to be of **medium** significance.
- » Impacts on threatened animals - assessed to be of **low** significance.
- » Loss of habitat for threatened animals - assessed to be of **low** significance.
- » Bird collisions with powerlines - assessed to be of **low** significance.

- » Establishment and spread of declared weeds and alien invader plants - assessed to be of **low** significance.

The overall impacts of the proposed project on ecology have been assessed as being of **low to medium** significance.

Impact tables summarising the significance of ecological impacts (with and without mitigation)

The proposed PV array is in an area of natural vegetation identified as being of medium sensitivity in the scoping phase. The impacts of potential concern are therefore on natural vegetation, habitat for threatened birds, protected plants and the potential establishment and spread of alien plants.

Nature: Loss or fragmentation of indigenous natural vegetation		
The study site falls within the Vaal Reefs Dolomite Sinkhole Woodland vegetation type which is classified as Vulnerable. Development of the solar facility will lead to loss of a significant proportion of the natural habitat on site.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	Medium (60)	Medium (55)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No, but can be limited in extent	
Mitigation: Avoid unnecessary impacts on natural vegetation surrounding infrastructure. Impacts should be contained, as much as possible, within the footprint of the array.		
Cumulative impacts: Alien invasions may lead to additional loss of habitat that could exacerbate this impact.		
Residual Impacts: Some loss of this vegetation type will occur, but this is insignificant relative to the total extent of the vegetation type.		

Nature: Impacts on plant species of conservation concern		
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. Due to the almost complete coverage of the site with proposed infrastructure, it is almost certain that two Declining plant species will be affected.		
	Without mitigation	With mitigation
Extent	local (1)	local (1)

Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	medium (32)	medium (32)
Status (positive or negative)	negative	negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some degree	
Mitigation: None.		
Cumulative impacts: Further impacts on these species due to mining activities		
Residual Impacts: None		

Nature: Loss of habitat for threatened animals

There is a low likelihood of any threatened or near threatened animal species being affected by the proposed project. Birds and other animals that could potentially occur on site are relatively mobile and will move away during construction. The footprint of the solar facility is moderate relative to the overall availability of habitat in the general area. The sites are also within a relatively disturbed landscape, with mining activity occurring in high density in surrounding areas. The potential impact on them due to a loss of a small area of habitat is therefore not considered to be serious.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible to some degree	Reversible to some degree
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not required	
Mitigation: None required		
Cumulative impacts: Further loss of habitat due to mining activities and the proposed facility		
Residual Impacts: None likely		

Nature: Establishment and spread of declared weeds and alien invader plants		
<p>There are very few concentrations of alien plants on site. Potential invasive weeds with a distribution centred on this part of the country include <i>Melia azeradach</i>, <i>Sesbania punicea</i>, <i>Opuntia ficus-indica</i>, <i>Opuntia imbricata</i>, <i>Prosopis glandulosa</i>, <i>Populus x canescens</i>, <i>Salix babylonica</i>, <i>Morus alba</i>, <i>Gleditsia triacanthos</i>, <i>Agave americana</i>, <i>Datura ferox</i>, <i>Datura stramonium</i>, <i>Arundo donax</i> and <i>Nicotiana glauca</i>. Construction of the solar facility will require the total clearing of vegetation within the footprint and this will probably be maintained as clear areas for the lifetime of the project. It is possible that there will be some invasion by aliens along the margins of disturbed areas. This could lead to general invasion of surrounding vegetation, especially along watercourses.</p>		
	Without mitigation	With mitigation
Extent	Site & surroundings (2)	Site & surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	medium (6)	minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (48)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation surrounding facility to a minimum » Rehabilitate disturbed areas as quickly as possible following completion of construction activities in an area » Do not translocate soil stockpiles from areas with alien plants » Control any alien plants immediately to avoid establishment of a soil seed bank that would take decades to remove » Establish an on-going monitoring programme to detect and quantify any aliens that may become established 		
Cumulative impacts:		
Other disturbance to parts of the site could lead to similar impacts.		
Residual Impacts:		
Will probably be very low if control measures are effectively applied		

Implications for Project Implementation

- » The development footprints will not impact on any ecological "no go" habitats or areas.
- » A permit will be required for the damage or removal of protected plant species.

7.4.2 Potential Impacts on Soils and Agricultural Potential

The most important direct impact is soil degradation including erosion from the area of construction activity. The erosion potential of the site is low due to the inherent well-drained nature of the soils (even the rocky and shallow soils) and impacts due to erosion are not expected. The most significant risks on the site are potentially the formation of sinkholes under conditions where stormwater ponds or where this water finds preferential flow paths into the underlying weathering and hard rock.

In terms of agricultural potential, the potential significance was rated as having a predominately low significance. The agricultural potential of the site is low due to the dominance of shallow and rocky soils. The fact that the site is underlain by dolomite means that the grazing potential is high but this type of land use will require adequate fencing and protection of livestock against theft as there is considerable traffic (vehicle and pedestrian) around and through the site. Although the inherent soil properties make the soils suitable for irrigation the underlying geology poses a risk in terms of sinkhole formation if that water regime in the landscape is altered. The conclusion is therefore that the site is generally of low agricultural potential with limitations regarding the land use options.

Impact tables summarising the significance of impacts on soils and agricultural potential (with and without mitigation)

Nature: Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure		
This activity entails the construction of buildings and other infrastructure with the associated disturbance of soils and existing land use.		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit footprint to the immediate development area. Rehabilitation possible after removal of infrastructure due to the low agricultural potential baseline of the development area.		

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

Nature: Disturbance of soils and impacts on existing land use due to construction of roads

This activity entails the construction of roads with the associated disturbance of soils and existing land use.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	

Mitigation:

» Limit footprint to the immediate development area and keep to existing roads as far as possible.

Cumulative Impacts:

» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.

Residual Impacts:

» None

Nature: Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles

This activity entails the operation of vehicles on site and their associated impacts in terms of spillages of lubricants and petroleum products.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (20)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	No	No

Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Maintain vehicles, prevent and address spillages.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed.		
Residual Impacts:		
» None		

Nature: Impact of dust generation on site		
This activity entails the operation of vehicles on site and their associated dust generation. Generated dust can impact large areas depending on environmental and climatic conditions.		
	Without mitigation	With mitigation
Extent	Local (2)	Site (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (24)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit vehicle movement to absolute minimum, construct appropriate roads for access.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed but can have widespread impacts if ignored.		
Residual Impacts:		
» None		

Nature of Impact: Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.		
	Without mitigation	With mitigation
Extent	Low (1) – Site	Low (1) – Site
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance*	Low (32)	Low (32)
Status (positive or negative)	Negative	Negative

Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some extent	No
Mitigation: The loss of agricultural land is a long-term loss and there are no mitigation measures that can be put in place to combat this loss. In the case of low agriculture potential, soil impacts can be rehabilitated afterwards if infrastructure is removed.		
Cumulative impacts: Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.		
Residual Impacts: The loss of agricultural land is a long term loss. This loss extends to the post-construction phase. The agricultural potential for the area is very low though.		

Implications for Project Implementation

- » The proposed development of a photovoltaic facility on the site will not have large impacts due to the low agricultural potential of the area proposed for development.
- » It is imperative that adequate stormwater management measures be put in place as the underlying rock strata are prone to the formation of sinkholes.

7.4.3 Assessment of Potential Impacts on Heritage Sites

No sites of heritage significance were identified during the survey. However, due to the nature of some heritage resources, there is potential to expose and/ damage unknown artefacts during construction. The potential impact on surface and/or sub-surface artefacts is however rated to be low.

Impact tables summarising the significance of impacts on heritage resources (with and without mitigation)

Nature: Impacts on heritage resources During the construction and operational phases of the project various activities will impact on surfaces and/or subsurface which may destroy, damage, alter or remove from its original position archaeological and palaeontological structures or artefacts.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	Low (9)	8 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: Although no sites were recorded during the field survey please note that if any archaeological or palaeontological material is uncovered during construction or operation a qualified archaeologist must be contacted to assess the remains. Mitigation measures can then be activated which will include a permit from SAHRA and documentation and sampling.		
Cumulative impacts: Cultural heritage sites are a non-renewable resource and any impacts on them is regarded as permanent and destructive.		
Residual Impacts: Destruction of heritage sites results in the depletion of known or unknown sites..		

Implications for Project Implementation

- » From an archaeological perspective, no sites of heritage significance were identified.
- » Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner so that an investigation and evaluation of the finds can be made.

7.4.4 Assessment of Potential Visual Impacts

The visibility analysis was undertaken from PV panel positions at an offset of 4 m above average ground level (i.e. the maximum height of the metal frames) in order to simulate a worst case scenario. The viewshed analysis indicates areas from which the PV panels would be visible (any number of panels with a minimum of one).

Visual exposure of Phase 2 is concentrated immediately around and north of the development site. Further exposure occurs intermittently to the west and the far south

Potential visual impact assessment –visual impact index

The results of analyses including visibility analysis / exposure (Figure 7.3); observer proximity to the facility (refer to Figure 7.4); viewer incidence / viewer perception; and visual absorption capacity (VAC) are merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in order to judge the severity of each impact (refer to Figure 7.5).

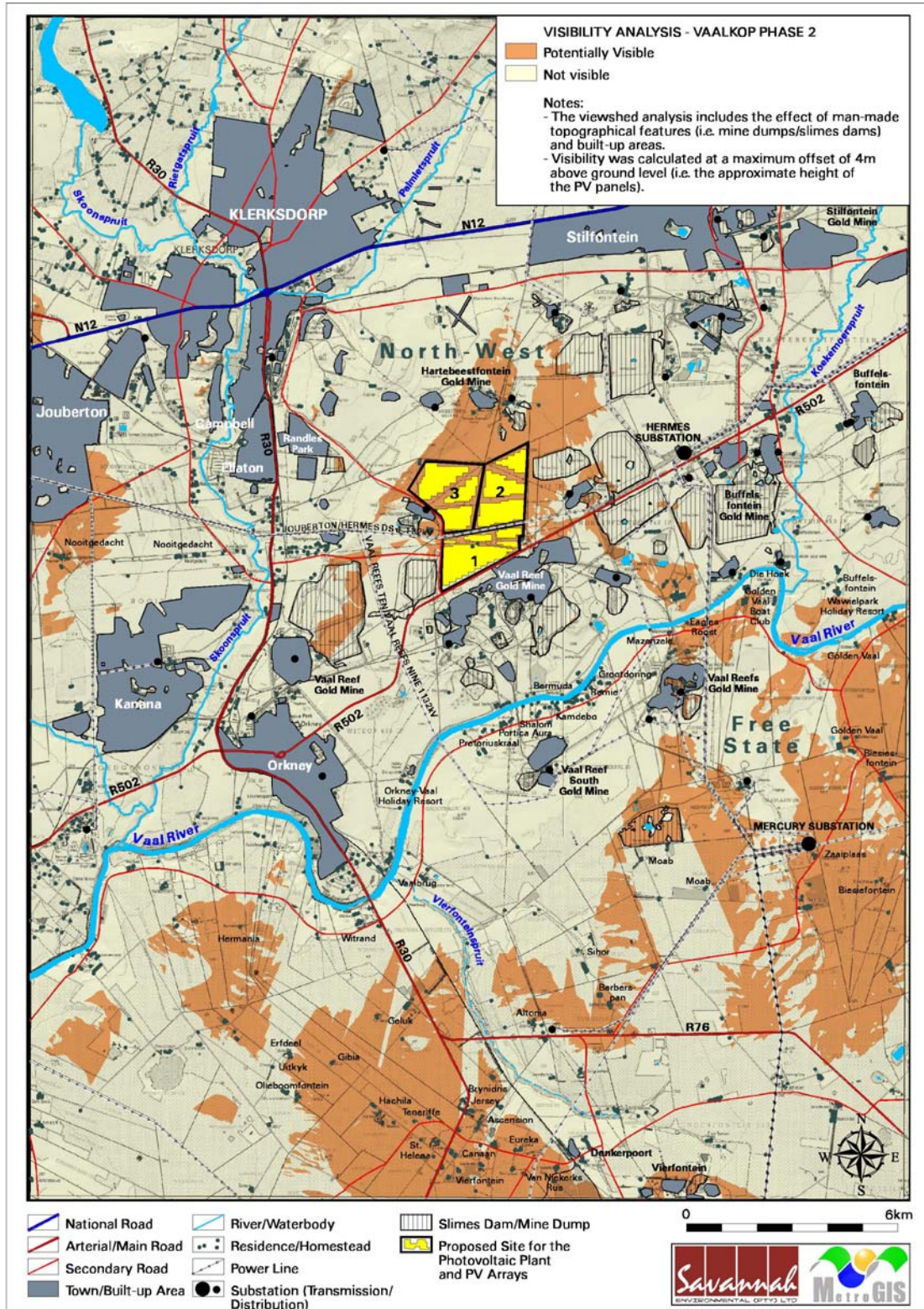


Figure 7.3: Potential visual exposure of the Kabi Vaalkop Solar II PV Facility
The potential visual exposure as illustrated is a theoretical representation of where visual receptors would be able to see the facility from. This does not take into consideration local factors such as vegetation, orientation of structures and views, and localised topographical features.

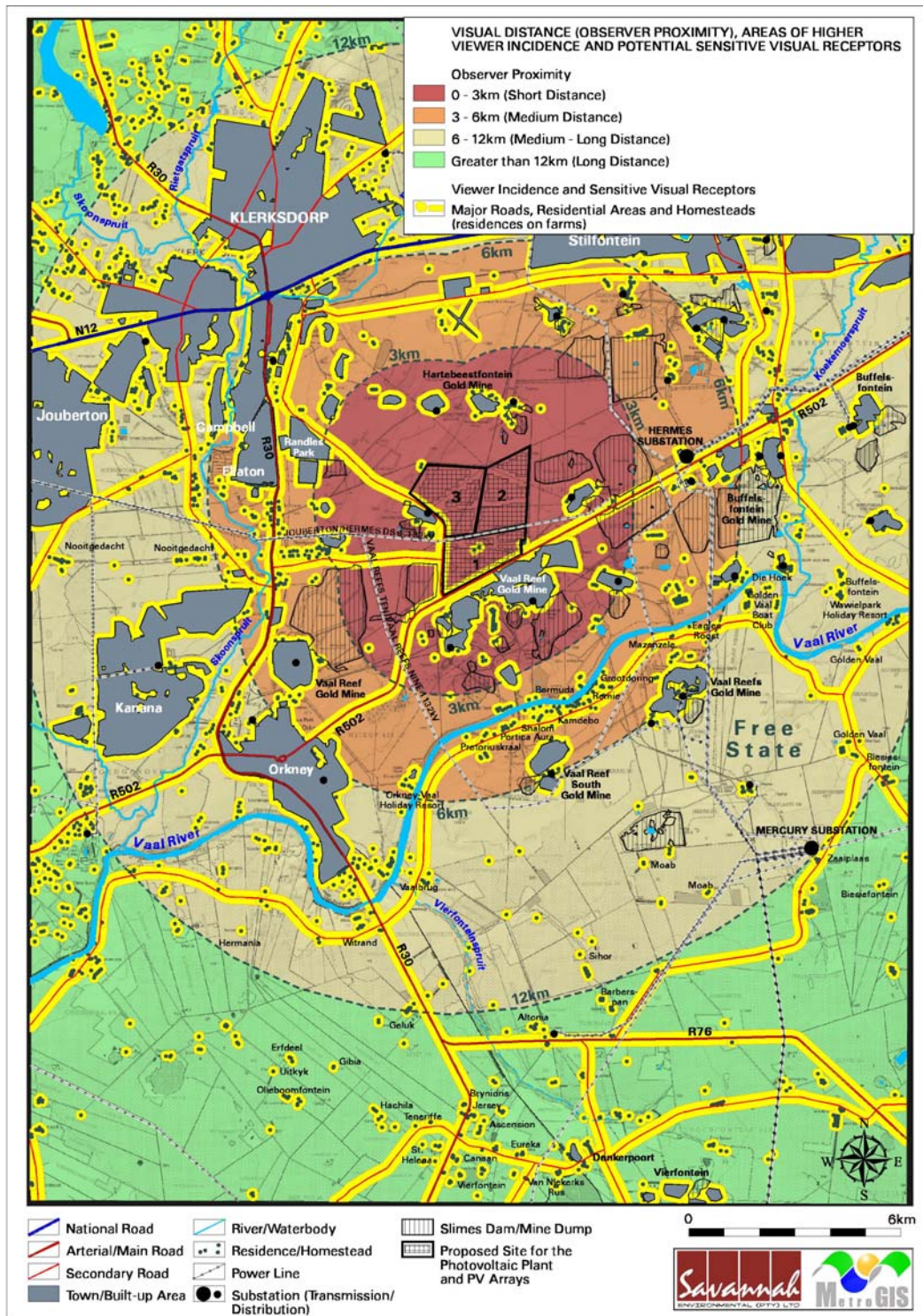


Figure 7.4: Observer Proximity, Areas of High Viewer Incidence and Potential Sensitive Visual Receptors

Results of the Visual Assessment

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed solar energy facility are displayed on **Figure 7.5**.

The quantitative analyses of possible impact have been integrated as a visual impact index. The sum of values assigned for each visual impact parameter is used to identify and visualise areas of high, moderate and low visual impact. Typically a location with close proximity to the proposed facility, a high viewer incidence, a predominantly negative perception and high visual exposure would have a high value on the index, thereby signifying a high visual impact.

The following is of relevance:

- » The proposed facility has a small area of moderate to high visual impact within 3km around the site. Affected areas of possible high sensitivity are the Vaal Reef Gold Mine village and the R502 arterial road.
- » Visual impact in the medium distance (i.e. between 3km and 6km), is low and will only affect isolated locations. The section of the R502 towards Orkney, as well as the eastern fringes of the town may, however, experience moderate visual impacts.
- » Beyond 6 km from the proposed solar PV development area the visual impact is expected to be very low, becoming negligible from 12 km.

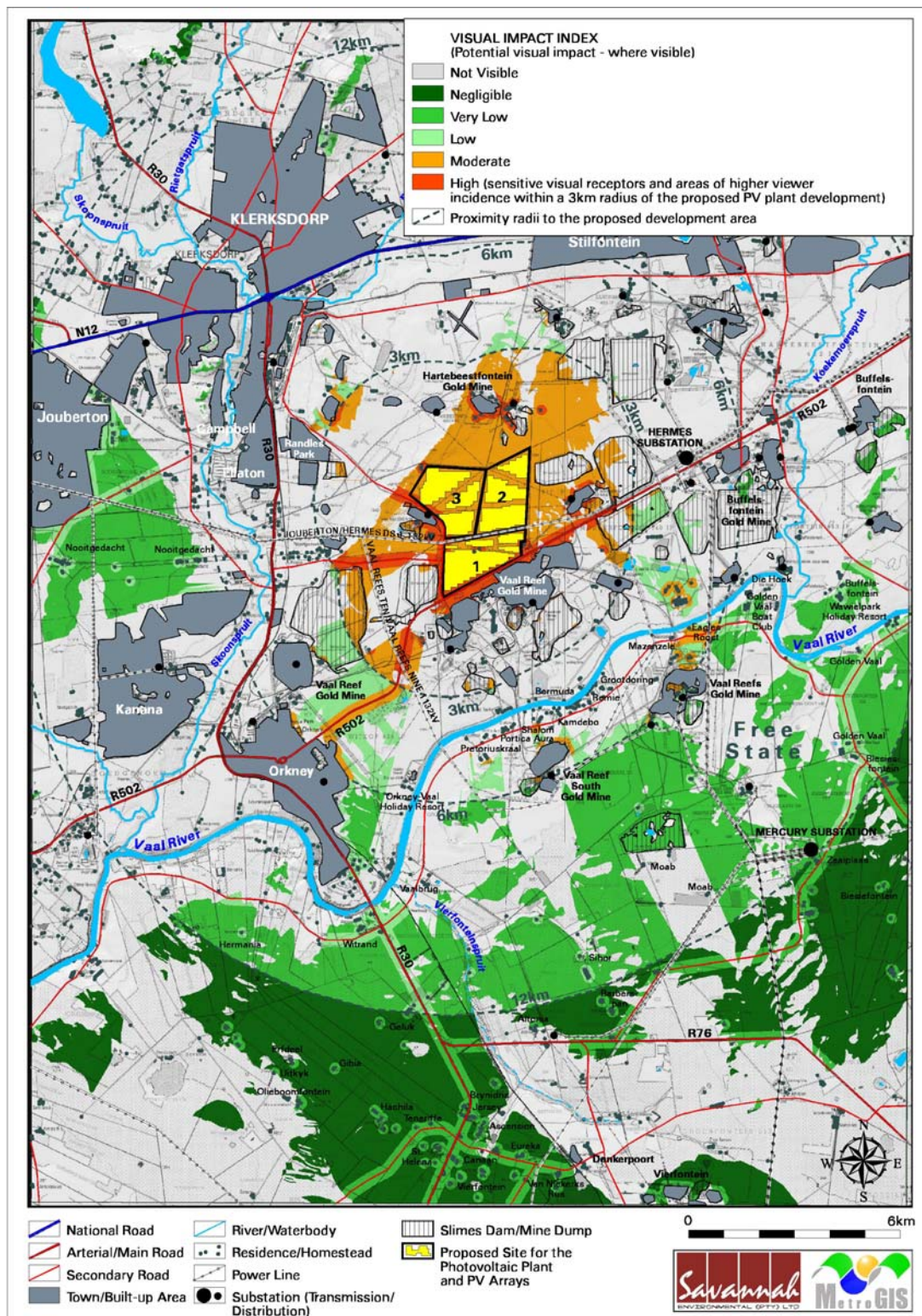


Figure 7.5: Visual impact index of the proposed Kabi Vaalkop Solar PV Facility

It should be noted that the visual impact index does not take into account visual clutter and structures that obstruct long distance views within built-up areas. For this reason it can be assumed that the solar energy facility would have a higher visual prominence from the outskirts of built up areas than from within these areas.

Impact tables summarising the significance of visual impacts (with and without mitigation)

Nature: Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.		
Potential visual impact on users of the R502 and secondary roads in close proximity of the proposed solar energy facility (i.e. within 3 km).		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (2)
Significance	Medium (24)	Medium (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Create a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on visual impact on towns and residential areas affected by visual exposure.		
It is envisaged that the facility may have a visual impact on residents of the Vaal Reef Gold Mine village, which is situated less than 500 m south of the proposed development area. Residents in the eastern parts of Orkney, approximately 6 km west of the proposed Phase 1 development area, may experience visual impacts.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (5)
Magnitude	Low (4)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Medium (24)	Medium (24)
Status (positive or negative)	Negative	Negative

Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Retain a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.		
Visual impacts may occur to a small number of holiday resorts and leisure facilities along the Vaal river (e.g. Eagles Roost and the Golden Vaal Boat Club). Activities are mostly associated with water sport, such as fishing, sailing, skiing, etc, as is evident from a number of jetties along the river bank.		
	Without mitigation	With mitigation
Extent	Local (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (3)	N/A
Significance	Low (30)	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Yes	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	N/A
Mitigation:		
<ul style="list-style-type: none"> » None 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility		
The immediate area south of Phase 1 has a relatively high incidence of possible sensitive receptors, owing to the location of the R502 and the Vaal Reef Gold Mine village south of the development area. Light trespass and glare from security and night time operational lighting may have negative impacts for visual receptors in close proximity, especially traffic on the R502 and residents in the northern area of the mine village.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (42)	Medium (42)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
Planning & Operation: <ul style="list-style-type: none"> » Limiting mounting heights of lighting fixtures. » Making use of downward directional lighting. » Making use of minimum lumen or wattage in fixtures. » Making use of Low Pressure Sodium lighting or other types of low impact lighting. » Making use of motion detectors. This will allow the site to remain in relative darkness, until lighting is required for security or operational purposes. 		
Cumulative impacts:		
The existing urban areas in the region generate lighting impact at night. The impact of the Solar Energy Facility will contribute to a regional increase in lighting impact		
Residual Impacts: None. The visual impact will be removed after decommissioning, provided all sources of lighting are removed.		

Nature: Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.
Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc) play a significant role.
A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. Specific aspects contributing to the sense of place of this region include un-impacted picturesque landscapes, dramatic mountains and isolation.

The visual impact on the visual character of the landscape and sense of place of the region is expected to be of low significance, due to the large degree of transformation of the natural environment, and the establishment of visual impacts by virtue of urban and mining development. No mitigation is possible.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low (24)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » None		
Cumulative impacts: The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Implications for Project Implementation

- » The anticipated visual impacts of the facility will be low given the already existing infrastructure and the number of potential receptors around the site. Therefore, the visual impacts are not considered to be a fatal flaw for the proposed solar energy facility.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

7.4.5 Assessment of Potential Social Impacts

Construction of the proposed solar facility is labour-intensive and it is estimated that it would take place over a time-period of between 18 and 24-months. Activities associated with construction include:

- » Site establishment;
- » Perimeter fence construction;

- » Civil works, including concrete foundations, installation of steel footings, installation of trackers, mounting of PV modules on trackers, installation of electrical cabling; establishment of perimeter trenches, lighting and security, establishment of internal trenches for low voltage (LV) cabling to the PV modules and establishment of the inverter and transformer shelter foundations;
- » Electrical works, such as installation of medium voltage (MV) loop, installation of LV lines and auxiliary services, installation and connection of inverters and AC/DC boxes; and
- » Installation of intrusion prevention system, PV module monitoring system and the weather station.

Each of the potential impacts associated with the construction phase is described and rated in the following impact tables.

Impact tables summarising the significance of social impacts during the construction and operational phases (with and without mitigation)

Nature: Influx of jobseekers		
Even though the developer's employment policy gives preference to the employment of local labour (especially with regards to lower and semi-skilled positions), the potential influx of 'outsiders' cannot be disregarded. The municipality indicated that a large influx of people attracted by infrastructure developments has not occurred in their area of jurisdiction in the past. However, the potential issue needs to be addressed pro-actively.		
	<i>Without Mitigation</i>	<i>With Enhancement</i>
<i>Extent</i>	Local (3)	Local (3)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Moderate (6)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (3)
<i>Significance</i>	Medium (33)	Medium (30)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	
<i>Enhancement :</i>		
<ul style="list-style-type: none"> » Stipulate the employment of local labour and enterprises in the tender documents to ensure the maximum use of a local labour force, especially with regards to lower and semi-skilled positions. Locals are, in this instance, defined as the nearest communities or people that reside within a 50 km radius from the project. » The developer, contractor and Community Liaison Officer (CLO) should formulate and implement a recruitment strategy to ensure that a suitable labour force is sourced. Tap 		

- into the LM's HR Department's skills database and do a skills audit.
- » The number and extent of the employment opportunities must be communicated to the local community to avoid that unrealistic expectations be created.
 - » Prior to construction commencing representatives of the local community, SAPS, the neighbouring residents and landowners should be informed of details of the construction company, the construction schedule and size of the workforce.
 - » Due to safety and security risks, recruitment of temporary workers at the access to the construction site should not be allowed. The CLO should work in consultation with the Ward Councillors and community representatives to establish labour desks at the most suitable localities within the local communities where workers are sourced.
 - » The area where workers are recruited should not be near schools or other sensitive receptors where a large influx of people could cause safety and security impacts for the residents and other sensitive receptors. Provide sufficient sanitation and refuse facilities.

Cumulative impacts:

- » The implementation of all five phases of the Kabi Vaalkop and other projects in the region would increase the likelihood of an influx of jobseekers, increasing the likelihood of conflict and would place pressure on the Local Municipality (LM) in terms of services and housing.
- » Should all four Kabi projects be implemented, it is expected that the available LM labour force would be able to provide the required local labour quota.

Residual impacts:

Should jobseekers remain in the LM area, an increase in the available workforce in the City of Motlasana would increase the local unemployment rate and place further pressure on the Municipality to provide jobs and services.

Nature: Employment opportunities and employment equity

Job creation is a positive impact during the construction phase. The construction team would consist of approximately 80% unskilled labour, 10% semi-skilled and 10% skilled temporary employees. Between 1 000 and 1 240 employment opportunities would emerge for each phase. The Department of Energy (DOE) requires that a minimum of 35% (with a target of 60%) of the project consist of local content and local labour would fulfil a large proportion of this quota.

	Without Mitigation	With Enhancement
Extent	Local (3)	Local municipal area (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly improbable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	N/A	N/A

Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Work in collaboration with the LM's HR Department to do a skills audit of the available workforce and minimise the workers to be brought in from other areas. » The recruitment strategy should clearly reflect the percentage of workers to be sourced from the local labour force. » Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project. » A policy regarding employment equity of minority groups (women, youth and the disabled) should be formulated and implemented wherever possible 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Should construction of the Kabi Vaalkop projects and projects in the region overlap, 2 000 to 2 500 employment opportunities would emerge. » Should all phases of the Kabi Vaalkop Solar projects be approved, skills development would be advantageous for the LM. 		
Residual impacts:		
<ul style="list-style-type: none"> » Positive social and economic impacts for employees their families and the LM, as high unemployment is prevalent. » Skills development and capacity building that would enable the workers to seek employment on similar projects in future. 		

Nature: Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions

Although the exact level and type of skills training is not known at this stage, it could be expected that some form of skills development and capacity building would take place. The tasks to be performed by unskilled labour are those activities usually associated with a construction site and would typically not require prior experience and extensive training. However, the semi- and highly skilled positions (20% of the temporary labour force) would require a higher level of training and skills development, as the technologies to be implemented in this project are still relatively new and unfamiliar to the South African labour market.

	<i>Without Enhancement</i>	<i>With Enhancement</i>
<i>Extent</i>	Regional (4)	Regional (4)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	low (4)	Moderate (6)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	Medium (30)	Medium (36)

Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Do a skills audit of the local workforce to determine what skills are available locally, and to reduce the number of workers and specialists that are brought in from other areas. The recruitment process and strategy should include local businesses, enterprises and SMME's to allow them to become part of the tender process. » Co-ordinate with the LM and use the existing skills data base of the HR Department as a point of departure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Should all four phases Kabi Solar project be approved and implemented, the collective skills development and capacity building will enhance the employability of the labour force with positive economic advantages for the LM. 		
Residual impacts:		
<ul style="list-style-type: none"> » Workers that obtain skills would be able to use it on similar construction projects in future. » Through skills development and government initiatives an environment could be established that enables upcoming SMME's to compete in the market, albeit on a smaller scale, such as the construction and erection of rooftop solar plants. 		

Nature: Impacts on the local economy		
Positive impacts and economic spin-offs on the local economy could manifest in a number of ways during the construction phase.		
	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly Probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (56)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » It is required from the developer to formulate a local procurement strategy to increase 		

the local content of the project to the maximum
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Demand might exceed local supply forcing the developer to procure goods and services from the broader region and overseas
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Materialisation of innovative economic opportunities in the local and district municipalities. » With careful and strategic planning small groups, SMME's and other small businesses could break into this market and gain from future renewable energy projects in the area.

<p>Nature: Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)</p> <p>Local procurement of goods and services could stimulate local and regional manufacturing, thereby increasing its contribution to the secondary sector over the short-term</p>		
	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (20)	Medium (30)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
<p>Enhancement :</p> <ul style="list-style-type: none"> » Formulation of a procurement strategy that maximises local content. » Government should identify upcoming and potential SMME's and strategically plan their involvement in the renewable energy sector. 		
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » New manufacturing industries that evolve to supply renewable energy products to the southern African markets 		
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Less dependency on the primary sector. 		

Nature: Disruption in daily living and movement patterns

Approximately 1 500 trucks would travel on the local roads, over a 500-day construction period, to transport equipment and material such as the modules, trackers, cables, electrical frames, tubes and cement to the construction site. On-site construction vehicles and equipment would include excavators, trucks, graders, compaction equipment and cement trucks.

Road safety issues and intrusion impacts could emerge for surrounding residents in Vaal Reef and road users on the R502 and Four Shaft / Randles Park Road (west of the site), causing short-term disruptions and safety hazards.

	Without Mitigation	With Enhancement
Extent	Study area (2)	Study area (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (24)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » The verification of appropriate access roads to the sites has to take good visibility for motorists into consideration.
- » Put up clear signboards along the access roads indicating the accesses to the construction site.
- » Impose penalties for reckless drivers as a way to enforce compliance to traffic rules.
- » Limit heavy vehicle movement through residential areas (Orkney and Vaal Reefs), especially avoiding peak times.
- » Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and unroadworthy vehicles that could lead to accidents.
- » Display a contact number on the construction vehicles where motorists can report bad driving.
- » No heavy vehicles to be parked outside the designated construction area where it could obstruct motorists' views.
- » No informal traders to be allowed on or near the construction site.
- » Set up the labour desk in a secure and suitable area, preferably in the communities where workers are being sourced, to discourage the gathering of temporary workers at the gates of the construction site where it could affect road users.
- » Mitigation measures for intrusion impacts (noise, visual, air and dust pollution) are addressed in greater detail in the SIA report (refer to Section 5.12 of the SIA report, Appendix K).

Cumulative impacts:

- » New manufacturing industries that evolve to supply renewable energy products to the southern African markets

Residual impacts:

Even with the implementation of mitigation measures to soften the impacts, impacts on living and movement patterns due to an increase in traffic and heavy vehicles is a reality. However, it would be of short duration, without major long-term consequences if the construction process is managed adequately.

Nature: Potential health risks for workers and surrounding communities due to poor management of the construction process

Health issues for surrounding residents and workers during the construction phase could manifest through air / dust pollution, poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. The most vulnerable people are the elderly, the very young and those with existing heart and lung conditions. Detrimental health impacts are not confined to the construction site and could affect the health of people living and working in the surrounding area.

	Without Enhancement	With Enhancement
Extent	Municipal areal (3)	Municipal areal (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Low (27)	Low (18)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » The contractor should recognize his responsibility towards social / soft issues and should embark on an HIV/AIDS awareness campaign amongst the workers. A strategy to appoint a local labour force as far as possible will limit the spread of diseases.
- » Appoint a Health and Safety Officer and comply with the Occupational Health and Safety Management System's requirements. The contact details of this person should be made available to the local community and procedures to lodge complaints set out.
- » Provide adequate drinking water and appropriate sanitation facilities to the workers. Sanitation facilities to be cleaned and serviced on a regular basis.
- » Dispose of rubble and other household waste appropriately and on a regular basis.
- » Identify the waste types that are likely to be produced and aim to reduce the amount of waste as much as possible, through identifying routes to reuse or recycle materials. Label all waste storage and skips, detailing the type of waste.

- » Store any materials away from sensitive locations in fenced off areas.
- » Spray gravel / sand surfaces regularly with water to suppress dust.
- » Avoid the establishment of a construction camp to house workers on the site.
- » Security guards should be the only people allowed to stay overnight on the site. Their accommodation and facilities should comply with health and safety standards.
- » Regularly inspect the site area for spillages and clean spillages using agreed wet handling methods.
- » Inform the LM and emergency services if harmful substances are spilled.

Cumulative impacts:

- » The construction of the Kabi Vaalkop Solar PV facility and other renewable energy projects in the area would increase the likelihood of an influx of jobseekers. Dissolute sexual behaviour, temporary relationships with local women and unwanted pregnancies could increase.
- » An influx of jobseekers is associated with the spreading of diseases and HIV/AIDS.
- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.

Residual impacts:

- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.
- » Employees that do not attend work on a regular basis and a high staff turnover, with financial and administrative implications for the Contractor.

Nature: Impacts on the 'sense of place'

Intrusion impacts (noise, visual and dust pollution) and safety and security issues could impact on the 'sense of place' as experienced by residents, tourists and visitors in the area. The site is surrounded by old mining land and the Vaal Reefs residential area is located south of the site. The R502 could act as a buffer to soften potential intrusion impacts. No sensitive receptors are in close proximity to the site.

	Without Enhancement	With Enhancement
Extent	Study area (2)	Study area (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (12)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » Nightlights (security lights) should be directed away from residences and the

surrounding roads to limit nuisances and safety hazards for motorists.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Possible devaluation of property prices if the 'sense of place' of the local community is negatively affected by numerous construction developments
<p>Residual impacts:</p> <ul style="list-style-type: none"> » None

Impact tables summarising the significance of social impacts during the operational phase of the facility

Nature: Job creation during the operational phase of the project		
	Without Enhancement	With Enhancement¹²
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement: The significance of the impact will increase if skilled local operators as well as local employees are sourced to perform the duties associated with the operational phase.</p>		
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » An increase in employment opportunities with economic advantages for the local economy and workforce » New local service providers that emerge with the increase of opportunities. » Increasing competition amongst service providers, resulting in a more favourable pricing structure for services. » Skills development and capacity building of the local workforce. » It would increasingly become more difficult to fill higher and semi-skilled positions with locals if other renewable energy projects in the area are also implemented 		
<p>Residual impacts:</p> <ul style="list-style-type: none"> » An increase in salaries and spending power with economic advantages for individual families and the local economy. » Skills development and capacity building 		

¹² This assumes the establishment of some form of Community Trust.

Nature: Skills development and capacity building during the operational phase		
Skills development and capacity building would result as on-site training is likely. Also, skilled local operators responsible for the maintenance of the plant would be trained in Spain on existing similar plants.		
An important outcome of skills development and training is that employees would be in a position to source work on similar plants once their contracts expire. A skilled labour force is more likely to find employment, resulting in economic advantages for the local economy over the long-term.		
	Without Enhancement	With Enhancement¹³
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Source locals for employment positions as far as possible, to enhance the advantages of skills development and training for the LM area. » Implement measures (bonuses or other financial benefits) for highly skilled staff to minimize the negative impacts associated with a high staff turnover. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Trained employees could leave and source work at similar plants that are being constructed in other parts of the country. The developer would need to train additional employees, resulting in time and money losses 		
Residual impacts:		
<ul style="list-style-type: none"> » Economic advantages for the local economy, as the labour force are better skilled, thus affecting employability in a positive way 		

Nature: Impacts associated with a change in land use

The project site is located on land that belongs to AngloGold Ashanti and a lease agreement with the developer will be concluded at a later stage. At present the majority of the site is vacant and fallow and is not suitable for agriculture or other developments, such as township

¹³ This assumes the establishment of some form of Community Trust

establishment. The change in land use is therefore regarded as a positive impact over the long-term, as the establishment of a renewable energy project is one of the few viable uses for the subject site.

	Without Enhancement	With Enhancement¹⁴
Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Medium (35)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: No enhancement is required.		
Cumulative impacts: None		
Residual impacts: Once decommissioned, the land zoning will be restored to the current zoning and rehabilitation of the site would be required.		

Nature: Impacts on the 'sense of place' for the local community

Extensive dust, noise and traffic impacts during the operational phase are highly unlikely, although visual impacts and safety and security issues, should they occur, has the potential to impact on the local community's 'sense of place', specifically residents in Vaal Reefs, as there are no other sensitive receptors in the direct vicinity of the site.

	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Low (16)
Status	Negative	Negative
Reversibility	Yes	

¹⁴ This assumes the establishment of some form of Community Trust.

Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Apply all the mitigation measures as proposed by the Visual Impact Assessment. » Ensure that residents in Vaal Reefs are aware of the procedures to lodge complaints. » Implement all safety and security measures, as proposed by the developer, to combat potential crime.. 		
Cumulative impacts:		
An increase in criminal activities could place additional pressure on the local SAPS and affect service delivery.		
Residual impacts:		
Hostility towards the project and developer.		

Nature: <i>Security related impacts during the operational phase</i>		
An increase in activity in and around the proposed development during the operational phase could increase security related concerns for the residential area of Vaal Reefs. Potential theft, vandalism and related criminal activities at the Solar PV facilities are also a concern for the Developer.		
	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Medium (30)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Extend the benefits of the project to the local community by employing local people as far as possible, allocating a percentage of the turnover of the project for community and socio-economic upliftment projects and allocate shares in the project to a community Trust or similar entity. » Implement all the proposed security measures, such as 24-hour security and access control, electric fencing, CCTV cameras and night lights where possible. 		

<ul style="list-style-type: none"> » Maintain good relationships with neighbours, discuss security issues and measures and make the contact details of the Operations Manager available should complaints be lodged
<p>Cumulative impacts: Increasing activities and potential security concerns with the establishment of additional solar plants in and around the study area</p>
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Impacts on the 'sense of place' for the local community. » Hostility between the local community and the developer if security concerns are not addressed adequately

<p>Nature: <i>Impacts of the proposed facility on national electricity supply and positive impacts on the environment</i></p>		
	Without Enhancement	With Enhancement
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (75)	High (75)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement: Not required</p>		
<p>Cumulative impacts: Eskom's intention to purchase 3 750MW of electricity from renewable energy projects over the next few years, would contribute significantly to environmental advantages.</p>		
<p>Residual impacts: The increase of electricity tariffs by Eskom to accommodate renewable energy projects.</p>		

Implications for Project Implementation

- » The findings of the SIA undertaken for the proposed **Kabi Vaalkop Solar II PV Facility** indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project.
- » Potential negative impacts can be reduced to low significance.

7.5. Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that, in itself, may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area¹⁵. The subsequent phases of the proposed development will add to the cumulative impacts of the proposed development.

These proposed developments, in addition to the already existing infrastructure (i.e. the Hermes and associated power lines, slimes dams and mine shafts), will increase the cumulative visual impact of industrial type infrastructure within the region. The cumulative impacts in this regard will be of low significance as the area is industrial in its nature. From an ecological point of view uncontrolled soil erosion from all the proposed phases may lead to establishment of alien invasive plants and loss of habitat for indigenous natural vegetation. From an agricultural potential point of view the cumulative impact of this activity will be small as it is constructed on land with low agricultural potential. These impact can however be mitigated if mitigation measures as recommended in this report and attached EMP are implemented.

The negative cumulative impacts of the proposed developments are offset by the positive cumulative impacts. The proposed developments (all phases) have the potential to result in significant positive cumulative impacts, specifically with regards to employment creation. The proposed developments will reduce the pressure on the electricity grid in the North West Province by injecting an additional 225 MW of energy.

Cumulative effects have been considered within the detailed specialist studies, where applicable (refer to Appendices F – K).

¹⁵ Definition as provided by DEA in the EIA Regulations.

ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED KABI VAALKOP SOLAR III PV FACILITY: CHAPTER 8

This chapter serves to determine the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) associated with the development of the proposed **Kabi Vaalkop Solar III PV Facility**, as well as for all of the facility's components (the proposed power line and substation are assessed in the chapters that follow).

The **Kabi Vaalkop Solar III PV Facility** will be comprised of the following components:

- » An array of **photovoltaic panels** with a generating capacity of up to **75 MW**.
- » **Support structures** to mount the photovoltaic panels. 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 4 m from ground level.
- » **Invertors** which are required to convert the electricity from direct current to alternating current.
- » **Cabling** between the project components, to be laid underground where practical.
- » New **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new overhead 132 kV power line 1 approximately 6 km long (with a servitude width of 31 m) to connect directly to the Eskom Hermes Substation to be shared with the Kabi Vaalkop Solar I PV Facility via the new onsite substation.
- » Temporary **laydown** and **storage areas** within the site. The laydown areas are proposed in an area that will eventually be covered by the PV panels.

The development of the Kabi Vaalkop Solar III PV Facility will comprise the following phases:

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, electricity generation infrastructure, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.
- » *Operation* – will include operation of the facility and the generation of electricity.
- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will

include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately and in further detail within this chapter.

8.1. Areas of Sensitivity

The broader study site of 803 ha in extent (i.e. the entire site proposed for all three phases of the Kabi Vaalkop Solar PV Facility) was evaluated within the scoping study (Savannah Environmental, March 2012). No environmental fatal flaws were identified to be associated with the Kabi Vaalkop Solar PV Facility site. It was found that some sections of the study area appear to be in a mostly natural condition even though they are within an area historically affected by mining and construction of water pipelines and power lines across the site. From the project point of view, it was therefore recommended that infrastructure should only be placed with caution or mitigation measures must be implemented to minimise impacts in the areas perceived to be in a natural condition. No environmental fatal flaws were identified to be associated with the site. In addition, due to the nature of the site (its location within a mining area), no areas of potential high environmental sensitivity were identified at the scoping stage. However, as recommended, care has been taken in designing the different components of the facility during the EIA Phase.

These and other environmental issues have been assessed during the EIA Phase. No areas of high sensitivity were identified in the EIA phase (see figure 8.1 for the sensitivity map).

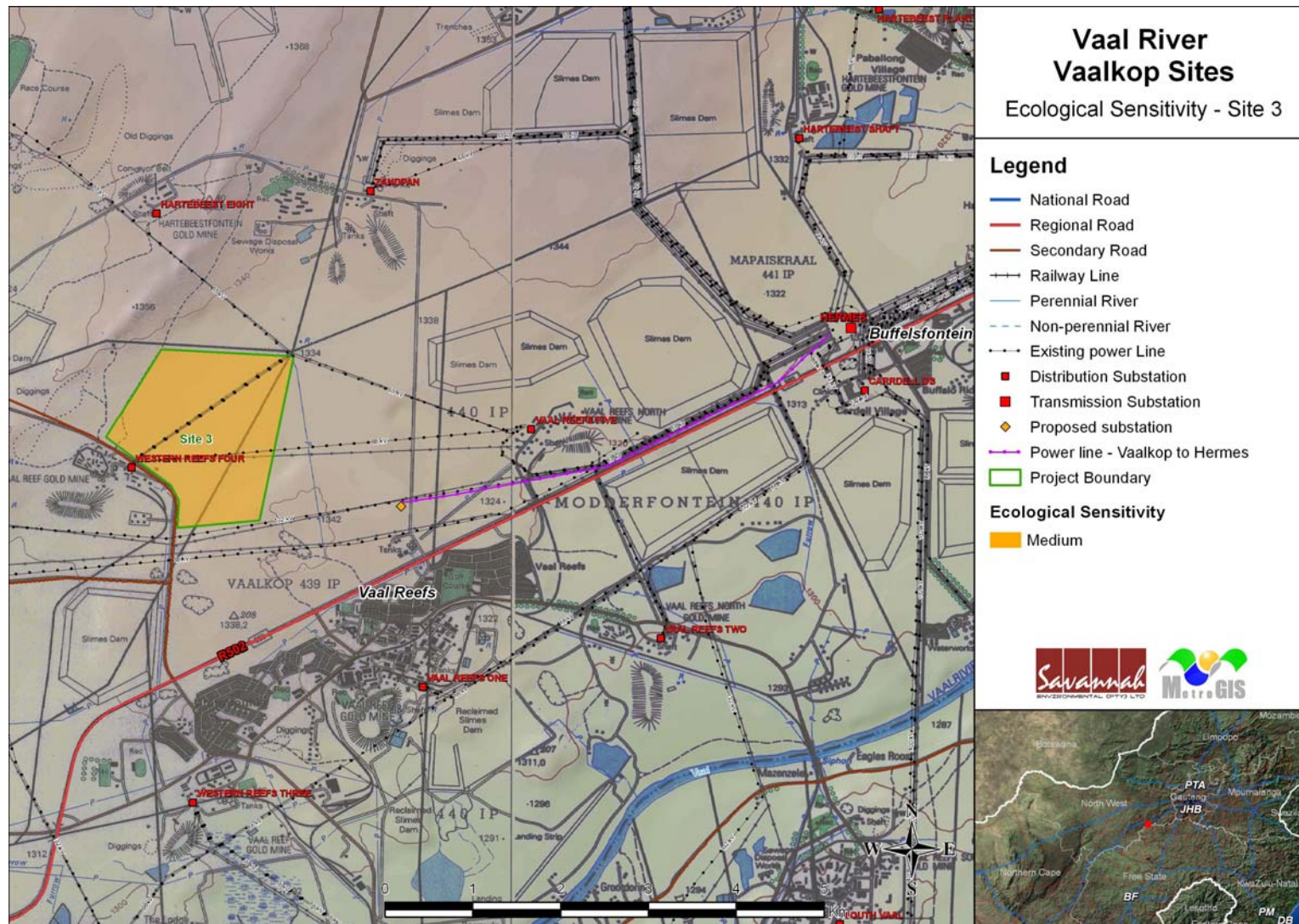


Figure 8.2: Sensitivity map illustrating ecologically sensitive areas across the site for the proposed development

8.2. Issues raised as part of the Public Participation Process

The opportunity to comment on the proposed project has been provided through the EIA process. This has included the use of stakeholder letters, a Background Information Document (BID), newspaper advertisements, site notices, and public and focus group meetings held in both the Scoping and EIA Phases. Comments raised to date in the process have included the following:

- » *Social* - employment opportunities and socio-economic impacts,

8.3. Methodology for the assessment of Potentially Significant Impacts

A broader site of approximately 281 ha (i.e. the entire site proposed **Kabi Vaalkop Solar III PV Facility**) was identified by the project developer for the purpose of establishing the proposed Kabi Vaalkop Solar III PV Facility. However, the development footprint will cover an area of approximately 281 ha in extent (for Kabi Vaalkop Solar II PV Facility only), which has been sited considering the identified environmental sensitivities and technical preferences. The site is likely to suffer disturbance, particularly during the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The Kabi Vaalkop Solar III PV Facility forms the third phase of the broader development proposed to be developed in phases under separate Special Purpose Vehicles (SPVs). Therefore, in order to accommodate the end-requirement that each SPV receive an Environmental Authorisation for their respective phase (i.e. in order to accommodate the requirements of the Request for Proposal (RfP) issued by the Department of Energy), the different phases were registered as separate projects to be assessed within one EIA report. The Kabi Vaalkop Solar III PV Facility was therefore issued with DEA reference number **12/12/20/2513/3**. The assessment of potential impacts that follows therefore only considers the impacts associated with Kabi Vaalkop Solar III PV Facility. The assessment of potential impacts associated with the other phases of the development (Kabi Vaalkop Solar I and II PV Facility) have been assessed in previous chapters while and the proposed substation and power line is assessed in the next chapter.

The assessment of potential impacts has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The revised Comments and Response Report included within Appendix D lists these issues and the responses given by the EAP during the Scoping Phase.

8.4. Assessment of the Potential Impacts associated with the Construction and Operation Phases of the proposed Kabi Vaalkop Solar III PV Facility

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed **Kabi Vaalkop Solar III PV Facility** on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.3.4). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

In order to assess the potential impacts associated with the proposed facility, it was necessary to quantify the extent of the permanently and temporarily affected areas. This includes the area required for the photovoltaic panels and associated infrastructure, as well as the linear infrastructure (i.e. access roads) (refer to the table below).

Permanent Component	Approximate extent (in ha)
PV panels including associated infrastructure	281
TOTAL (ha)	(a total area of 281 ha of 281 ha) ~ 100% of site

There will be no permanent laydown areas on site. As construction progresses different sections of the site will be used as temporary laydown areas. These areas will eventually be covered by the PV panels.

8.4.1 Potential Impacts on Ecology

Solar energy facilities require relatively large areas of land for placement of infrastructure. The major expected negative impact will be due to loss of habitat which may have direct or indirect impacts on individual organisms.

Potential impacts and the relative significance of the impacts are summarised below (refer to Appendix F for more details):

- » Loss or fragmentation of indigenous natural vegetation (terrestrial) – assessed to be of **medium** significance.
- » Loss of individuals of plant species of conservation concern - assessed to be of **medium** significance.
- » Impacts on threatened animals - assessed to be of **low** significance.
- » Loss of habitat for threatened animals - assessed to be of **low** significance.
- » Bird collisions with powerlines - assessed to be of **low** significance.

- » Establishment and spread of declared weeds and alien invader plants - assessed to be of **low** significance.

The overall impacts of the proposed project on ecology have been assessed as being of **low to medium** significance.

Impact tables summarising the significance of ecological impacts (with and without mitigation)

The proposed PV array is in an area of natural vegetation identified as being of medium sensitivity in the scoping phase. The impacts of potential concern are therefore on natural vegetation, habitat for threatened birds, protected plants and the potential establishment and spread of alien plants.

Nature: Loss or fragmentation of indigenous natural vegetation		
The study site falls within the Vaal Reefs Dolomite Sinkhole Woodland vegetation type which is classified as Vulnerable. Development of the solar facility will lead to loss of a significant proportion of the natural habitat on site.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	Medium (60)	Medium (55)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No, but can be limited in extent	
Mitigation: Avoid unnecessary impacts on natural vegetation surrounding infrastructure. Impacts should be contained, as much as possible, within the footprint of the array.		
Cumulative impacts: Alien invasions may lead to additional loss of habitat that could exacerbate this impact.		
Residual Impacts: Some loss of this vegetation type will occur, but this is insignificant relative to the total extent of the vegetation type.		

Nature: Impacts on plant species of conservation concern		
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. Due to the almost complete coverage of the site with proposed infrastructure, it is almost certain that two Declining plant species will be affected.		
	Without mitigation	With mitigation
Extent	local (1)	local (1)

Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	medium (32)	medium (32)
Status (positive or negative)	negative	negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some degree	
Mitigation: None.		
Cumulative impacts: Further impacts on these species due to mining activities		
Residual Impacts: None		

Nature: Loss of habitat for threatened animals

There is a low likelihood of any threatened or near threatened animal species being affected by the proposed project. Birds and other animals that could potentially occur on site are relatively mobile and will move away during construction. The footprint of the solar facility is moderate relative to the overall availability of habitat in the general area. The sites are also within a relatively disturbed landscape, with mining activity occurring in high density in surrounding areas. The potential impact on them due to a loss of a small area of habitat is therefore not considered to be serious.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible to some degree	Reversible to some degree
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not required	
Mitigation: None required		
Cumulative impacts: Further loss of habitat due to mining activities and the proposed facility		
Residual Impacts: None likely		

Nature: Establishment and spread of declared weeds and alien invader plants		
<p>There are very few concentrations of alien plants on site. Potential invasive weeds with a distribution centred on this part of the country include <i>Melia azeradach</i>, <i>Sesbania punicea</i>, <i>Opuntia ficus-indica</i>, <i>Opuntia imbricata</i>, <i>Prosopis glandulosa</i>, <i>Populus x canescens</i>, <i>Salix babylonica</i>, <i>Morus alba</i>, <i>Gleditsia triacanthos</i>, <i>Agave americana</i>, <i>Datura ferox</i>, <i>Datura stramonium</i>, <i>Arundo donax</i> and <i>Nicotiana glauca</i>. Construction of the solar facility will require the total clearing of vegetation within the footprint and this will probably be maintained as clear areas for the lifetime of the project. It is possible that there will be some invasion by aliens along the margins of disturbed areas. This could lead to general invasion of surrounding vegetation, especially along watercourses.</p>		
	Without mitigation	With mitigation
Extent	Site & surroundings (2)	Site & surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	medium (6)	minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (48)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation surrounding facility to a minimum » Rehabilitate disturbed areas as quickly as possible following completion of construction activities in an area » Do not translocate soil stockpiles from areas with alien plants » Control any alien plants immediately to avoid establishment of a soil seed bank that would take decades to remove » Establish an on-going monitoring programme to detect and quantify any aliens that may become established 		
Cumulative impacts:		
Other disturbance to parts of the site could lead to similar impacts.		
Residual Impacts:		
Will probably be very low if control measures are effectively applied		

Implications for Project Implementation

- » The development footprints will not impact on any ecological "no go" habitats or areas.
- » A permit will be required for the damage or removal of protected plant species.

8.4.2 Potential Impacts on Soils and Agricultural Potential

The most important direct impact is soil degradation including erosion from the area of construction activity. The erosion potential of the site is low due to the inherent well-drained nature of the soils (even the rocky and shallow soils) and impacts due to erosion are not expected. The most significant risks on the site are potentially the formation of sinkholes under conditions where stormwater ponds or where this water finds preferential flow paths into the underlying weathering and hard rock.

In terms of agricultural potential, the potential significance was rated as having a predominately low significance. The agricultural potential of the site is low due to the dominance of shallow and rocky soils. The fact that the site is underlain by dolomite means that the grazing potential is high but this type of land use will require adequate fencing and protection of livestock against theft as there is considerable traffic (vehicle and pedestrian) around and through the site. Although the inherent soil properties make the soils suitable for irrigation the underlying geology poses a risk in terms of sinkhole formation if that water regime in the landscape is altered. The conclusion is therefore that the site is generally of low agricultural potential with limitations regarding the land use options.

Impact tables summarising the significance of impacts on soils and agricultural potential (with and without mitigation)

Nature: Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure		
This activity entails the construction of buildings and other infrastructure with the associated disturbance of soils and existing land use.		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit footprint to the immediate development area. Rehabilitation possible after removal of infrastructure due to the low agricultural potential baseline of the development area.		

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

Nature: Disturbance of soils and impacts on existing land use due to construction of roads

This activity entails the construction of roads with the associated disturbance of soils and existing land use.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (32)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	

Mitigation:

» Limit footprint to the immediate development area and keep to existing roads as far as possible.

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

Nature: Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles

This activity entails the operation of vehicles on site and their associated impacts in terms of spillages of lubricants and petroleum products.

	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (20)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	No	No

Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Maintain vehicles, prevent and address spillages.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed.		
Residual Impacts:		
» None		

Nature: Impact of dust generation on site		
This activity entails the operation of vehicles on site and their associated dust generation. Generated dust can impact large areas depending on environmental and climatic conditions.		
	Without mitigation	With mitigation
Extent	Local (2)	Site (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (24)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit vehicle movement to absolute minimum, construct appropriate roads for access.		
Cumulative Impacts:		
» The cumulative impact of this activity will be small if managed but can have widespread impacts if ignored.		
Residual Impacts:		
» None		

Nature of Impact: Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.		
	Without mitigation	With mitigation
Extent	Low (1) – Site	Low (1) – Site
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance*	Low (32)	Low (32)
Status (positive or negative)	Negative	Negative

Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some extent	No
Mitigation: The loss of agricultural land is a long-term loss and there are no mitigation measures that can be put in place to combat this loss. In the case of low agriculture potential, soil impacts can be rehabilitated afterwards if infrastructure is removed.		
Cumulative impacts: Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.		
Residual Impacts: The loss of agricultural land is a long term loss. This loss extends to the post-construction phase. The agricultural potential for the area is very low though.		

Implications for Project Implementation

- » The proposed development of a photovoltaic facility on the site will not have large impacts due to the low agricultural potential of the area proposed for development.
- » It is imperative that adequate stormwater management measures be put in place as the underlying rock strata are prone to the formation of sinkholes.

8.4.3 Assessment of Potential Impacts on Heritage Sites

No sites of heritage significance were identified during the survey. However, due to the nature of some heritage resources, there is potential to expose and/ damage unknown artefacts during construction. The potential impact on surface and/or sub-surface artefacts is however rated to be low.

Impact tables summarising the significance of impacts on heritage resources (with and without mitigation)

Nature: Impacts on heritage resources During the construction and operational phases of the project various activities will impact on surfaces and/or subsurface which may destroy, damage, alter or remove from its original position archaeological and palaeontological structures or artefacts.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	Low (9)	8 (low)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible

Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: Although no sites were recorded during the field survey please note that if any archaeological or palaeontological material is uncovered during construction or operation a qualified archaeologist must be contacted to assess the remains. Mitigation measures can then be activated which will include a permit from SAHRA and documentation and sampling.		
Cumulative impacts: Cultural heritage sites are a non-renewable resource and any impacts on them is regarded as permanent and destructive.		
Residual Impacts: Destruction of heritage sites results in the depletion of known or unknown sites..		

Implications for Project Implementation

- » From an archaeological perspective, no sites of heritage significance were identified.
- » Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner so that an investigation and evaluation of the finds can be made.

8.4.4 Assessment of Potential Visual Impacts

The visibility analysis was undertaken from PV panel positions at an offset of 4 m above average ground level (i.e. the maximum height of the metal frames) in order to simulate a worst case scenario. The viewshed analysis indicates areas from which the PV panels would be visible (any number of panels with a minimum of one).

Potential visibility of Phase 3 shows the same pattern as Phase 2, but with remarkably less visual exposure to the west and the south. Affected areas are limited to the southern parts of Jouberton and Nooitgedacht farmstead, and a few farmsteads south of the Vaal River. It is noted that these farmsteads are 12 km and further away from the proposed solar energy facility development area.

It is evident from the above analysis that the different phases present similar patterns of possible visual impact, which may be magnified in terms of cumulative impacts.

Potential visual impact assessment –visual impact index

The results of analyses including visibility analysis / exposure (Figure 8.3); observer proximity to the facility (refer to Figure 8.4); viewer incidence / viewer perception; and visual absorption capacity (VAC) are merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in order to judge the severity of each impact (refer to Figure 8.5).

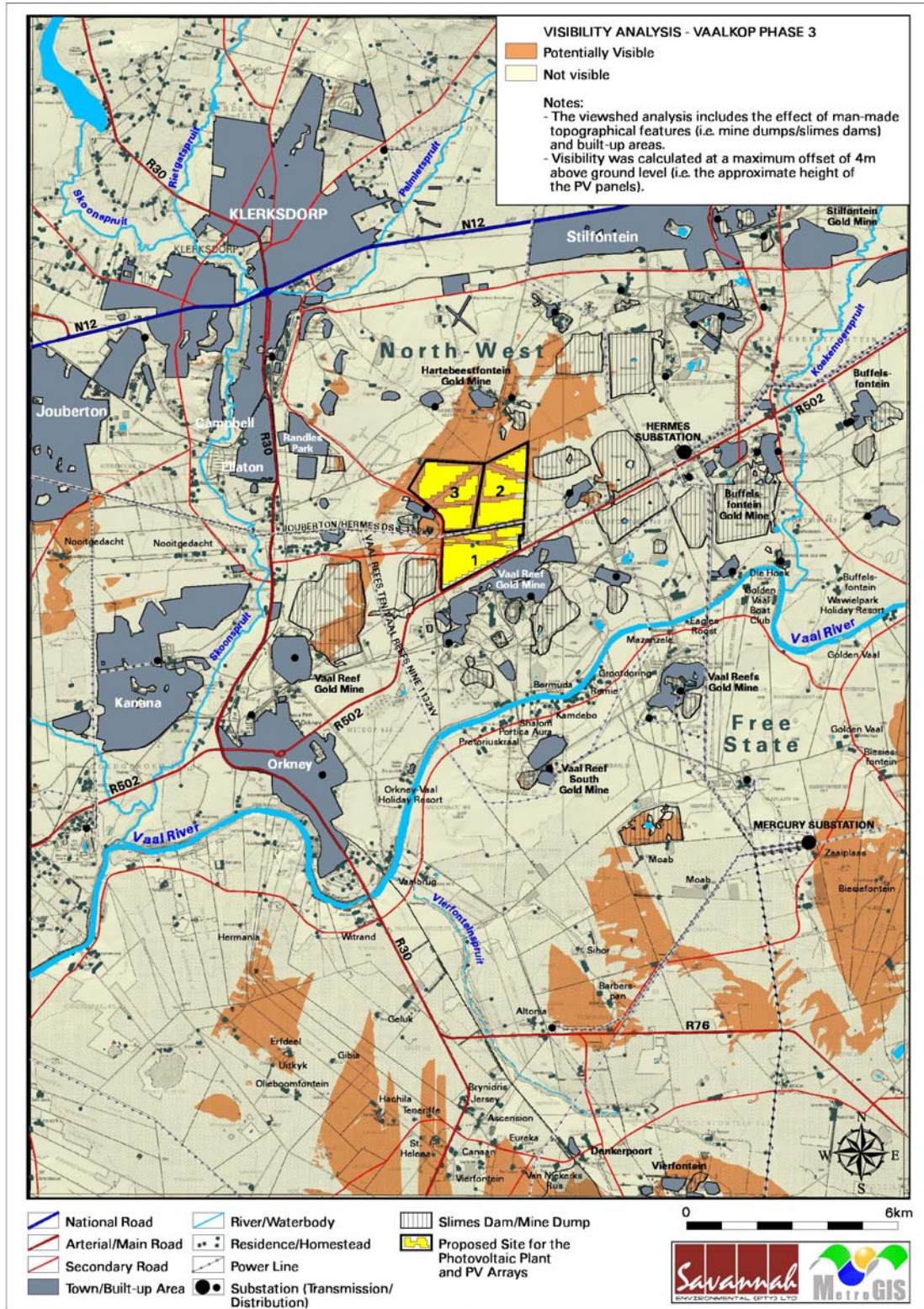


Figure 8.3: Potential visual exposure of the Kabi Vaalkop Solar III PV Facility
The potential visual exposure as illustrated is a theoretical representation of where visual receptors would be able to see the facility from. This does not take into consideration local factors such as vegetation, orientation of structures and views, and localised topographical features.

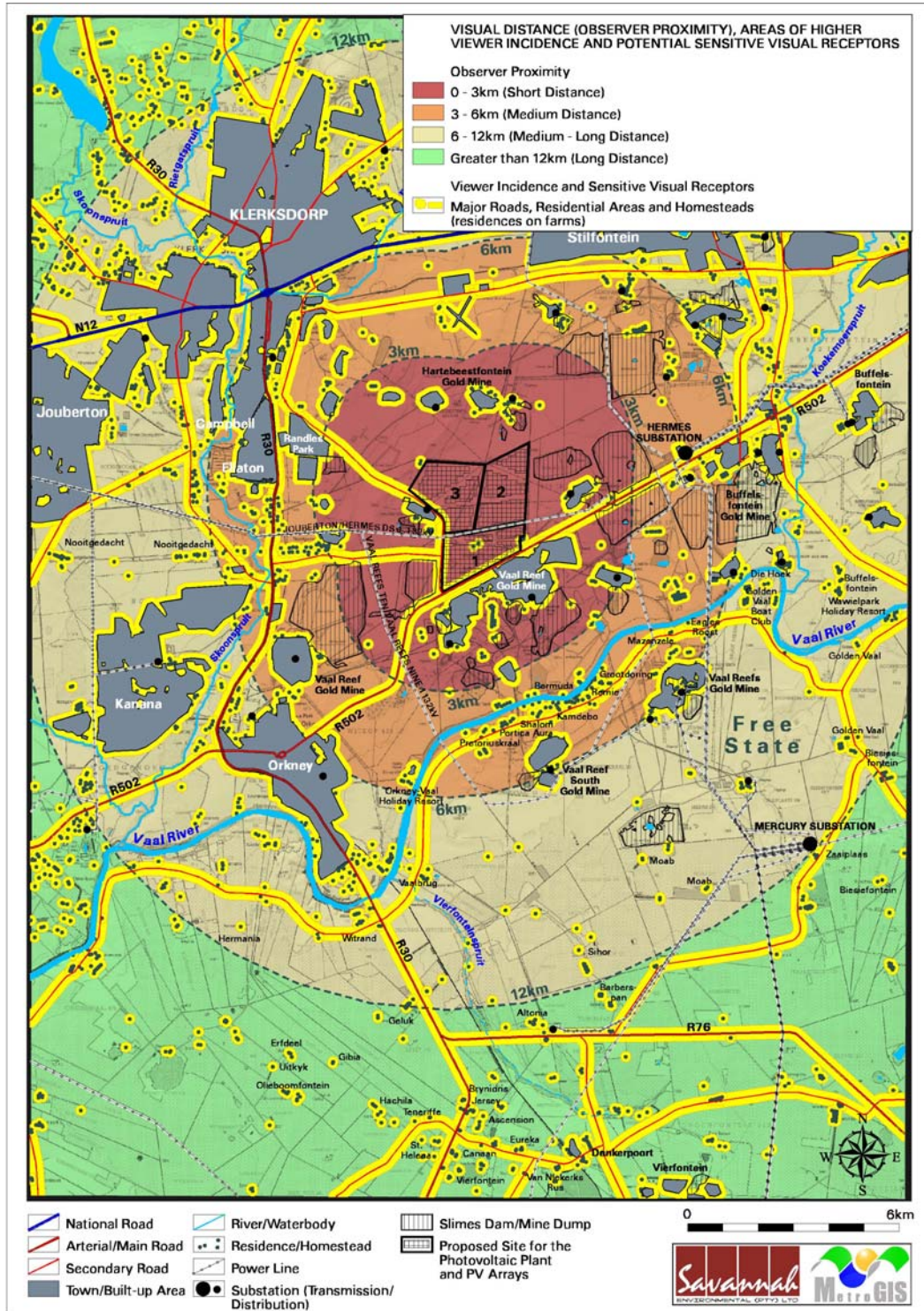


Figure 8.4: Observer Proximity, Areas of High Viewer Incidence and Potential Sensitive Visual Receptors

Results of the Visual Assessment

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed solar energy facility are displayed on **Figure 8.5**.

The quantitative analyses of possible impact have been integrated as a visual impact index. The sum of values assigned for each visual impact parameter is used to identify and visualise areas of high, moderate and low visual impact. Typically a location with close proximity to the proposed facility, a high viewer incidence, a predominantly negative perception and high visual exposure would have a high value on the index, thereby signifying a high visual impact.

The following is of relevance:

- » The proposed facility has a small area of moderate to high visual impact within 3km around the site. Affected areas of possible high sensitivity are the Vaal Reef Gold Mine village and the R502 arterial road.
- » Visual impact in the medium distance (i.e. between 3km and 6km), is low and will only affect isolated locations. The section of the R502 towards Orkney, as well as the eastern fringes of the town may, however, experience moderate visual impacts.
- » Beyond 6 km from the proposed solar PV development area the visual impact is expected to be very low, becoming negligible from 12 km.

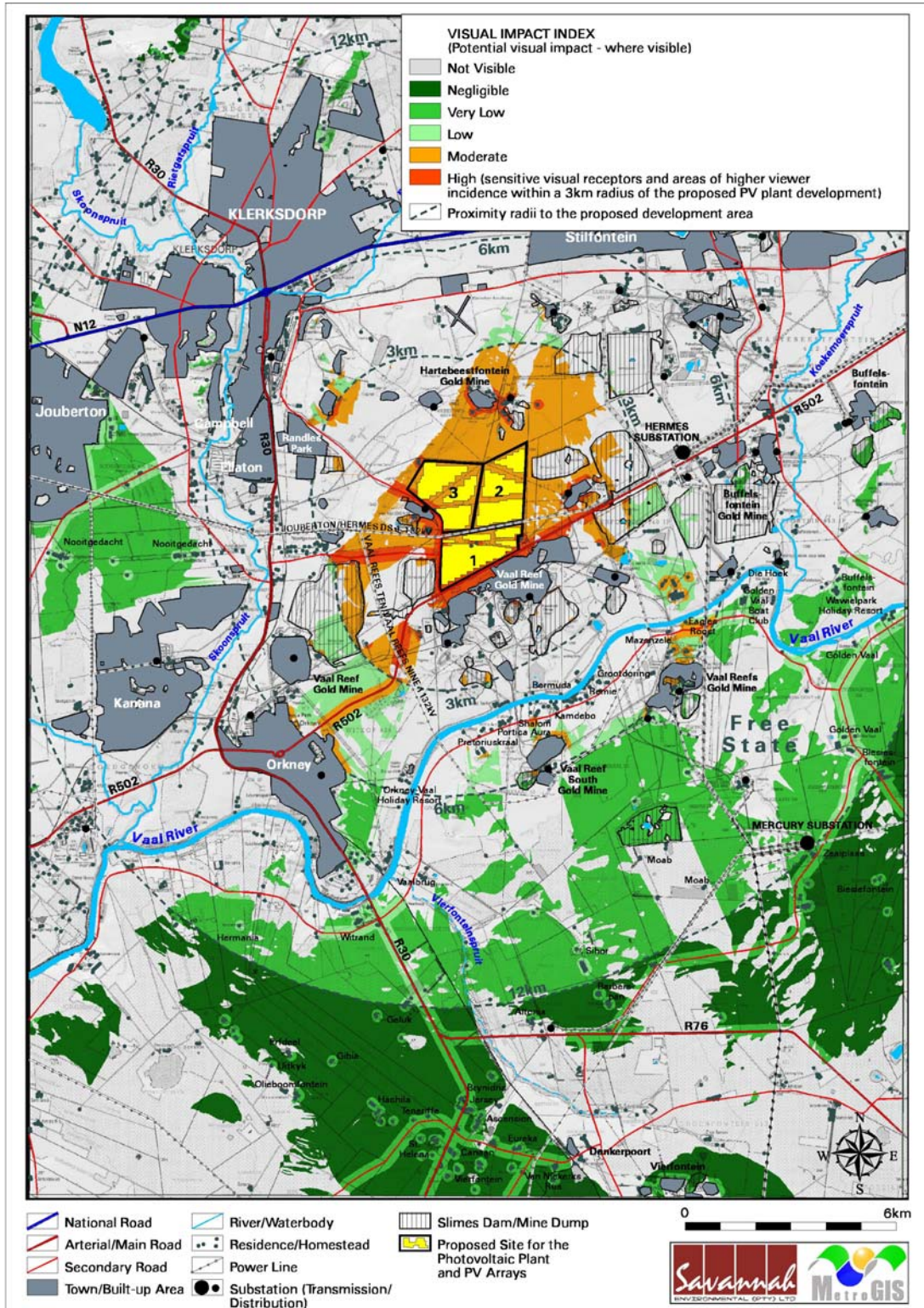


Figure 8.5: Visual impact index of the proposed Kabi Vaalkop Solar PV Facility

It should be noted that the visual impact index does not take into account visual clutter and structures that obstruct long distance views within built-up areas. For this reason it can be assumed that the solar energy facility would have a higher visual prominence from the outskirts of built up areas than from within these areas.

Impact tables summarising the significance of visual impacts (with and without mitigation)

Nature: Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.		
Potential visual impact on users of the R502 and secondary roads in close proximity of the proposed solar energy facility (i.e. within 3 km).		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (2)
Significance	Medium (24)	Medium (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Create a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on visual impact on towns and residential areas affected by visual exposure.		
It is envisaged that the facility may have a visual impact on residents of the Vaal Reef Gold Mine village, which is situated less than 500 m south of the proposed development area. Residents in the eastern parts of Orkney, approximately 6 km west of the proposed Phase 1 development area, may experience visual impacts.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (5)
Magnitude	Low (4)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Medium (24)	Medium (24)
Status (positive or negative)	Negative	Negative

Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Retain a buffer around Solar Arrays. » Consult an ecologist with regard to appropriate species and placement of additional vegetation cover to soften the visual effect of facility infrastructure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

Nature: Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.		
Visual impacts may occur to a small number of holiday resorts and leisure facilities along the Vaal river (e.g. Eagles Roost and the Golden Vaal Boat Club). Activities are mostly associated with water sport, such as fishing, sailing, skiing, etc, as is evident from a number of jetties along the river bank.		
	Without mitigation	With mitigation
Extent	Local (4)	N/A
Duration	Long term (4)	N/A
Magnitude	Minor (2)	N/A
Probability	Probable (3)	N/A
Significance	Low (30)	N/A
Status (positive or negative)	Negative	N/A
Reversibility	Yes	N/A
Irreplaceable loss of resources?	No	N/A
Can impacts be mitigated?	Yes	N/A
Mitigation:		
<ul style="list-style-type: none"> » None 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region. 		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain		

<i>Nature: Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility</i>		
	Without mitigation	With mitigation
<i>Extent</i>	Local (4)	Local (2)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Moderate (6)	Moderate (6)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	Medium (42)	Medium (42)
<i>Status (positive or negative)</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated?</i>	Yes	Yes
<i>Mitigation:</i> Planning & Operation: <ul style="list-style-type: none"> » Limiting mounting heights of lighting fixtures. » Making use of downward directional lighting. » Making use of minimum lumen or wattage in fixtures. » Making use of Low Pressure Sodium lighting or other types of low impact lighting. » Making use of motion detectors. This will allow the site to remain in relative darkness, until lighting is required for security or operational purposes. 		
<i>Cumulative impacts:</i> The existing urban areas in the region generate lighting impact at night. The impact of the Solar Energy Facility will contribute to a regional increase in lighting impact		
<i>Residual Impacts:</i> None. The visual impact will be removed after decommissioning, provided all sources of lighting are removed.		

<p><i>Nature: Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.</i></p> <p>Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc) play a significant role.</p> <p>A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. Specific aspects contributing to the sense of place of this region include un-impacted picturesque landscapes, dramatic mountains and isolation.</p> <p>The visual impact on the visual character of the landscape and sense of place of the region is expected to be of low significance, due to the large degree of transformation of the natural environment, and the establishment of visual impacts by virtue of urban and mining development. No mitigation is possible.</p>
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	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Improbable (2)
Significance	Low (24)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » None		
Cumulative impacts: The construction of PV panels will increase the cumulative visual impact of industrial and / or power related infrastructure (such as power lines and substations) within the region.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Implications for Project Implementation

- » The anticipated visual impacts of the facility will be low given the already existing infrastructure and the number of potential receptors around the site. Therefore, the visual impacts are not considered to be a fatal flaw for the proposed solar energy facility.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

8.4.5 Assessment of Potential Social Impacts

Construction of the proposed solar facility is labour-intensive and it is estimated that it would take place over a time-period of between 18 and 24-months. Activities associated with construction include:

- » Site establishment;
- » Perimeter fence construction;
- » Civil works, including concrete foundations, installation of steel footings, installation of trackers, mounting of PV modules on trackers, installation of electrical cabling; establishment of perimeter trenches, lighting and security,

- establishment of internal trenches for low voltage (LV) cabling to the PV modules and establishment of the inverter and transformer shelter foundations;
- » Electrical works, such as installation of medium voltage (MV) loop, installation of LV lines and auxiliary services, installation and connection of inverters and AC/DC boxes; and
 - » Installation of intrusion prevention system, PV module monitoring system and the weather station.

Each of the potential impacts associated with the construction phase is described and rated in the following impact tables.

Impact tables summarising the significance of social impacts during the construction and operational phases (with and without mitigation)

<i>Nature: Influx of jobseekers</i>		
Even though the developer's employment policy gives preference to the employment of local labour (especially with regards to lower and semi-skilled positions), the potential influx of 'outsiders' cannot be disregarded. The municipality indicated that a large influx of people attracted by infrastructure developments has not occurred in their area of jurisdiction in the past. However, the potential issue needs to be addressed pro-actively.		
	<i>Without Mitigation</i>	<i>With Enhancement</i>
<i>Extent</i>	Local (3)	Local (3)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Moderate (6)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (3)
<i>Significance</i>	Medium (33)	Medium (30)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	
<i>Enhancement :</i>		
<ul style="list-style-type: none"> » Stipulate the employment of local labour and enterprises in the tender documents to ensure the maximum use of a local labour force, especially with regards to lower and semi-skilled positions. Locals are, in this instance, defined as the nearest communities or people that reside within a 50 km radius from the project. » The developer, contractor and Community Liaison Officer (CLO) should formulate and implement a recruitment strategy to ensure that a suitable labour force is sourced. Tap into the LM's HR Department's skills database and do a skills audit. » The number and extent of the employment opportunities must be communicated to the 		

local community to avoid that unrealistic expectations be created.

- » Prior to construction commencing representatives of the local community, SAPS, the neighbouring residents and landowners should be informed of details of the construction company, the construction schedule and size of the workforce.
- » Due to safety and security risks, recruitment of temporary workers at the access to the construction site should not be allowed. The CLO should work in consultation with the Ward Councillors and community representatives to establish labour desks at the most suitable localities within the local communities where workers are sourced.
- » The area where workers are recruited should not be near schools or other sensitive receptors where a large influx of people could cause safety and security impacts for the residents and other sensitive receptors. Provide sufficient sanitation and refuse facilities.

Cumulative impacts:

- » The implementation of all five phases of the Kabi Vaalkop and other projects in the region would increase the likelihood of an influx of jobseekers, increasing the likelihood of conflict and would place pressure on the Local Municipality (LM) in terms of services and housing.
- » Should all four Kabi projects be implemented, it is expected that the available LM labour force would be able to provide the required local labour quota.

Residual impacts:

Should jobseekers remain in the LM area, an increase in the available workforce in the City of Motlasana would increase the local unemployment rate and place further pressure on the Municipality to provide jobs and services.

Nature: Employment opportunities and employment equity

Job creation is a positive impact during the construction phase. The construction team would consist of approximately 80% unskilled labour, 10% semi-skilled and 10% skilled temporary employees. Between 1 000 and 1 240 employment opportunities would emerge for each phase. The Department of Energy (DOE) requires that a minimum of 35% (with a target of 60%) of the project consist of local content and local labour would fulfil a large proportion of this quota.

	Without Mitigation	With Enhancement
Extent	Local (3)	Local municipal area (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly improbable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No

Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Work in collaboration with the LM's HR Department to do a skills audit of the available workforce and minimise the workers to be brought in from other areas. » The recruitment strategy should clearly reflect the percentage of workers to be sourced from the local labour force. » Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project. » A policy regarding employment equity of minority groups (women, youth and the disabled) should be formulated and implemented wherever possible 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Should construction of the Kabi Vaalkop projects and projects in the region overlap, 2 000 to 2 500 employment opportunities would emerge. » Should all phases of the Kabi Vaalkop Solar projects be approved, skills development would be advantageous for the LM. 		
Residual impacts:		
<ul style="list-style-type: none"> » Positive social and economic impacts for employees their families and the LM, as high unemployment is prevalent. » Skills development and capacity building that would enable the workers to seek employment on similar projects in future. 		

Nature: Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions

Although the exact level and type of skills training is not known at this stage, it could be expected that some form of skills development and capacity building would take place. The tasks to be performed by unskilled labour are those activities usually associated with a construction site and would typically not require prior experience and extensive training. However, the semi- and highly skilled positions (20% of the temporary labour force) would require a higher level of training and skills development, as the technologies to be implemented in this project are still relatively new and unfamiliar to the South African labour market.

	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (36)
Status	Positive	Positive
Reversibility	N/A	N/A

Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Do a skills audit of the local workforce to determine what skills are available locally, and to reduce the number of workers and specialists that are brought in from other areas. The recruitment process and strategy should include local businesses, enterprises and SMME's to allow them to become part of the tender process. » Co-ordinate with the LM and use the existing skills data base of the HR Department as a point of departure. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Should all four phases Kabi Solar project be approved and implemented, the collective skills development and capacity building will enhance the employability of the labour force with positive economic advantages for the LM. 		
Residual impacts:		
<ul style="list-style-type: none"> » Workers that obtain skills would be able to use it on similar construction projects in future. » Through skills development and government initiatives an environment could be established that enables upcoming SMME's to compete in the market, albeit on a smaller scale, such as the construction and erection of rooftop solar plants. 		

Nature: Impacts on the local economy		
Positive impacts and economic spin-offs on the local economy could manifest in a number of ways during the construction phase.		
	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly Probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (56)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » It is required from the developer to formulate a local procurement strategy to increase the local content of the project to the maximum 		
Cumulative impacts:		

- » Demand might exceed local supply forcing the developer to procure goods and services from the broader region and overseas

Residual impacts:

- » Materialisation of innovative economic opportunities in the local and district municipalities.
- » With careful and strategic planning small groups, SMME's and other small businesses could break into this market and gain from future renewable energy projects in the area.

Nature: Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)

Local procurement of goods and services could stimulate local and regional manufacturing, thereby increasing its contribution to the secondary sector over the short-term

	Without Enhancement	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	Low (20)	Medium (30)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Enhancement :

- » Formulation of a procurement strategy that maximises local content.
- » Government should identify upcoming and potential SMME's and strategically plan their involvement in the renewable energy sector.

Cumulative impacts:

- » New manufacturing industries that evolve to supply renewable energy products to the southern African markets

Residual impacts:

- » Less dependency on the primary sector.

Nature: Disruption in daily living and movement patterns

Approximately 1 500 trucks would travel on the local roads, over a 500-day construction period, to transport equipment and material such as the modules, trackers, cables, electrical frames, tubes and cement to the construction site. On-site construction vehicles and equipment would include excavators, trucks, graders, compaction equipment and

<p>cement trucks.</p> <p>Road safety issues and intrusion impacts could emerge for surrounding residents in Vaal Reef and road users on the R502 and Four Shaft / Randles Park Road (west of the site), causing short-term disruptions and safety hazards.</p>		
	<i>Without Mitigation</i>	<i>With Enhancement</i>
<i>Extent</i>	Study area (2)	Study area (2)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Moderate (6)	Low (4)
<i>Probability</i>	Probable (3)	Probable (3)
<i>Significance</i>	Medium (30)	Medium (24)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> » The verification of appropriate access roads to the sites has to take good visibility for motorists into consideration. » Put up clear signboards along the access roads indicating the accesses to the construction site. » Impose penalties for reckless drivers as a way to enforce compliance to traffic rules. » Limit heavy vehicle movement through residential areas (Orkney and Vaal Reefs), especially avoiding peak times. » Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and unroadworthy vehicles that could lead to accidents. » Display a contact number on the construction vehicles where motorists can report bad driving. » No heavy vehicles to be parked outside the designated construction area where it could obstruct motorists' views. » No informal traders to be allowed on or near the construction site. » Set up the labour desk in a secure and suitable area, preferably in the communities where workers are being sourced, to discourage the gathering of temporary workers at the gates of the construction site where it could affect road users. » Mitigation measures for intrusion impacts (noise, visual, air and dust pollution) are addressed in greater detail in the SIA report (refer to Section 5.12 of the SIA report, Appendix K). 		
<p><i>Cumulative impacts:</i></p> <ul style="list-style-type: none"> » New manufacturing industries that evolve to supply renewable energy products to the southern African markets 		
<p><i>Residual impacts:</i></p> <p>Even with the implementation of mitigation measures to soften the impacts, impacts on</p>		

living and movement patterns due to an increase in traffic and heavy vehicles is a reality. However, it would be of short duration, without major long-term consequences if the construction process is managed adequately.

Nature: Potential health risks for workers and surrounding communities due to poor management of the construction process

Health issues for surrounding residents and workers during the construction phase could manifest through air / dust pollution, poor management of the construction process resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. The most vulnerable people are the elderly, the very young and those with existing heart and lung conditions. Detrimental health impacts are not confined to the construction site and could affect the health of people living and working in the surrounding area.

	<i>Without Enhancement</i>	<i>With Enhancement</i>
<i>Extent</i>	Municipal areal (3)	Municipal area (3)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (2)
<i>Significance</i>	Low (27)	Low (18)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	

Mitigation:

- » The contractor should recognize his responsibility towards social / soft issues and should embark on an HIV/AIDS awareness campaign amongst the workers. A strategy to appoint a local labour force as far as possible will limit the spread of diseases.
- » Appoint a Health and Safety Officer and comply with the Occupational Health and Safety Management System's requirements. The contact details of this person should be made available to the local community and procedures to lodge complaints set out.
- » Provide adequate drinking water and appropriate sanitation facilities to the workers. Sanitation facilities to be cleaned and serviced on a regular basis.
- » Dispose of rubble and other household waste appropriately and on a regular basis.
- » Identify the waste types that are likely to be produced and aim to reduce the amount of waste as much as possible, through identifying routes to reuse or recycle materials. Label all waste storage and skips, detailing the type of waste.
- » Store any materials away from sensitive locations in fenced off areas.
- » Spray gravel / sand surfaces regularly with water to suppress dust.
- » Avoid the establishment of a construction camp to house workers on the site.
- » Security guards should be the only people allowed to stay overnight on the site. Their accommodation and facilities should comply with health and safety standards.

- » Regularly inspect the site area for spillages and clean spillages using agreed wet handling methods.
- » Inform the LM and emergency services if harmful substances are spilled.

Cumulative impacts:

- » The construction of the Kabi Vaalkop Solar PV facility and other renewable energy projects in the area would increase the likelihood of an influx of jobseekers. Dissolute sexual behaviour, temporary relationships with local women and unwanted pregnancies could increase.
- » An influx of jobseekers is associated with the spreading of diseases and HIV/AIDS.
- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.

Residual impacts:

- » Impacts on health care facilities and services and an increasing burden for the Local Municipality.
- » Employees that do not attend work on a regular basis and a high staff turnover, with financial and administrative implications for the Contractor.

Nature: Impacts on the 'sense of place'

Intrusion impacts (noise, visual and dust pollution) and safety and security issues could impact on the 'sense of place' as experienced by residents, tourists and visitors in the area. The site is surrounded by old mining land and the Vaal Reefs residential area is located south of the site. The R502 could act as a buffer to soften potential intrusion impacts. No sensitive receptors are in close proximity to the site.

	Without Enhancement	With Enhancement
Extent	Study area (2)	Study area (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (12)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Mitigation:

- » Nightlights (security lights) should be directed away from residences and the surrounding roads to limit nuisances and safety hazards for motorists.

Cumulative impacts:

- » Possible devaluation of property prices if the 'sense of place' of the local community is negatively affected by numerous construction developments

Residual impacts:

- » None

Impact tables summarising the significance of social impacts during the operational phase of the facility

Nature: Job creation during the operational phase of the project		
	Without Enhancement	With Enhancement¹⁶
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: The significance of the impact will increase if skilled local operators as well as local employees are sourced to perform the duties associated with the operational phase.		
Cumulative impacts: <ul style="list-style-type: none"> » An increase in employment opportunities with economic advantages for the local economy and workforce » New local service providers that emerge with the increase of opportunities. » Increasing competition amongst service providers, resulting in a more favourable pricing structure for services. » Skills development and capacity building of the local workforce. » It would increasingly become more difficult to fill higher and semi-skilled positions with locals if other renewable energy projects in the area are also implemented 		
Residual impacts: <ul style="list-style-type: none"> » An increase in salaries and spending power with economic advantages for individual families and the local economy. » Skills development and capacity building 		

Nature: Skills development and capacity building during the operational phase
 Skills development and capacity building would result as on-site training is likely. Also, skilled local operators responsible for the maintenance of the plant would be trained in Spain

¹⁶ This assumes the establishment of some form of Community Trust.

on existing similar plants.		
An important outcome of skills development and training is that employees would be in a position to source work on similar plants once their contracts expire. A skilled labour force is more likely to find employment, resulting in economic advantages for the local economy over the long-term.		
	Without Enhancement	With Enhancement¹⁷
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Source locals for employment positions as far as possible, to enhance the advantages of skills development and training for the LM area. » Implement measures (bonuses or other financial benefits) for highly skilled staff to minimize the negative impacts associated with a high staff turnover. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Trained employees could leave and source work at similar plants that are being constructed in other parts of the country. The developer would need to train additional employees, resulting in time and money losses 		
Residual impacts:		
<ul style="list-style-type: none"> » Economic advantages for the local economy, as the labour force are better skilled, thus affecting employability in a positive way 		

Nature: <i>Impacts associated with a change in land use</i>		
The project site is located on land that belongs to AngloGold Ashanti and a lease agreement with the developer will be concluded at a later stage. At present the majority of the site is vacant and fallow and is not suitable for agriculture or other developments, such as township establishment. The change in land use is therefore regarded as a positive impact over the long-term, as the establishment of a renewable energy project is one of the few viable uses for the subject site.		
	Without Enhancement	With Enhancement¹⁸

¹⁷ This assumes the establishment of some form of Community Trust

Extent	Site (1)	Site (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (35)	Medium (35)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement: No enhancement is required.		
Cumulative impacts: None		
Residual impacts: Once decommissioned, the land zoning will be restored to the current zoning and rehabilitation of the site would be required.		

Nature: <i>Impacts on the 'sense of place' for the local community</i>		
Extensive dust, noise and traffic impacts during the operational phase are highly unlikely, although visual impacts and safety and security issues, should they occur, has the potential to impact on the local community's 'sense of place', specifically residents in Vaal Reefs, as there are no other sensitive receptors in the direct vicinity of the site.		
	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Low (16)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	

¹⁸ This assumes the establishment of some form of Community Trust.

Enhancement:

- » Apply all the mitigation measures as proposed by the Visual Impact Assessment.
- » Ensure that residents in Vaal Reefs are aware of the procedures to lodge complaints.
- » Implement all safety and security measures, as proposed by the developer, to combat potential crime..

Cumulative impacts:

An increase in criminal activities could place additional pressure on the local SAPS and affect service delivery.

Residual impacts:

Hostility towards the project and developer.

Nature: *Security related impacts during the operational phase*

An increase in activity in and around the proposed development during the operational phase could increase security related concerns for the residential area of Vaal Reefs. Potential theft, vandalism and related criminal activities at the Solar PV facilities are also a concern for the Developer.

	Without Mitigation	With Mitigation
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Medium (30)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	

Enhancement:

- » Extend the benefits of the project to the local community by employing local people as far as possible, allocating a percentage of the turnover of the project for community and socio-economic upliftment projects and allocate shares in the project to a community Trust or similar entity.
- » Implement all the proposed security measures, such as 24-hour security and access control, electric fencing, CCTV cameras and night lights where possible.
- » Maintain good relationships with neighbours, discuss security issues and measures and make the contact details of the Operations Manager available should complaints be lodged

Cumulative impacts:

Increasing activities and potential security concerns with the establishment of additional solar

plants in and around the study area
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Impacts on the 'sense of place' for the local community. » Hostility between the local community and the developer if security concerns are not addressed adequately

Nature: <i>Impacts of the proposed facility on national electricity supply and positive impacts on the environment</i>		
	Without Enhancement	With Enhancement
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	High (75)	High (75)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement: Not required</p>		
<p>Cumulative impacts: Eskom's intention to purchase 3 750MW of electricity from renewable energy projects over the next few years, would contribute significantly to environmental advantages.</p>		
<p>Residual impacts: The increase of electricity tariffs by Eskom to accommodate renewable energy projects.</p>		

Implications for Project Implementation

- » The findings of the SIA undertaken for the proposed **Kabi Vaalkop Solar III PV Facility** indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project.
- » Potential negative impacts can be reduced to low significance.

8.5. Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that, in itself, may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area¹⁹. The subsequent phases of the proposed development will add to the cumulative impacts of the proposed development.

These proposed developments, in addition to the already existing infrastructure (i.e. the Hermes and associated power lines, slimes dams and mine shafts), will increase the cumulative visual impact of industrial type infrastructure within the region. The cumulative impacts in this regard will be of low significance as the area is industrial in its nature. From an ecological point of view uncontrolled soil erosion from all the proposed phases may lead to establishment of alien invasive plants and loss of habitat for indigenous natural vegetation. From an agricultural potential point of view the cumulative impact of this activity will be small as it is constructed on land with low agricultural potential. These impact can however be mitigated if mitigation measures as recommended in this report and attached EMP are implemented.

The negative cumulative impacts of the proposed developments are offset by the positive cumulative impacts. The proposed developments (all phases) have the potential to result in significant positive cumulative impacts, specifically with regards to employment creation. The proposed developments will reduce the pressure on the electricity grid in the North West Province by injecting an additional 225 MW of energy.

Cumulative effects have been considered within the detailed specialist studies, where applicable (refer to Appendices F – K).

¹⁹ Definition as provided by DEA in the EIA Regulations.

ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED VAALKOP SUBSTATION AND POWER LINE: CHAPTER 9

This chapter serves to determine the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) associated with the development of the proposed **Vaalkop Substation and power line** to connect to the Eskom grid, as well as for all of the facility's components.

The **Vaalkop Substation and power line** to connect to the Eskom grid will be comprised of the following:

- » A new **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new **overhead 132 kV power line** approximately 6 km long (with a servitude of 31 m wide) to connect directly to the Eskom Hermes Substation via the new on site substation. The power line will follow an existing corridor of 5 power lines feeding into Hermes Substation. The corridor of the new power line and the existing power lines becomes wedged between an old slimes dam and the R502 arterial road (refer to Figure 9.1). The new power line is to be used to evacuate the power from the Kabi Vaalkop Solar I and Kabi Vaalkop Solar III PV facilities.

The development of the Vaalkop Substation and power line will comprise the following phases:

- » *Pre-Construction and Construction* – will include preconstruction surveys; site preparation; establishment of the access road, power line servitudes, construction camps, laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan.
- » *Operation* – will include operation of the substation and power line.
- » *Decommissioning* – depending on the economic viability of the associated PV plants, the length of the operational phase of the power line and substation may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately and in further detail within this chapter.

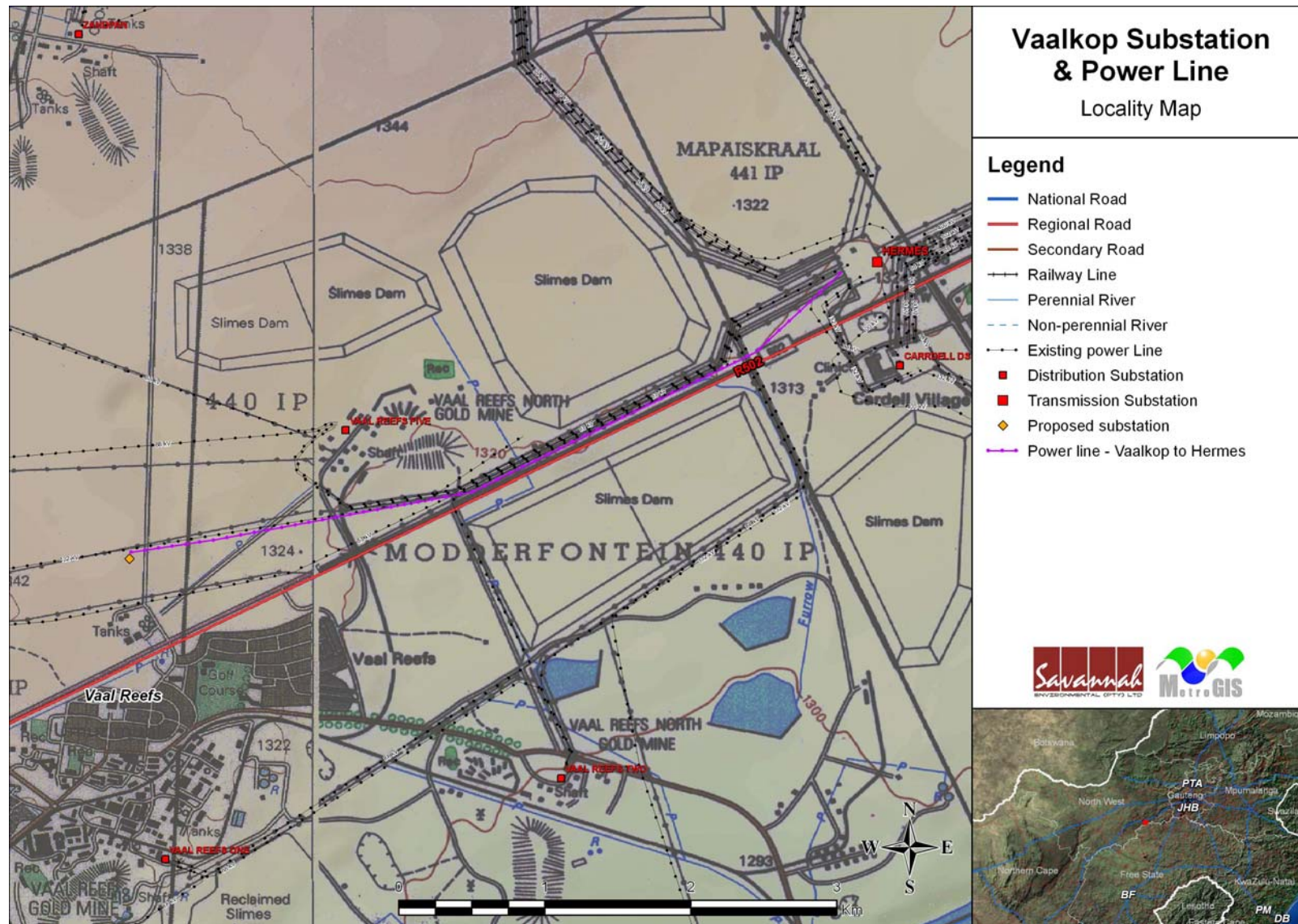


Figure 9.1: Locality map indicating the location of the Vaalkop Substation and power line corridor

9.1. Areas of Sensitivity

A broader study area approximately 268 ha in extent (i.e. the entire site proposed Valkop substation) as well as the power line corridor were evaluated within the scoping study (Savannah Environmental, March 2012). No environmental fatal flaws were identified to be associated with the substation site and the power line route. It was found that some sections of the study area proposed for the substation appear to be in a mostly natural condition even though they are within an area historically affected by mining, construction of water pipelines and power lines. Therefore, from the project point of view, it was recommended that substation and power line infrastructure be placed with caution and/or mitigation measures be implemented to minimise impacts in the areas perceived to be in natural condition.

In addition, due to the nature of the site (its location within a mining area), no areas of potential high environmental sensitivity were identified at the scoping stage. However, as recommended, care has been taken in designing the different components of the facility during the EIA Phase. In terms of the social environment, potential issues identified through the scoping study include:

- » *Social and visual impacts* - from a social (security issues), visual (visibility of the substation and power line), health and safety (operation risks such as fire due to presence of infrastructure) and economic (job creation although limited) perspective, impacts could occur on people in close proximity to the substation and power line.

These and other environmental issues have been assessed during the EIA Phase. No areas of high sensitivity were identified in the EIA phase along the power line corridor and on the substation location.

9.2. Issues raised as part of the Public Participation Process

The opportunity to comment on the proposed project has been provided through the EIA process. This has included the use of stakeholder letters, a Background Information Document (BID), newspaper advertisements, site notices, and public and focus group meetings held in both the Scoping and EIA Phases. Comments raised to date in the process have included the following:

- » *Social* - employment opportunities and socio-economic impacts

9.3. Methodology for the assessment of Potentially Significant Impacts

A broader area of 268 ha in extent (i.e. the entire site proposed Vaalkop Substation) was identified by the project developer for the purpose of establishing the proposed Vaalkop Substation. However, the development footprint of the substation will cover an area of approximately 1 ha in extent (for Vaalkop Substation only), which has been sited considering the identified environmental sensitivities and technical preferences. A corridor from the on-site substation towards the Hermes Substation was also considered for the establishment of the proposed 132 kV power line. The servitude of this power line will be approximately 18.6 ha (6 000 m x 31 m). However, only an area approximately 4.8 ha (6 000 m X 8 m) will be disturbed during the construction of the power line.

The Vaalkop Substation and power line are considered as the fourth aspect of the broader development proposed to be developed under separate Special Purpose Vehicles (SPVs). Therefore, in order to accommodate the end-requirement that each SPV receive an Environmental Authorisation for their respective phase (i.e. in order to accommodate the requirements of the Request for Proposal (RfP) issued by the Department of Energy), the different phases were registered as separate projects to be assessed within one EIA report. The Vaalkop Substation and power line was therefore issued with DEA reference number **12/12/20/2513/4**. The assessment of potential impacts that follows therefore only considers the impacts associated with Vaalkop Substation and power line. The assessment of potential impacts associated with the other phases of the development (Kabi Vaalkop Solar I-III PV Facility) has been considered in Chapter 6 – 8 of this report respectively.

The assessment of potential impacts has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The revised Comments and Response Report included within Appendix D lists these issues and the responses given by the EAP during the Scoping Phase.

9.4. Assessment of the Potential Impacts associated with the Construction and Operation Phases of the proposed Vaalkop Substation and power line

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed **Vaalkop Substation and power line** on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.3.4). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

9.4.1 Potential Impacts on Ecology

The natural vegetation occupying the site proposed for the Vaalkop Substation is considered to have moderately high conservation status. Local factors that lead to parts of the broader study area being classified as sensitive 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. The impacts of potential concern are therefore on natural vegetation, habitat for threatened birds, protected plants and the potential establishment and spread of alien plants. However, the proposed substation will only cover a footprint of 1 ha. Therefore, the potential impact of the substation on ecology will be low, especially when compared to the full facility.

The power line route is proposed to follow an existing corridor of 5 power lines feeding into Hermes Substation. The corridor of the new power line and the existing power lines becomes wedged between an old slimes dam and the R502 arterial road. The natural vegetation within this corridor has already undergone some level of disturbance. The potential impact on ecology will therefore be low to negligible.

Potential impacts and the relative significance of the impacts are summarised in the tables below (refer to Appendix F for more details):

Impact tables summarising the significance of ecological impacts (with and without mitigation)

Nature: Loss or fragmentation of indigenous natural vegetation		
The study site falls within the Vaal Reefs Dolomite Sinkhole Woodland vegetation type which is classified as Vulnerable. Development of the substation and power line will lead to a very small loss of the natural habitat on site		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No, but can be limited in extent	
Mitigation:		
Avoid unnecessary impacts on natural vegetation surrounding infrastructure.		

Cumulative impacts:

Alien invasions may lead to additional loss of habitat that could exacerbate this impact.

Residual Impacts:

Some loss of this vegetation type will occur, but this is insignificant relative to the total extent of the vegetation type.

Nature: Impacts on plant species of conservation concern

Two Declining plant species are known to occur on the greater site proposed for the Vaalkop Substation. In addition, there is the potential for one Near threatened and two more Declining plant species to occur on site. Due to the almost complete coverage of the site with proposed infrastructure, it is almost certain that two Declining plant species will be affected.

	Without mitigation	With mitigation
Extent	local (1)	local (1)
Duration	Permanent (5)	Long term (4)
Magnitude	minor (2)	minor (2)
Probability	Probable (3)	probable (2)
Significance	Low (24)	Low (16)
Status (positive or negative)	negative	negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	To some degree	

Mitigation:

The foot print of the substation to be surveyed by an ecologist before construction.

Cumulative impacts:

None.

Residual Impacts:

None

Nature: Loss of habitat for threatened animals

There is a low likelihood of any threatened or near threatened animal species being affected by the proposed project. Birds and other animals that could potentially occur on site are relatively mobile and will move away during construction. The footprint of the substation and power line is moderate relative to the overall availability of habitat in the general area. The sites are also within a relatively disturbed landscape, with mining activity occurring in high density in surrounding areas. The potential impact on them due to a loss of a small area of habitat is therefore not considered to be serious.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	minor (2)	minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (16)	Low (16)

Status (positive or negative)	Negative	Negative
Reversibility	Reversible to some degree	Reversible to some degree
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Not required	
Mitigation: None required		
Cumulative impacts: None		
Residual Impacts: None likely		

Nature: Establishment and spread of declared weeds and alien invader plants

There are very few concentrations of alien plants on site. 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*. Construction of the substation and power line will require the clearing of vegetation and this will probably be maintained as clear areas for the lifetime of the project. It is possible that there will be some invasion by aliens along the margins of disturbed areas. This could lead to general invasion of surrounding vegetation, especially along watercourses.

	Without mitigation	With mitigation
Extent	Site & surroundings (2)	Site & surroundings (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	medium (6)	minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium (48)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Keep disturbance of indigenous vegetation surrounding facility to a minimum » Rehabilitate disturbed areas as quickly as possible following completion of construction activities in an area » Do not translocate soil stockpiles from areas with alien plants » Control any alien plants immediately to avoid establishment of a soil seed bank that would take decades to remove » Establish an on-going monitoring programme to detect and quantify any aliens that may become established 		
Cumulative impacts:		

Other disturbance to parts of the site could lead to similar impacts.

Residual Impacts:

Will probably be very low if control measures are effectively applied

Nature: Bird collisions with overhead power lines

There is a moderate likelihood of threatened or near threatened bird species occurring along the proposed overhead power line route. The potential impact on them due to collisions is therefore not considered to be likely to be of high frequency, but could potentially have a serious impact on some species

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	low (4)	low (4)
Probability	probable (3)	improbable (2)
Significance	Low (27)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible to some degree	Reversible to some degree
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some degree	
Mitigation: Devices to make lines more visible must be attached to overhead power lines.		
Cumulative impacts: None		
Residual Impacts: None likely		

Implications for Project Implementation

- » The development footprints will not impact on any ecological “no go” habitats or areas.
- » A permit will be required for the damage or removal of protected plant species.
- » Final walk through survey will be required for the substation location and power line route.

9.4.2 Potential Impacts on Soils and Agricultural Potential

The most important direct impact is soil degradation including erosion from the area of construction activity. The erosion potential of the site is low due to the inherent well-drained nature of the soils (even the rocky and shallow soils) and impacts due to erosion are not expected. The most significant risks on the site are potentially the formation of sinkholes under conditions where storm water ponds or where this water finds preferential flow paths into the underlying weathering and hard rock.

In terms of agricultural potential, the potential significance was rated as having a predominately low significance. The agricultural potential of the site is low due to the dominance of shallow and rocky soils. The fact that the site is underlain by dolomite means that the grazing potential is high but this type of land use will require adequate fencing and protection of livestock against theft as there is considerable traffic (vehicle and pedestrian) around and through the site. Although the inherent soil properties make the soils suitable for irrigation the underlying geology poses a risk in terms of sinkhole formation if that water regime in the landscape is altered. The conclusion is therefore that the site is generally of low agricultural potential with limitations regarding the land use options.

Impact tables summarising the significance of impacts on soils and agricultural potential (with and without mitigation)

Nature: Disturbance of soils and impacts on existing land use due to construction of substation and power line		
The construction of the substation and power line will create some level of soil disturbance.		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Probable (2)
Significance	Medium (32)	Low (16)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes,	
Can impacts be mitigated?	Yes	
Mitigation:		
» Limit footprint to the immediate development area. Rehabilitation possible after removal of infrastructure due to the low agricultural potential baseline of the development area.		

<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small as it is constructed on land with low agricultural potential.</p>
<p>Residual Impacts:</p> <p>» None</p>

<p>Nature: Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles</p> <p>There is a potential for hydrocarbon contamination of soils during construction.</p>		
	Without mitigation	With mitigation
Extent	Site (1)	Site (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (20)	Low (10)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	
<p>Mitigation:</p> <p>» Maintain vehicles, prevent and address spillages.</p>		
<p>Cumulative Impacts:</p> <p>» The cumulative impact of this activity will be small if managed.</p>		
<p>Residual Impacts:</p> <p>» None</p>		

<p>Nature: Impact of dust generation on site</p> <p>This activity entails the operation of vehicles on site and their associated dust generation. Generated dust can impact large areas depending on environmental and climatic conditions.</p>		
	Without mitigation	With mitigation
Extent	Local (2)	Site (2)
Duration	Short-term (2)	Short-term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Low (24)	Low (12)
Status (positive or negative)	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated?	Yes	

<p>Mitigation:</p> <ul style="list-style-type: none"> » Limit vehicle movement to absolute minimum, construct appropriate roads for access.
<p>Cumulative Impacts:</p> <ul style="list-style-type: none"> » The cumulative impact of this activity will be small if managed but can have widespread impacts if ignored.
<p>Residual Impacts:</p> <ul style="list-style-type: none"> » None

Nature of Impact: Loss of agricultural potential and land capability owing to the construction of the substation and power line.

	Without mitigation	With mitigation
Extent	Low (1) – Site	Low (1) – Site
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (2)
Probability	Highly probable (4)	Highly probable (4)
Significance*	32 (Low)	32 (Low)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	To some extent	No

Mitigation:

The loss of agricultural land is a long-term loss and there are no mitigation measures that can be put in place to combat this loss. In the case of low agriculture potential, soil impacts can be rehabilitated afterwards if infrastructure is removed.

Cumulative impacts:

Soil erosion may arise owing to increased surface water runoff. Adequate management and erosion control measures should be implemented.

Residual Impacts:

The loss of agricultural land is a long term loss. This loss extends to the post-construction phase. The agricultural potential for the area is very low though.

Implications for Project Implementation

- » The proposed development of the substation and power line on the site will not have large impacts due to the low agricultural potential of the area proposed for development.
- » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes.

9.4.3 Assessment of Potential Impacts on Heritage and Palaeontological resources

No sites of heritage significance were identified during the survey. However, due to the nature of some heritage resources, there is potential to expose and/ damage unknown artefacts during construction. The potential impact on surface and/or sub-surface artefacts is however rated to be low.

Impact tables summarising the significance of impacts on heritage resources (with and without mitigation)

Nature: Impacts on heritage and Palaeontological resources		
During the construction and operational phases of the project various activities will impact on surfaces and/or subsurface which may destroy, damage, alter or remove from its original position archaeological and palaeontological structures or artefacts.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (2)	Low (1)
Probability	Probable (1)	Probable (1)
Significance	Low (9)	Low (7)
Status (positive or negative)	Negative	Negative
Reversibility	Not reversible	Not reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
Although no sites were recorded during the field survey please note that if any archaeological or palaeontological material is uncovered during construction or operation a qualified archaeologist must be contacted to assess the remains. Mitigation measures can then be activated which will include a permit from SAHRA and documentation and sampling.		
Cumulative impacts:		
Cultural heritage sites are a non-renewable resource and any impacts on them is regarded as permanent and destructive.		
Residual Impacts: Destruction of heritage sites results in the depletion of known or unknown sites..		

Implications for Project Implementation

- » From an archaeological perspective, no sites of heritage significance were identified.
- » Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to

a suitably qualified heritage practitioner so that an investigation and evaluation of the finds can be made.

9.4.4 Assessment of Potential Visual Impacts

An on-site substation will be constructed to feed power from all three phases into two power lines (i.e. the existing Jouberton – Hermes DS 1 132 kV power line, and a new overhead 132 kV line). Potential visual exposure of the substation falls within the viewshed of the PV panels as described in the previous chapters. The visual exposure of the substation will therefore be masked by the PV panels of the proposed PV facility.

A new overhead 132 kV power line will be constructed to connect directly to the Eskom Hermes Substation via the new substation. This line will be used by the Kabi Vaalkop Solar I PV Facility and the Kabi Vaalkop Solar III PV Facility. The line will follow an existing corridor of power lines feeding into Hermes Substation from the west. Following the path of the existing Jouberton / Hermes DS 1 132 kV line, the proposed new power line will join a corridor of 5 existing power lines that provide electricity to several mines in the area. This corridor becomes wedged between an old slimes dam and the R502 arterial road.

Visual exposure of the proposed lines is effectively screened by slimes dams and waste rock dumps occurring in the area. Consequently the viewshed for the proposed new power line covers a small area, limiting potential visual receptors to travellers on the R501 road. Given the number of existing power lines (i.e. 5), cumulative visual impacts have already been established, which is unlikely to be exacerbated with the addition of the proposed new power line. It is concluded that these lines provide prospects of visual absorption capacity which will render visual impact of the proposed new power line as being neutral.

Potential visual impact assessment –visual impact index

The results of analyses including visibility analysis / exposure (Figure 9.3); observer proximity to the facility (refer to Figure 9.4); viewer incidence / viewer perception; and visual absorption capacity (VAC) are merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in order to judge the severity of each impact (refer to Figure 9.5).

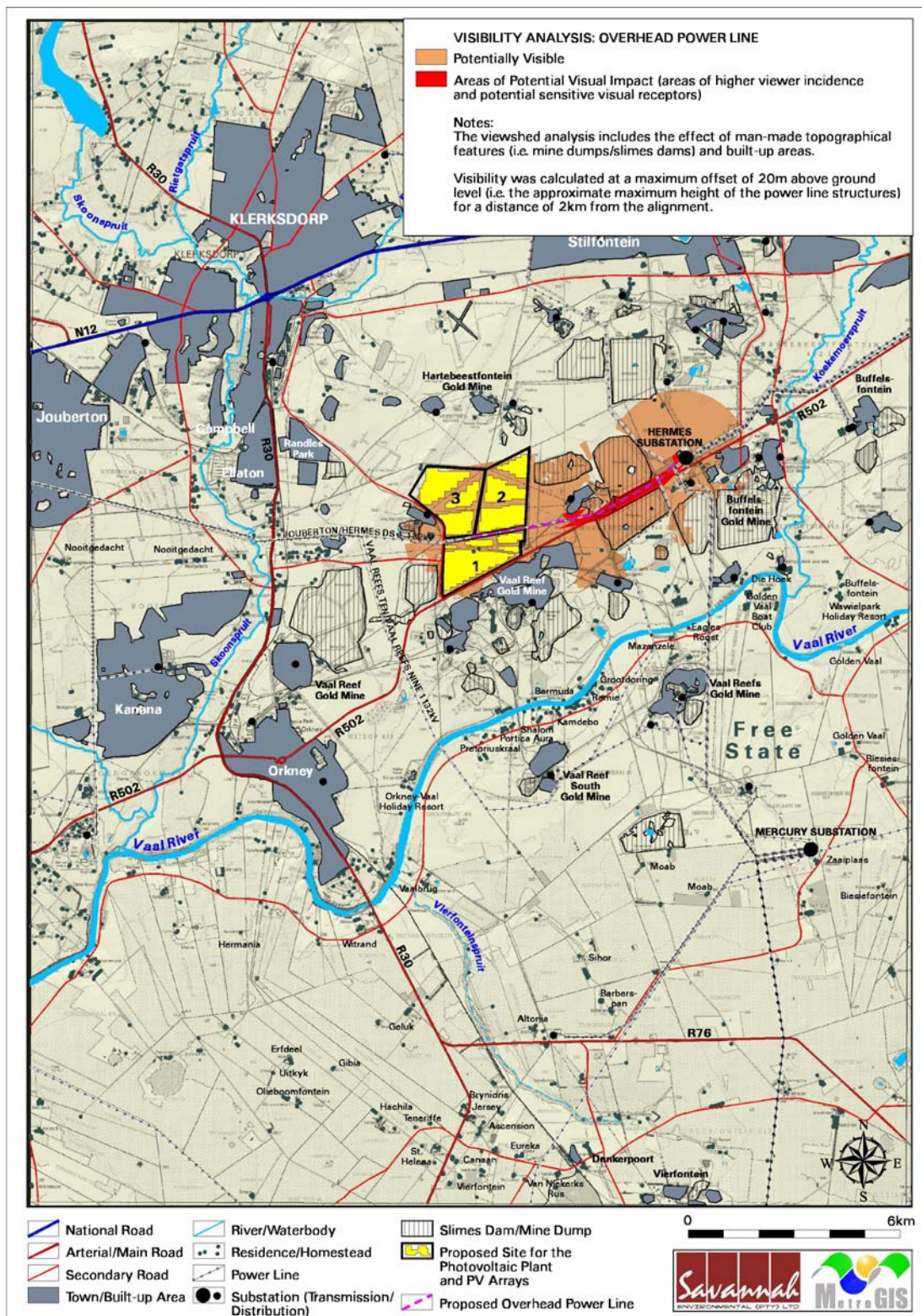


Figure 9.3: Potential visual exposure of the proposed 132 kV power line feeding into the Eskom Hermes Substation, 6 km east of the site
 The potential visual exposure as illustrated is a theoretical representation of where visual receptors would be able to see the facility from. This does not take into consideration local factors such as vegetation, orientation of structures and views, and localised topographical features.

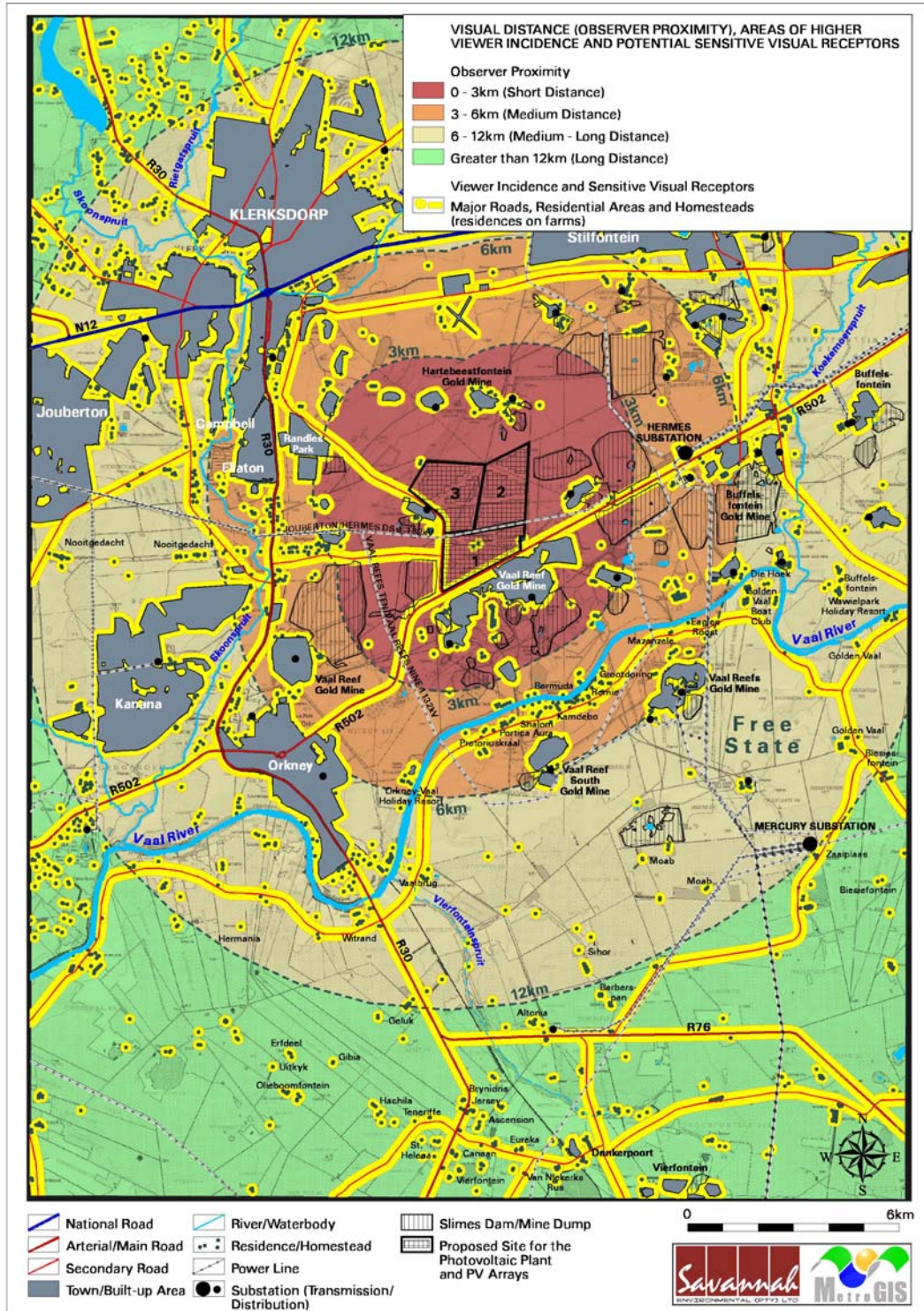


Figure 6.4: Observer Proximity, Areas of High Viewer Incidence and Potential Sensitive Visual Receptors

Results of the Visual Assessment

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed solar energy facility are displayed on **Figure 6.5**.

The quantitative analyses of possible impact have been integrated as a visual impact index. The sum of values assigned for each visual impact parameter is used to identify and visualise areas of high, moderate and low visual impact. Typically a location with close proximity to the proposed facility, a high viewer incidence, a predominantly negative perception and high visual exposure would have a high value on the index, thereby signifying a high visual impact.

The following is of relevance:

- » The proposed facility has a small area of moderate to high visual impact within 3km around the site. Affected areas of possible high sensitivity are the Vaal Reef Gold Mine village and the R502 arterial road.
- » Visual impact in the medium distance (i.e. between 3km and 6km), is low and will only affect isolated locations. The section of the R502 towards Orkney, as well as the eastern fringes of the town may, however, experience moderate visual impacts.
- » Beyond 6 km from the proposed substation and power line development area the visual impact is expected to be very low to negligible

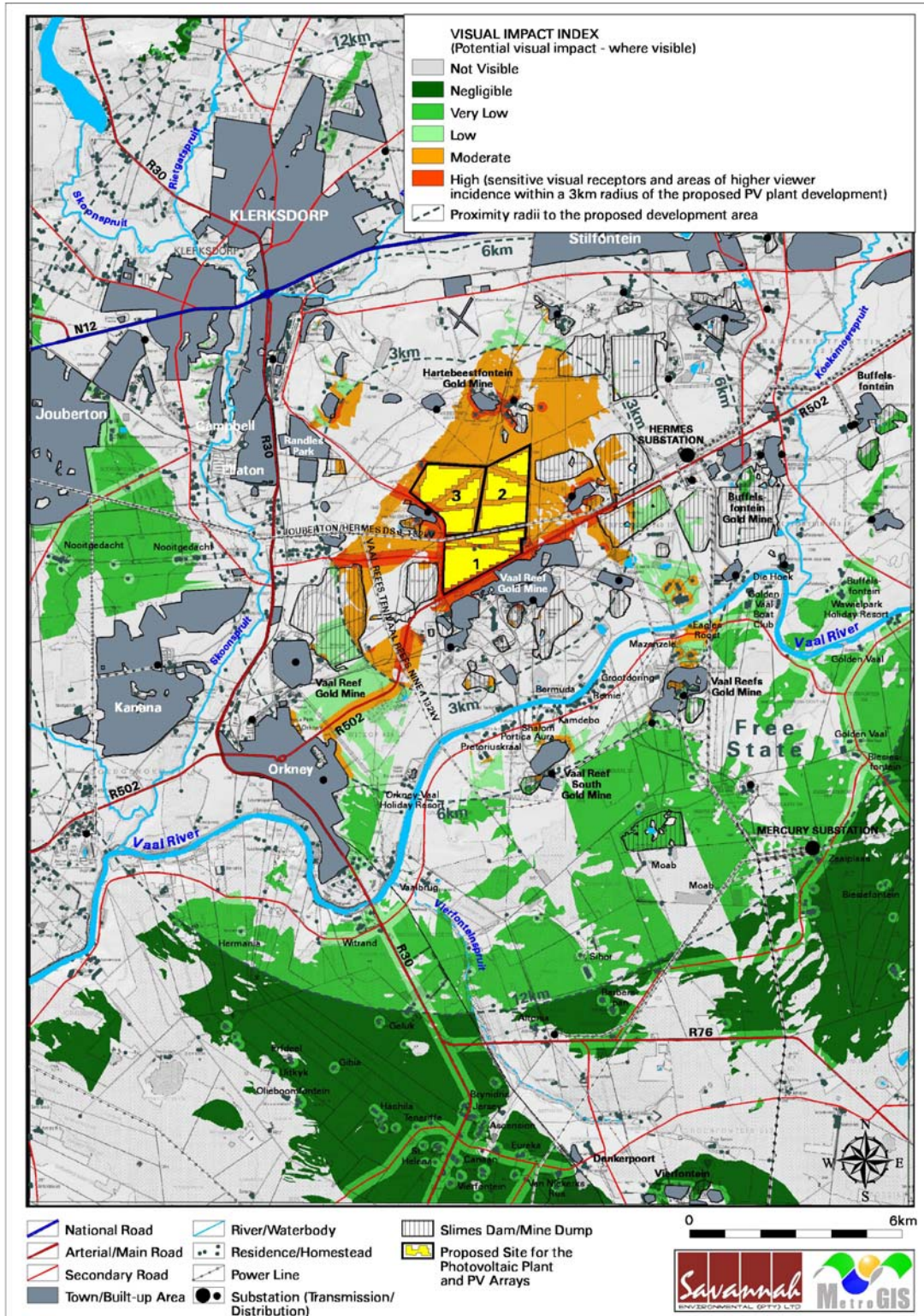


Figure 6.5: Visual impact index of the proposed Kabi Vaalkop Solar PV Facility including the proposed substation and power line.

It should be noted that the visual impact index does not take into account visual clutter and structures that obstruct long distance views within built-up areas. For this reason it can be assumed that the solar energy facility would have a higher visual prominence from the outskirts of built up areas than from within these areas.

Impact tables summarising the significance of visual impacts (with and without mitigation)

Nature: Potential visual impact of substation on observers in close proximity to the proposed site.		
Potential visual impact on towns and residential areas affected by visual exposure.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	Low (28)	Low (28)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<u>Planning:</u>		
<ul style="list-style-type: none"> » Plan internal roads and ancillary infrastructure to avoid or minimise the clearing of vegetation. Consolidate infrastructure and favour already disturbed areas over non-disturbed areas within the development area. 		
<u>Construction:</u>		
<ul style="list-style-type: none"> » Rehabilitate all construction areas. » Avoid the unnecessary removal of vegetation, especially with regard to the construction of access roads and buildings. 		
<u>Operation:</u>		
<ul style="list-style-type: none"> » Maintain roads to avoid erosion. » Maintain ancillary buildings. 		
<u>Decommissioning:</u>		
<ul style="list-style-type: none"> » Remove infrastructure and rehabilitate all disturbed areas. » Monitor rehabilitated areas and implement remedial actions. 		
Cumulative impacts:		
The construction of ancillary infrastructure will increase the cumulative visual impact of roads and / or power related infrastructure (such as power lines and substations) within the region.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and ancillary infrastructure is removed. Failing this, the visual impact will remain.		

Nature: Potential visual impact of the proposed 132 kV power line on observers in close proximity to the power line.		
	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	Low (28)	Low (28)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » No mitigation is possible		
Cumulative impacts: The construction of the proposed 132 kV power line is unlikely to increase the cumulative visual impact of power lines due to the existence of up to 5 power lines in the same corridor area.		
Residual Impacts: The visual impact will be removed after decommissioning, provided the facility and power lines are removed. Failing this, the visual impact will remain.		

Implications for Project Implementation

- » The anticipated visual impacts of the substation and power line will be low given the already existing infrastructure. Therefore, the visual impacts are not considered to be a fatal flaw for the proposed solar energy facility.
- » A lighting engineer should be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.

9.4.5 Assessment of Potential Social Impacts

Construction of the proposed substation and power line is would take place over a time-period of up to 6 months. Each of the potential impacts associated with the construction phase is described and rated in the following section.

Impact tables summarising the significance of social impacts during the construction and operational phases (with and without mitigation)

Nature: Influx of jobseekers		
Even though the developer's employment policy gives preference to the employment of local labour (especially with regards to lower and semi-skilled positions), the potential influx of 'outsiders' cannot be disregarded. The municipality indicated that a large influx of people attracted by infrastructure developments has not occurred in their area of jurisdiction in the past. However, the potential issue needs to be addressed pro-actively. Influx of job seekers will not only be influenced by the proposed substation and power line but will be linked to the proposed PV Plant.		
	Without Mitigation	With Enhancement
Extent	Local (3)	Local (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (3)
Significance	Medium (33)	Medium (30)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	
Enhancement :		
<ul style="list-style-type: none"> » Stipulate the employment of local labour and enterprises in the tender documents to ensure the maximum use of a local labour force, especially with regards to lower and semi-skilled positions. Locals are, in this instance, defined as the nearest communities or people that reside within a 50 km radius from the project. » The developer, contractor and Community Liaison Officer (CLO) should formulate and implement a recruitment strategy to ensure that a suitable labour force is sourced. Tap into the LM's HR Department's skills database and do a skills audit. » The number and extent of the employment opportunities must be communicated to the local community to avoid that unrealistic expectations be created. » Prior to construction commencing representatives of the local community, SAPS, the neighbouring residents and landowners should be informed of details of the construction company, the construction schedule and size of the workforce. » Due to safety and security risks, recruitment of temporary workers at the access to the 		

construction site should not be allowed. The CLO should work in consultation with the Ward Councilors and community representatives to establish labour desks at the most suitable localities within the local communities where workers are sourced.

» The area where workers are recruited should not be near schools or other sensitive receptors where a large influx of people could cause safety and security impacts for the residents and other sensitive receptors. Provide sufficient sanitation and refuse facilities.

Cumulative impacts:

- » The implementation of all phases of the Kabi Vaalkop Solar PV projects would increase the likelihood of an influx of jobseekers, increasing the likelihood of conflict and would place pressure on the Local Municipality in terms of services and housing.
- » Should all five Kabi phases be implemented, it is expected that the available LM labour force would be able to provide the required local labour quota.

Residual impacts:

Should jobseekers remain in the LM area, an increase in the available workforce in the City of Motlasana would increase the local unemployment rate and place further pressure on the Municipality to provide jobs and services

Nature: Employment opportunities and employment equity

Job creation is a positive impact during the construction phase. The construction team would consist of approximately 80% unskilled labour, 10% semi-skilled and 10% skilled temporary employees.

	Without Mitigation	With Enhancement
Extent	Local (3)	Local municipal area (3)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Highly improbable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Enhancement :

- » Work in collaboration with the LM's HR Department to do a skills audit of the available workforce and minimize the workers to be brought in from other areas.
- » The recruitment strategy should clearly reflect the percentage of workers to be sourced from the local labour force.
- » Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project.
- » A policy regarding employment equity of minority groups (women, youth and the

disabled) should be formulated and implemented wherever possible

Cumulative impacts:

- » Should construction of the Kabi Vaalkop PV Solar facility and the substation overlap, a lot of employment opportunities would emerge.

Residual impacts:

- » Positive social and economic impacts for employees their families and the LM, as high unemployment is prevalent.
- » Skills development and capacity building that would enable the workers to seek employment on similar projects in future.

Nature: Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions

Although the exact level and type of skills training is not known at this stage, it could be expected that some form of skills development and capacity building would take place. The tasks to be performed by unskilled labour are those activities usually associated with a construction site and would typically not require prior experience and extensive training. However, the semi- and highly skilled positions (20% of the temporary labour force) would require a higher level of training and skills development, as the technologies to be implemented in this project are still relatively new and unfamiliar to the South African labour market.

	Without Mitigation	With Enhancement
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	low (4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (36)
Status	Positive	Positive
Reversibility	N/A	N/A
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Enhancement :

- » Do a skills audit of the local workforce to determine what skills are available locally, and to reduce the number of workers and specialists that are brought in from other areas. The recruitment process and strategy should include local businesses, enterprises and SMME's to allow them to become part of the tender process.
- » Co-ordinate with the Local Municipality and use the existing skills data base of the HR Department as a point of departure.

Cumulative impacts:

- » Should all phases of the Kabi Solar projects be approved and implemented, the collective skills development and capacity building will enhance the employability of the

labour force with positive economic advantages for the Local Municipality.

Residual impacts:

- » Workers that obtain skills would be able to use it on similar construction projects in future.
- » Through skills development and government initiatives an environment could be established that enables upcoming SMME's to compete in the market, albeit on a smaller scale, such as the construction and erection of rooftop solar plants.

Nature: Impacts on the local economy

Positive impacts and economic spin-offs on the local economy could manifest in a number of ways during the construction phase.

	<i>Without Mitigation</i>	<i>With Enhancement</i>
Extent	Regional (4)	Regional (4)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6)	High (8)
Probability	Highly Probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (56)
Status	Positive	Positive
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impact be enhanced?	Yes	

Enhancement :

- » It is required from the developer to formulate a local procurement strategy to increase the local content of the project to the maximum

Cumulative impacts:

- » Demand might exceed local supply forcing the developer to procure goods and services from the broader region and overseas

Residual impacts:

- » Materialization of innovative economic opportunities in the local and district municipalities.
- » With careful and strategic planning small groups, SMME's and other small businesses could break into this market and gain from future renewable energy projects in the area.

Nature: Potential health risks for workers and surrounding communities due to poor management of the construction process

Health issues for surrounding residents and workers during the construction phase could manifest through air / dust pollution, poor management of the construction process

resulting in pollution problems (e.g. insufficient sanitation facilities, littering and refuse), flies rodents and pests and possible contamination of water sources. The most vulnerable people are the elderly, the very young and those with existing heart and lung conditions. Detrimental health impacts are not confined to the construction site and could affect the health of people living and working in the surrounding area.

	<i>Without Mitigation</i>	<i>With Enhancement</i>
<i>Extent</i>	Municipal areal (3)	Municipal areal (3)
<i>Duration</i>	Short Term (2)	Short Term (2)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (2)
<i>Significance</i>	Low (27)	Low (18)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Yes	Yes
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impact be enhanced?</i>	Yes	

Mitigation:

- » The contractor should recognize his responsibility towards social / soft issues and should embark on an HIV/AIDS awareness campaign amongst the workers. A strategy to appoint a local labour force as far as possible will limit the spread of diseases.
- » Appoint a Health and Safety Officer and comply with the Occupational Health and Safety Management System's requirements. The contact details of this person should be made available to the local community and procedures to lodge complaints set out.
- » Provide adequate drinking water and appropriate sanitation facilities to the workers. Sanitation facilities to be cleaned and serviced on a regular basis.
- » Dispose of rubble and other household waste appropriately and on a regular basis.
- » Identify the waste types that are likely to be produced and aim to reduce the amount of waste as much as possible, through identifying routes to reuse or recycle materials. Label all waste storage and skips, detailing the type of waste.
- » Store any materials away from sensitive locations in fenced off areas.
- » Spray gravel / sand surfaces regularly with water to suppress dust.
- » Avoid the establishment of a construction camp to house workers on the site.
- » Security guards should be the only people allowed to stay overnight on the site. Their accommodation and facilities should comply with health and safety standards.
- » Regularly inspect the site area for spillages and clean spillages using agreed wet handling methods.
- » Vacuum or sweep regularly to prevent the build-up of fine waste dust.
- » Inform the LM and emergency services if harmful substances are spilled.

Cumulative impacts:

- » The construction of the Kabi Witkop and Vaalkop Solar PV facility and other renewable energy projects in the area would increase the likelihood of an influx of jobseekers. Dissolute sexual behaviour, temporary relationships with local women and unwanted pregnancies could increase.

<ul style="list-style-type: none"> » An influx of jobseekers is associated with the spreading of diseases and HIV/AIDS. » Impacts on health care facilities and services and an increasing burden for the Local Municipality
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Impacts on health care facilities and services and an increasing burden for the Local Municipality. » Employees that do not attend work on a regular basis and a high staff turnover, with financial and administrative implications for the Contractor

Impact tables summarising the significance of social impacts during the operational phase of the facility

<p>Nature: Skills development and capacity building during the operational phase</p> <p>Skills development and capacity building would result as on-site training is likely. Also, skilled local operators responsible for the maintenance of the plant would be trained in Spain on existing similar plants.</p> <p>An important outcome of skills development and training is that employees would be in a position to source work on similar plants once their contracts expire. A skilled labour force is more likely to find employment, resulting in economic advantages for the local economy over the long-term.</p>		
	Without Mitigation	With Enhancement²⁰
Extent	Local municipal area (3)	Local municipal area (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Medium (33)	Medium (44)
Status	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
<p>Enhancement:</p> <ul style="list-style-type: none"> » Source locals for employment positions as far as possible, to enhance the advantages of skills development and training for the LM area. » Implement measures (bonuses or other financial benefits) for highly skilled staff to minimize the negative impacts associated with a high staff turnover. 		

²⁰ This assumes the establishment of some form of Community Trust

Cumulative impacts:

- » Trained employees could leave and source work at similar plants that are being constructed in other parts of the country. The developer would need to train additional employees, resulting in time and money losses

Residual impacts:

- » Economic advantages for the local economy, as the labour force are better skilled, thus affecting employability in a positive way

Nature: Impacts on the 'sense of place' for the local community

Extensive dust, noise and traffic impacts during the operational phase are highly unlikely, although visual impacts and safety and security issues, should they occur, has the potential to impact on the local community's 'sense of place', specifically residents in Vaal Reefs, as there are no other sensitive receptors in the direct vicinity of the site.

	Without Mitigation	With Enhancement²¹
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	low (4)	Minor (2)
Probability	Improbable (2)	Improbable (2)
Significance	Low (20)	Medium (16)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	

Enhancement:

- » Apply all the mitigation measures as proposed by the Visual Impact Assessment.
- » Ensure that residents in Vaal Reefs are aware of the procedures to lodge complaints.
- » Implement all safety and security measures, as proposed by the developer, to combat potential crime.

Cumulative impacts:

An increase in criminal activities could place additional pressure on the local SAPS and affect service delivery

Residual impacts:

Hostility towards the project and developer.

²¹ This assumes the establishment of some form of Community Trust

Nature: <i>Security related impacts during the operational phase</i>		
An increase in activity in and around the proposed development during the operational phase could increase security related concerns for the residential area of Vaal Reefs. Potential theft, vandalism and related criminal activities on the substation and power line are also a concern for the Developer.		
	Without Mitigation	With Enhancement²²
Extent	Study area (2)	Study area (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Medium (30)
Status	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impact be enhanced?	Yes	
Enhancement:		
<ul style="list-style-type: none"> » Extend the benefits of the project to the local community by employing local people as far as possible, allocating a percentage of the turnover of the project for community and socio-economic upliftment projects and allocate shares in the project to a community Trust or similar entity. » Implement all the proposed security measures, such as 24-hour security and access control, electric fencing, CCTV cameras and night lights where possible. » Maintain good relationships with neighbours, discuss security issues and measures and make the contact details of the Operations Manager available should complaints be lodged 		
Cumulative impacts:		
Increasing activities and potential security concerns with the establishment of additional substation and power lines in and around the study area		
Residual impacts:		
<ul style="list-style-type: none"> » Impacts on the 'sense of place' for the local community. » Hostility between the local community and the developer if security concerns are not addressed adequately 		

²² This assumes the establishment of some form of Community Trust

Implications for Project Implementation

- » The findings of the SIA undertaken for the proposed **Vaalkop Substation and power line** indicate that the development will create limited employment and business opportunities for locals during the construction phase.

9.5. Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that, in itself, may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area²³. The subsequent phases of the proposed development will add to the cumulative impacts of the proposed development.

The proposed substation and power line, in addition to the already existing infrastructure (i.e. slimes dams, mine shafts the Hermes Substation and over 10 other substations around the site and associated power lines), will increase the cumulative visual impact of industrial type infrastructure within the region. The visual impact is considered to be of low significance as the area industrial in nature. From an ecological point of view uncontrolled soil erosion from all the proposed phases may lead to establishment of alien invasive plants and loss of habitat for indigenous natural vegetation. From an agricultural potential point of view the cumulative impact of this activity will be small as it is constructed on land with low agricultural potential. These impact can however be mitigated if mitigation measures as recommended in this report and attached EMP are implemented.

The negative cumulative impacts of the proposed developments are offset by the positive cumulative impacts. The proposed developments have the potential to result in significant positive cumulative impacts, specifically with regards to employment creation.

Cumulative effects have been considered within the detailed specialist studies, where applicable (refer to Appendices F – K).

²³ Definition as provided by DEA in the EIA Regulations.

KABI VAALKOP SOLAR I PV FACILITY: CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 10

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, through the development of three phases, have a total generating capacity of up to **225 MW**. The Kabi Vaalkop facility is proposed to be developed as three phases of 75 MW each.

Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs), and each receive a separate Environmental Authorisation (i.e. in order to accommodate the requirements the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa). The proposed development comprises the following applications:

- » 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

The conclusions and recommendations presented in this chapter are applicable to the **Kabi Vaalkop Solar I PV Facility** (DEA ref: 12/12/20/2513/1). The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

- » **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** with a width of less than 6 m; and
- » Workshop area for maintenance and storage
- » **On-site substation** (100m x 100m) to be shared by all three phases
- » A new overhead 132 kV power line approximately 6 km long (with a servitude of width 31 m) to connect directly to the Eskom Hermes Substation via the new on site substation (the power line is to be shared with the Kabi Vaalkop Solar III PV Facility)

The EIA for the proposed facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). As the proposed Kabi Vaalkop Solar I PV Facility forms part of a larger solar energy facility development, a consolidated EIA process²⁴ has been undertaken with a single EIA report being produced to assess the potential environmental impacts associated with the larger development, as well as the potential cumulative impacts of all the proposed phases. Potential impacts associated with the Kabi Vaalkop Solar I PV Facility have been assessed in Chapter 6 of this report. The EIA Phase aimed to achieve the following:

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

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

²⁴ The approach to undertake one consolidated EIA process has been accepted by DEA

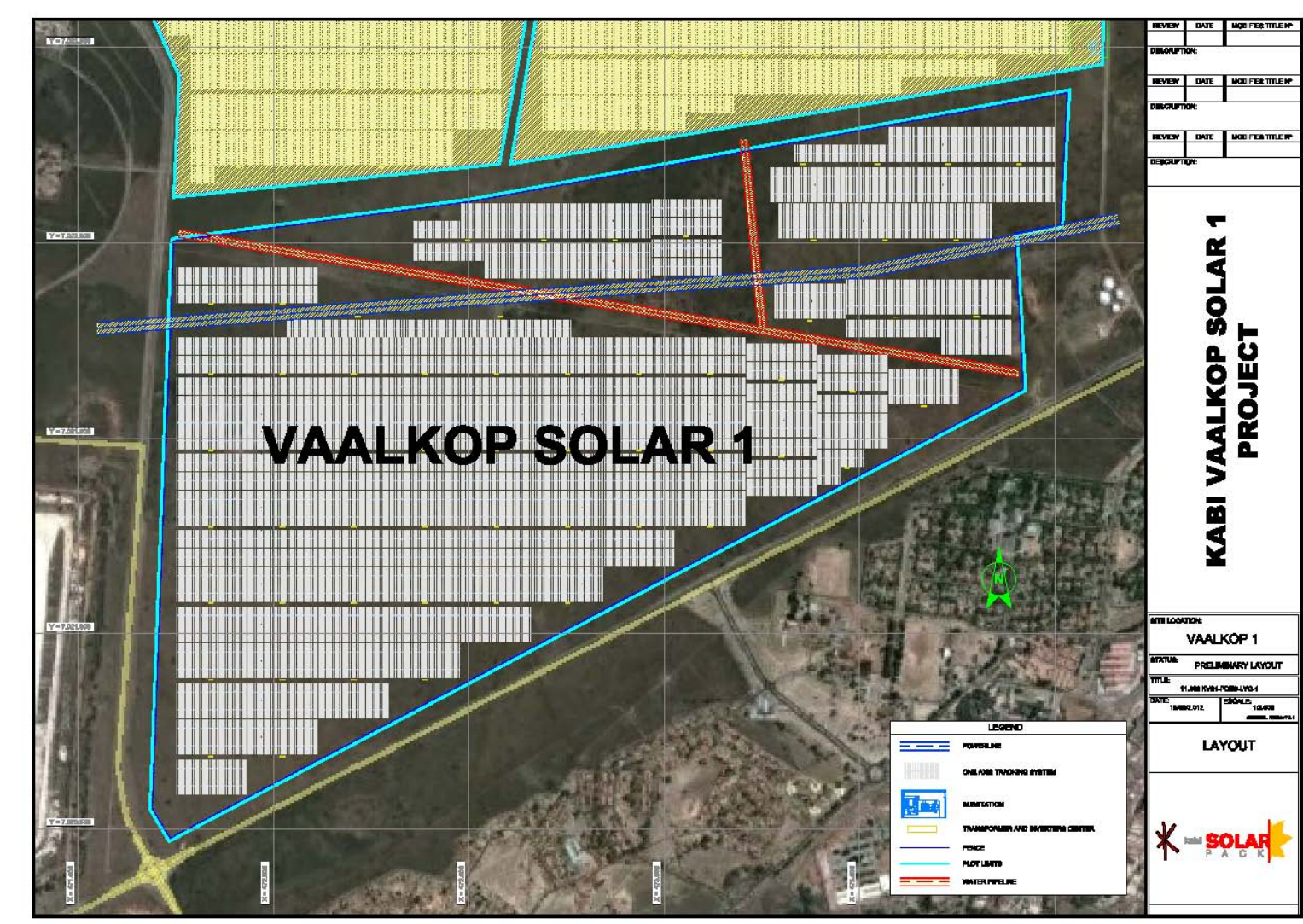


Figure 10.1: Layout of the proposed Kabi Vaalkop Solar I PV Facility showing location of the proposed infrastructure

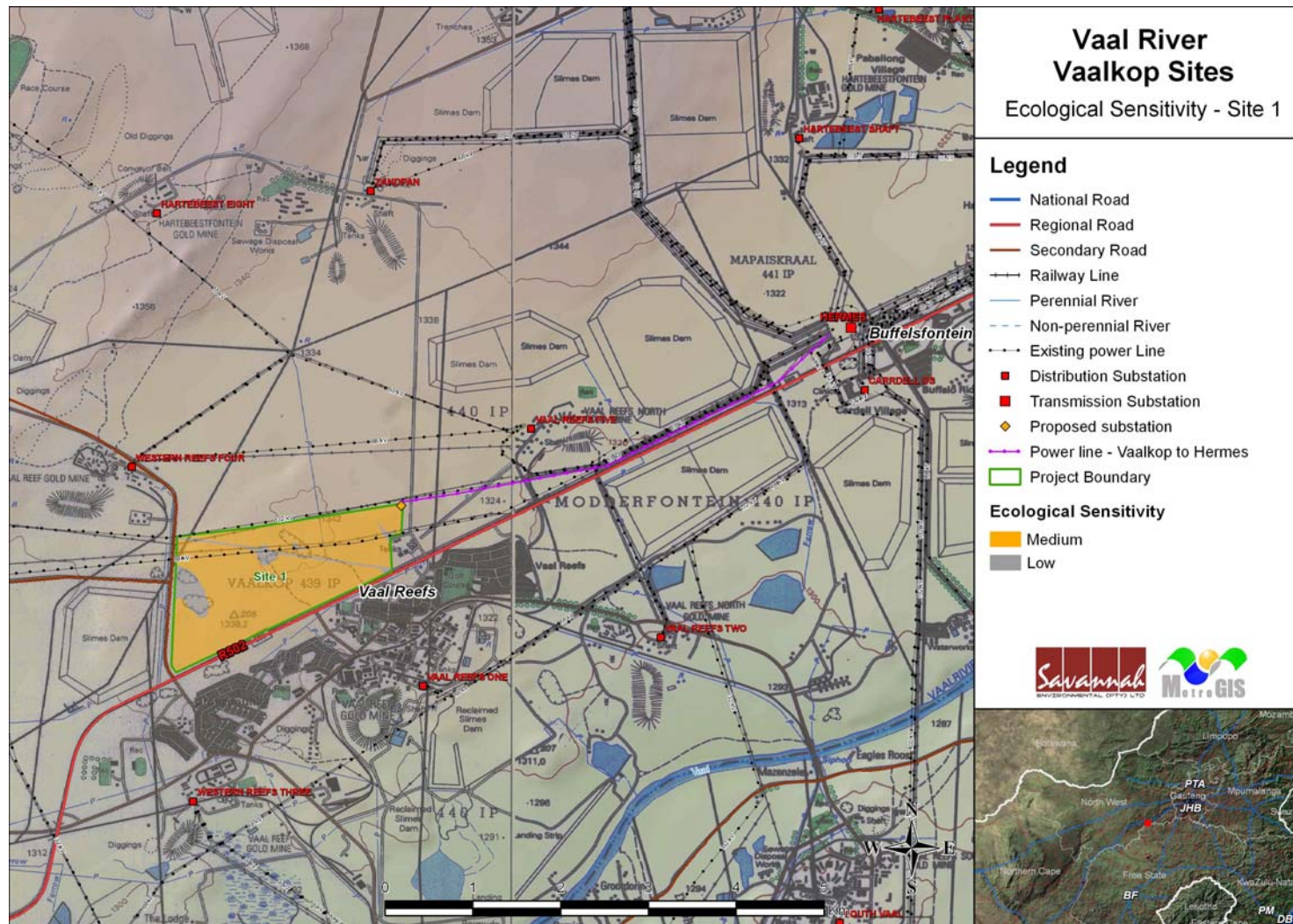


Figure 10.2: Sensitivity map illustrating the sensitive areas across the site

10.1. Evaluation of the Proposed Kabi Vaalkop Solar I PV Facility

Chapter 6 of this report together with the specialist studies contained within Appendices F - K provide a detailed assessment of the potential impacts that may result from the proposed Kabi Vaalkop Solar I PV Facility. This chapter concludes the EIA reporting for the Kabi Vaalkop Solar I PV Facility by providing a summary of the conclusions of the assessment of the proposed site. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

The majority of impacts identified through the EIA are of moderate to low significance. In summary, the most significant environmental impacts associated with the proposed project, as identified through the EIA include:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on the social environment.

Table 10.1 below gives a summary of the potential impacts identified and assessed through the EIA process as well as their impact rating before and after mitigation.

Table 10.1: Summary of All Impacts

The following table provides a summary of the potential impacts identified and assessed through the EIA process with and without mitigation for the proposed Kabi Vaalkop Solar I PV Facility.

<i>Nature</i>	Kabi Vaalkop Solar I PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Impacts on Ecology</i>		
Loss or fragmentation of indigenous natural vegetation	Medium	Medium
Impacts on plant species of conservation concern	Medium	Medium
Loss of habitat for threatened animals	Low	Low
Establishment and spread of declared weeds and alien invader plants	Medium	Low
<i>Impacts on soils and agricultural potential</i>		
Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure	Medium	Medium
Disturbance of soils and impacts on existing land use due to construction of roads	Medium	Medium
Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles	Low	Low
Impact of dust generation on site	Low	Low
Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.	Low	Low
<i>Potential Heritage Impacts</i>		
Impacts on heritage resources	Low	Low
<i>Potential Visual Impacts</i>		
Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.	Medium	Medium
Potential visual impact on visual impact on towns and residential areas affected by visual exposure.	Medium	Medium
Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.	Low	Low
Potential visual impact on aircraft approaching or taking off from the airfield north of the site in terms of the reflection of sunlight from the solar panels.	Low	Low

Nature	Kabi Vaalkop Solar I PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility	High	Medium
Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.	Low	Low
<i>Potential Social Impacts</i>		
Influx of jobseekers	Medium	Medium
Employment opportunities and employment equity	Medium (positive)	Medium (positive)
Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions	Medium (positive)	Medium (positive)
Impacts on the local economy	Medium (positive)	Medium (positive)
Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)	Low (positive)	Medium (positive)
Disruption in daily living and movement patterns	Medium	Medium
Potential health risks for workers and surrounding communities due to poor management of the construction process	Low	Low
Impacts on the 'sense of place'	Low	Low
Impacts associated with a change in land use	Medium (positive)	Medium (positive)
Security related impacts during the operational phase	Medium	Medium
Impacts of the proposed facility on national electricity supply and positive impacts on the environment	High (positive)	High (positive)

10.1.1. Local Site-specific Impacts

The construction of the Kabi Vaalkop Solar I PV Facility will lead to permanent disturbance of an area of approximately 270 ha in extent (98% of the site). Permanently affected areas include the area for the PV panels and associated infrastructure, as well as the internal power line routes and the internal access roads. From the specialist investigations undertaken for the proposed solar energy facility development site, no 'no go' areas or areas of high sensitivity were identified (refer to the sensitivity map - Figure 10.2). However, areas of medium sensitivity were identified. These potentially sensitive areas include:

» Areas of natural vegetation

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 natural vegetation across most of the site is therefore considered, from this perspective, to have moderately high conservation status. Local factors that may lead to parts of the study area being classified as sensitive 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.

In order to minimise potential impacts during construction on potentially sensitive areas within the site, the following recommendations have been made:

- » The construction impacts must be confined to the footprint of the infrastructure.
- » Avoid impacts on natural habitats outside the footprint of the proposed infrastructure.

10.1.2 Impacts on the Social Environment

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).

Impacts on the social environment are expected during both the construction phase and the operational phase of the solar energy facility. Impacts are expected at both a local and regional scale. Impacts on the social environment as a result of the construction of the solar energy facility can be mitigated to impacts of low significance or can be enhanced to be of positive significance to the region.

No construction crew camp will be established on the site, and construction workers will be housed in the town of Orkney or other available/existing accommodation. Construction activities on the site will be restricted to daylight hours, and the construction phase (for each phase of the proposed development) is anticipated to extend for a minimum 12-month period. Negative impacts during construction relate mainly to impacts due to presence of construction workers and visual impact imposed by the facility on the local environment. There will be a positive impact due to employment creation, which is a much needed relief by the Matlosana Local Municipality (which has very high unemployment levels). The positive impact due to employment creation will be lower than during operation as there will be a limited number of staff required compared to the construction phase. The potential social negative impacts of the proposed development are offset by the potential positive impacts.

10.2. Conclusion (Impact Statement)

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a 10-year cumulative target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. This amounts to approximately 4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

The viability of establishing a solar plant on a site near Orkney has been established by Kabi Solar. The positive implications of establishing a solar energy facility on the identified site include:

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.
- » The project is anticipated to have positive social and health related impacts through the "greener" technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.

- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed **Kabi Vaalkop Solar I PV Facility** conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within **Appendix L1**.

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

10.3. Overall Recommendation

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

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

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F to K should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix L1 of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed

as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.

- » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Alien invasive plants should be controlled on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

KABI VAALKOP SOLAR II PV FACILITY: CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 11

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, through the development of three phases, have a total generating capacity of up to **225 MW**. The Kabi Vaalkop facility is proposed to be developed as three phases of 75 MW each.

Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs), and each receive a separate Environmental Authorisation (i.e. in order to accommodate the requirements the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa). The proposed development comprises the following applications:

- » 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

The conclusions and recommendations presented in this chapter are applicable to the **Kabi Vaalkop Solar II PV Facility** (DEA ref: 12/12/20/2513/2). The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

- » **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** with a width of less than 6 m; and
- » Workshop area for maintenance and storage
- » **On-site substation** (100m x 100m) to be shared by all three phases
- » A new 132 kV **power line** to turn into the existing Jouberton - Hermes 132 kV power line that crosses the site via the new on-site substation. The proposed onsite substation is to be constructed near the existing Jouberton - Hermes 132 kV power line.

The EIA for the proposed facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of

1998). As the proposed Kabi Vaalkop Solar I PV Facility forms part of a larger solar energy facility development, a consolidated EIA process²⁵ has been undertaken with a single EIA report being produced to assess the potential environmental impacts associated with the larger development, as well as the potential cumulative impacts of all the proposed phases. Potential impacts associated with the Kabi Vaalkop Solar II PV Facility have been assessed in Chapter 7 of this report. The EIA Phase aimed to achieve the following:

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

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

²⁵ The approach to undertake one consolidated EIA process has been accepted by DEA

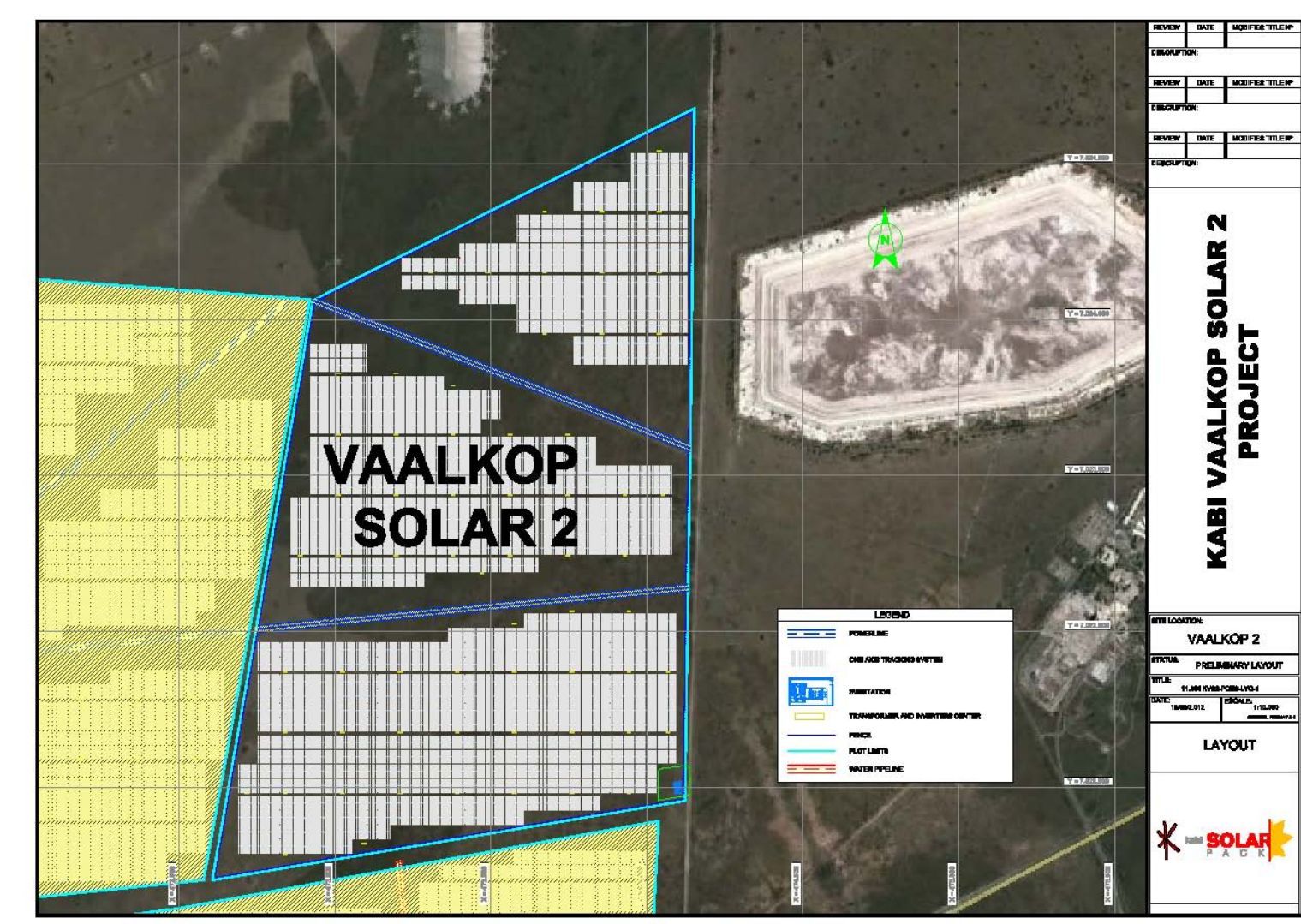


Figure 11.1: Layout of the proposed Kabi Vaalkop Solar II PV Facility showing location of the proposed infrastructure

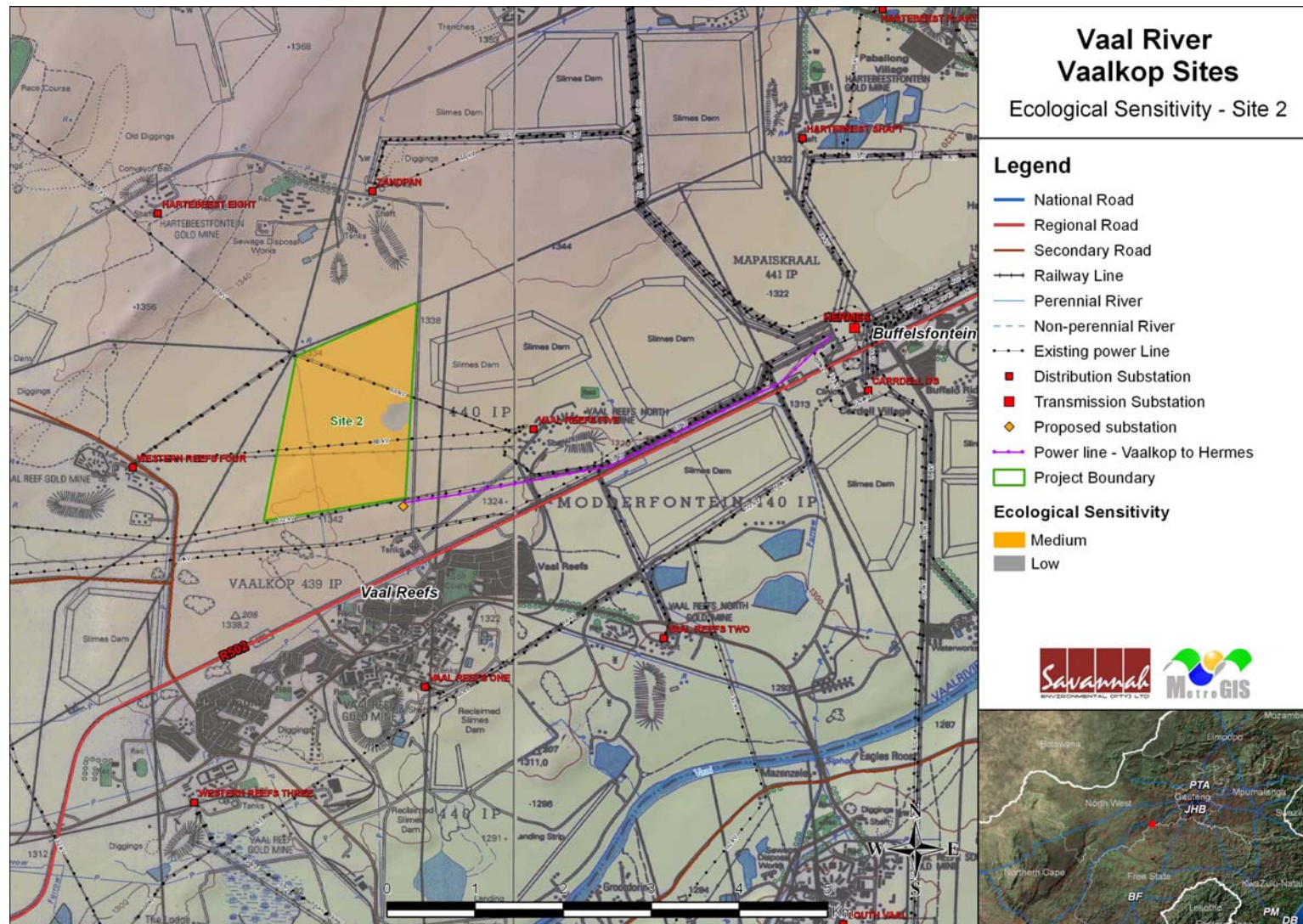


Figure 11.2: Sensitivity map illustrating the sensitive areas across the site

11.1. Evaluation of the Proposed Kabi Vaalkop Solar I PV Facility

Chapter 7 of this report together with the specialist studies contained within Appendices F - K provide a detailed assessment of the potential impacts that may result from the proposed Kabi Vaalkop Solar II PV Facility. This chapter concludes the EIA reporting for the Kabi Vaalkop Solar II PV Facility by providing a summary of the conclusions of the assessment of the proposed site. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

The majority of impacts identified through the EIA are of moderate to low significance. In summary, the most significant environmental impacts associated with the proposed project, as identified through the EIA include:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on the social environment.

Table 11.1 below gives a summary of the potential impacts identified and assessed through the EIA process as well as their impact rating before and after mitigation.

Table 11.1: Summary of All Impacts

The following table provides a summary of the potential impacts identified and assessed through the EIA process with and without mitigation for the proposed Kabi Vaalkop Solar II PV Facility.

<i>Nature</i>	Kabi Vaalkop Solar II PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Impacts on Ecology</i>		
Loss or fragmentation of indigenous natural vegetation	Medium	Medium
Impacts on plant species of conservation concern	Medium	Medium
Loss of habitat for threatened animals	Low	Low
Establishment and spread of declared weeds and alien invader plants	Medium	Low
<i>Impacts on soils and agricultural potential</i>		
Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure	Medium	Medium
Disturbance of soils and impacts on existing land use due to construction of roads	Medium	Medium
Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles	Low	Low
Impact of dust generation on site	Low	Low
Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.	Low	Low
<i>Potential Heritage Impacts</i>		
Impacts on heritage resources	Low	Low
<i>Potential Visual Impacts</i>		
Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.	Medium	Medium
Potential visual impact on visual impact on towns and residential areas affected by visual exposure.	Medium	Medium
Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.	Low	Low
Potential visual impact on aircraft approaching or taking off from the airfield north of the site in terms of the reflection of sunlight from the solar panels.	Low	Low

Nature	Kabi Vaalkop Solar II PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility	High	Medium
Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.	Low	Low
<i>Potential Social Impacts</i>		
Influx of jobseekers	Medium	Medium
Employment opportunities and employment equity	Medium (positive)	Medium (positive)
Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions	Medium (positive)	Medium (positive)
Impacts on the local economy	Medium (positive)	Medium (positive)
Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)	Low (positive)	Medium (positive)
Disruption in daily living and movement patterns	Medium	Medium
Potential health risks for workers and surrounding communities due to poor management of the construction process	Low	Low
Impacts on the 'sense of place'	Low	Low
Impacts associated with a change in land use	Medium (positive)	Medium (positive)
Security related impacts during the operational phase	Medium	Medium
Impacts of the proposed facility on national electricity supply and positive impacts on the environment	High (positive)	High (positive)

11.1.1. Local Site-specific Impacts

The construction of the Kabi Vaalkop Solar II PV Facility will lead to permanent disturbance of an area of approximately 268 ha in extent (100% of the site). Permanently affected areas include the area for the PV panels and associated infrastructure, as well as the internal power line routes and the internal access roads. From the specialist investigations undertaken for the proposed solar energy facility development site, no 'no go' areas or areas of high sensitivity were identified (refer to the sensitivity map - Figure 11.2). However, areas of medium sensitivity were identified. These potentially sensitive areas include:

» Areas of natural vegetation

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 natural vegetation across most of the site is therefore considered, from this perspective, to have moderately high conservation status. Local factors that may lead to parts of the study area being classified as sensitive 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.

In order to minimise potential impacts during construction on potentially sensitive areas within the site, the following recommendations have been made:

- » The construction impacts must be confined to the footprint of the infrastructure.
- » Avoid impacts on natural habitats outside the footprint of the proposed infrastructure.

11.1.2 Impacts on the Social Environment

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).

Impacts on the social environment are expected during both the construction phase and the operational phase of the solar energy facility. Impacts are expected at both a local and regional scale. Impacts on the social environment as a result of the construction of the solar energy facility can be mitigated to impacts of low significance or can be enhanced to be of positive significance to the region.

No construction crew camp will be established on the site, and construction workers will be housed in the town of Orkney or other available/existing accommodation. Construction activities on the site will be restricted to daylight hours, and the construction phase (for each phase of the proposed development) is anticipated to extend for a minimum 12-month period. Negative impacts during construction relate mainly to impacts due to presence of construction workers and visual impact imposed by the facility on the local environment. There will be a positive impact due to employment creation, which is a much needed relief by the Matlosana Local Municipality (which has very high unemployment levels). The positive impact due to employment creation will be lower than during operation as there will be a limited number of staff required compared to the construction phase. The potential social negative impacts of the proposed development are offset by the potential positive impacts.

11.2. Conclusion (Impact Statement)

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a 10-year cumulative target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. This amounts to approximately 4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

The viability of establishing a solar plant on a site near Orkney has been established by Kabi Solar. The positive implications of establishing a solar energy facility on the identified site include:

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.
- » The project is anticipated to have positive social and health related impacts through the "greener" technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.

- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed **Kabi Vaalkop Solar II PV Facility** conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within **Appendix L2**.

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

11.3. Overall Recommendation

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

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

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F to K should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix L2 of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed

as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.

- » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Alien invasive plants should be controlled on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

KABI VAALKOP SOLAR III PV FACILITY: CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 12

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, through the development of three phases, have a total generating capacity of up to **225 MW**. The Kabi Vaalkop facility is proposed to be developed as three phases of 75 MW each.

Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs), and each receive a separate Environmental Authorisation (i.e. in order to accommodate the requirements the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa). The proposed development comprises the following applications:

- » 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

The conclusions and recommendations presented in this chapter are applicable to the **Kabi Vaalkop Solar III PV Facility** (DEA ref: 12/12/20/2513/3). The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

- » **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** with a width of less than 6 m; and
- » Workshop area for maintenance and storage
- » **On-site substation** (100m x 100m) to be shared by all three phases
- » A new overhead 132 kV power line approximately 6 km long (with a servitude width of 31 m) to connect directly to the Eskom Hermes Substation to be shared with the Kabi Vaalkop Solar I PV Facility via the new onsite substation.

The EIA for the proposed facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of

1998). As the proposed Kabi Vaalkop Solar I PV Facility forms part of a larger solar energy facility development, a consolidated EIA process²⁶ has been undertaken with a single EIA report being produced to assess the potential environmental impacts associated with the larger development, as well as the potential cumulative impacts of all the proposed phases. Potential impacts associated with the Kabi Vaalkop Solar III PV Facility have been assessed in Chapter 8 of this report. The EIA Phase aimed to achieve the following:

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

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

²⁶ The approach to undertake one consolidated EIA process has been accepted by DEA

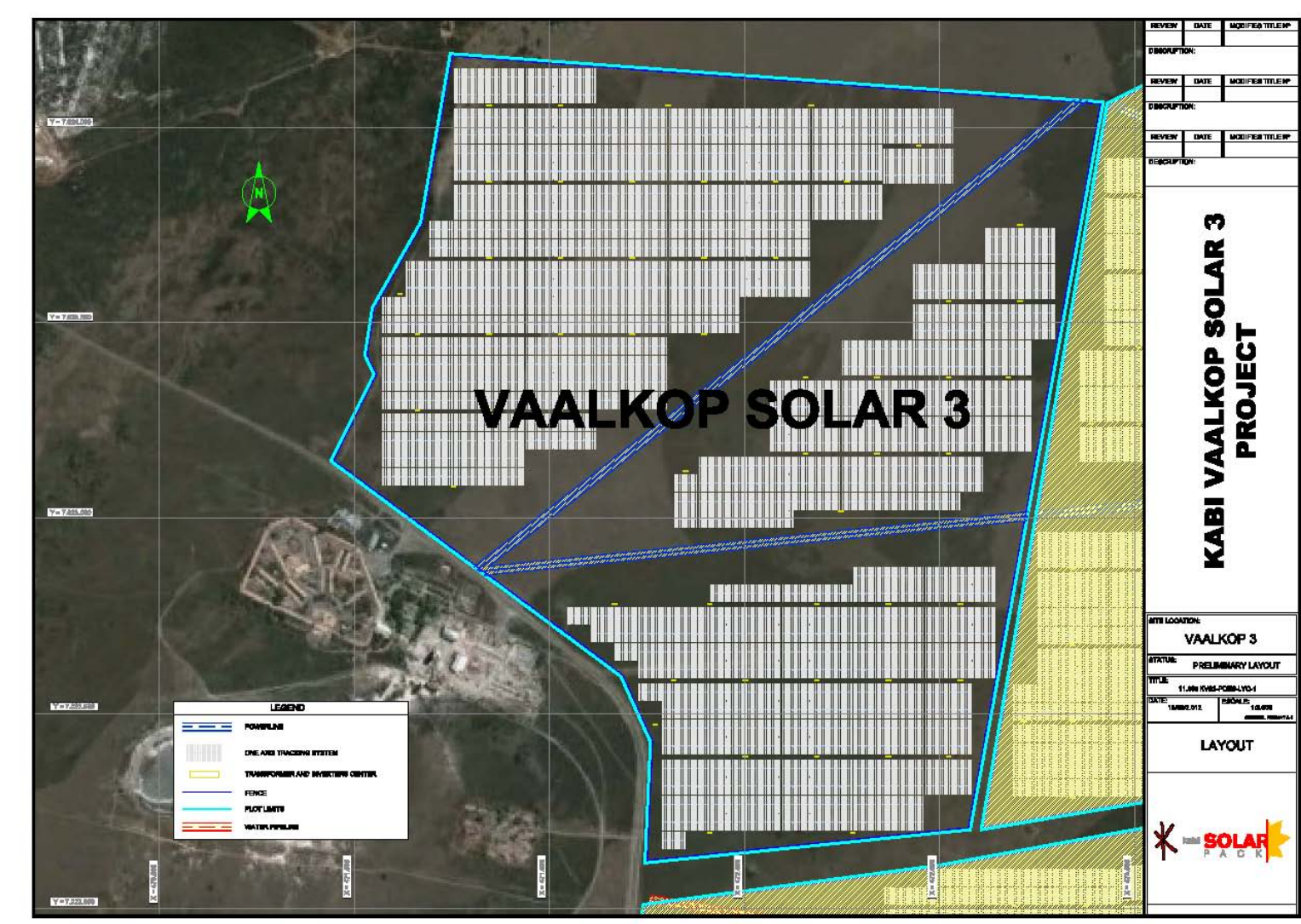


Figure 12.1: Layout of the proposed Kabi Vaalkop Solar III PV Facility showing location of the proposed infrastructure

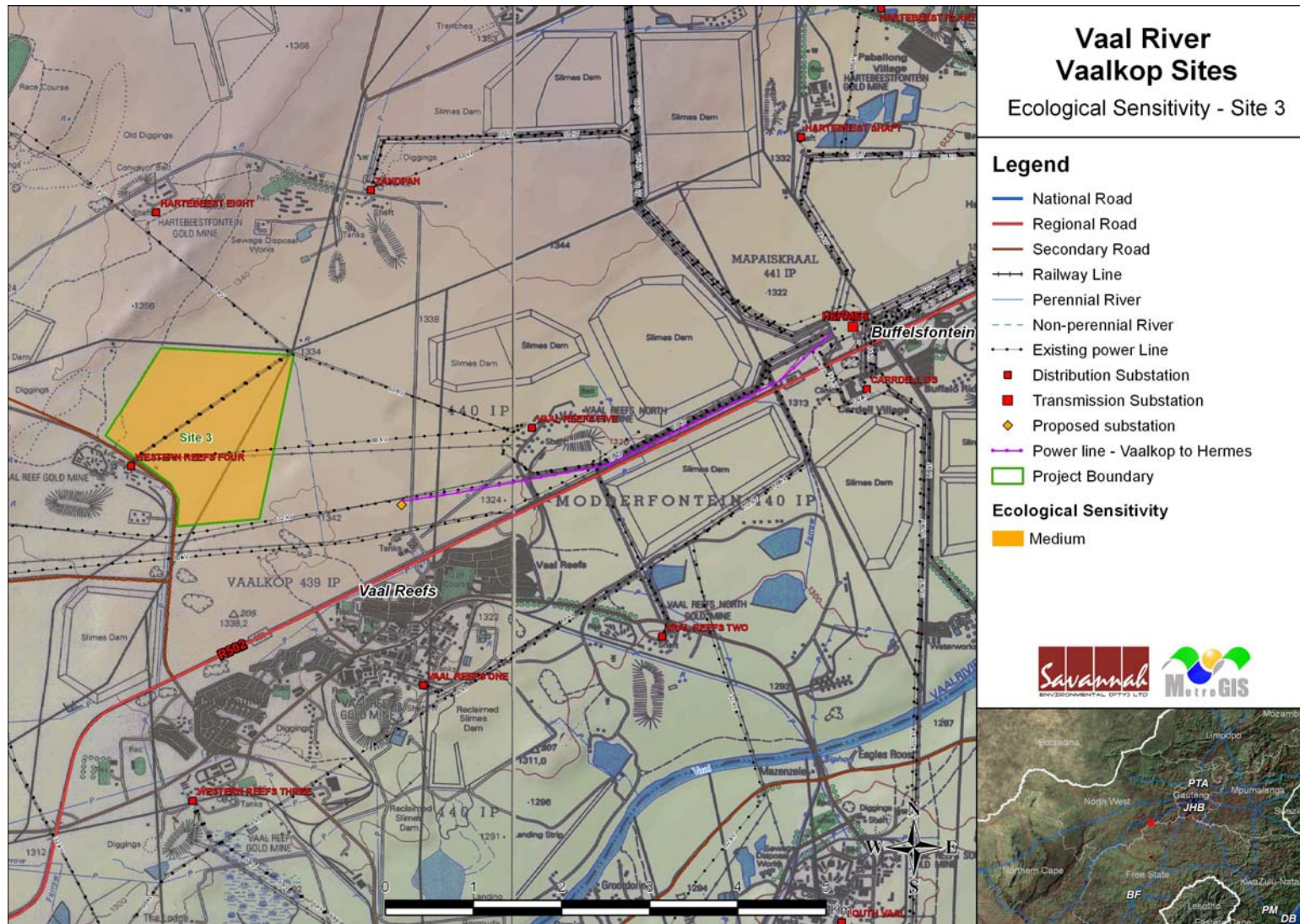


Figure 12.2: Sensitivity map illustrating the sensitive areas across the site

12.1. Evaluation of the Proposed Kabi Vaalkop Solar I PV Facility

Chapter 8 of this report together with the specialist studies contained within Appendices F - K provide a detailed assessment of the potential impacts that may result from the proposed Kabi Vaalkop Solar III PV Facility. This chapter concludes the EIA reporting for the Kabi Vaalkop Solar III PV Facility by providing a summary of the conclusions of the assessment of the proposed site. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

The majority of impacts identified through the EIA are of moderate to low significance. In summary, the most significant environmental impacts associated with the proposed project, as identified through the EIA include:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on the social environment.

Table 12.1 below gives a summary of the potential impacts identified and assessed through the EIA process as well as their impact rating before and after mitigation.

Table 12.1: Summary of All Impacts

The following table provides a summary of the potential impacts identified and assessed through the EIA process with and without mitigation for the proposed Kabi Vaalkop Solar III PV Facility.

<i>Nature</i>	Kabi Vaalkop Solar III PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Impacts on Ecology</i>		
Loss or fragmentation of indigenous natural vegetation	Medium	Medium
Impacts on plant species of conservation concern	Medium	Medium
Loss of habitat for threatened animals	Low	Low
Establishment and spread of declared weeds and alien invader plants	Medium	Low
<i>Impacts on soils and agricultural potential</i>		
Disturbance of soils and impacts on existing land use due to construction of buildings and associated infrastructure	Medium	Medium
Disturbance of soils and impacts on existing land use due to construction of roads	Medium	Medium
Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles	Low	Low
Impact of dust generation on site	Low	Low
Loss of agricultural potential and land capability owing to the construction of the PV panels, access roads, buildings and other infrastructure.	Low	Low
<i>Potential Heritage Impacts</i>		
Impacts on heritage resources	Low	Low
<i>Potential Visual Impacts</i>		
Potential visual impact on observers travelling along arterial and secondary roads in close proximity to the proposed solar energy facility.	Medium	Medium
Potential visual impact on visual impact on towns and residential areas affected by visual exposure.	Medium	Medium
Potential visual impact on holiday resorts and other tourist facilities or places of leisure along the Vaal river.	Low	Low
Potential visual impact on aircraft approaching or taking off from the airfield north of the site in terms of the reflection of sunlight from the solar panels.	Low	Low

Nature	Kabi Vaalkop Solar III PV Facility	
	<i>Without mitigation</i>	<i>With mitigation</i>
Potential visual impact of lighting at night on observers in close proximity to the proposed Solar Energy Facility	High	Medium
Potential visual impact of the facility on the visual character of the landscape and sense of place of the region.	Low	Low
<i>Potential Social Impacts</i>		
Influx of jobseekers	Medium	Medium
Employment opportunities and employment equity	Medium (positive)	Medium (positive)
Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions	Medium (positive)	Medium (positive)
Impacts on the local economy	Medium (positive)	Medium (positive)
Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)	Low (positive)	Medium (positive)
Disruption in daily living and movement patterns	Medium	Medium
Potential health risks for workers and surrounding communities due to poor management of the construction process	Low	Low
Impacts on the 'sense of place'	Low	Low
Impacts associated with a change in land use	Medium (positive)	Medium (positive)
Security related impacts during the operational phase	Medium	Medium
Impacts of the proposed facility on national electricity supply and positive impacts on the environment	High (positive)	High (positive)

12.1.1. Local Site-specific Impacts

The construction of the Kabi Vaalkop Solar III PV Facility will lead to permanent disturbance of an area of approximately 281 ha in extent (100% of the site). Permanently affected areas include the area for the PV panels and associated infrastructure, as well as the internal power line routes and the internal access roads. From the specialist investigations undertaken for the proposed solar energy facility development site, no 'no go' areas or areas of high sensitivity were identified (refer to the sensitivity map - Figure 12.2). However, areas of medium sensitivity were identified. These potentially sensitive areas include:

» Areas of natural vegetation

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 natural vegetation across most of the site is therefore considered, from this perspective, to have moderately high conservation status. Local factors that may lead to parts of the study area being classified as sensitive 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.

In order to minimise potential impacts during construction on potentially sensitive areas within the site, the following recommendations have been made:

- » The construction impacts must be confined to the footprint of the infrastructure.
- » Avoid impacts on natural habitats outside the footprint of the proposed infrastructure.

12.1.2 Impacts on the Social Environment

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).

Impacts on the social environment are expected during both the construction phase and the operational phase of the solar energy facility. Impacts are expected at both a local and regional scale. Impacts on the social environment as a result of the construction of the solar energy facility can be mitigated to impacts of low significance or can be enhanced to be of positive significance to the region.

No construction crew camp will be established on the site, and construction workers will be housed in the town of Orkney or other available/existing accommodation. Construction activities on the site will be restricted to daylight hours, and the construction phase (for each phase of the proposed development) is anticipated to extend for a minimum 12-month period. Negative impacts during construction relate mainly to impacts due to presence of construction workers and visual impact imposed by the facility on the local environment. There will be a positive impact due to employment creation, which is a much needed relief by the Matlosana Local Municipality (which has very high unemployment levels). The positive impact due to employment creation will be lower than during operation as there will be a limited number of staff required compared to the construction phase. The potential social negative impacts of the proposed development are offset by the potential positive impacts.

12.2. Conclusion (Impact Statement)

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a 10-year cumulative target for renewable energy of 10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. This amounts to approximately 4% (1 667 MW) of the total estimated electricity demand (41 539 MW) by 2013.

The viability of establishing a solar plant on a site near Orkney has been established by Kabi Solar. The positive implications of establishing a solar energy facility on the identified site include:

- » The injection of electricity into the grid, at the proposed point, would serve to strengthen the power supply in the area.
- » Solar facilities have an advantage over other more conventional power generating facilities (e.g. coal-fired power stations). The facilities utilise a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a positive light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks. In addition, PV facilities have a lower visual impact compared wind energy facilities.
- » The project is anticipated to have positive social and health related impacts through the "greener" technology that will be used (limited noise, no emissions etc).
- » On a global scale the project has the potential to assist in reducing carbon dioxide emissions which would thus have an ameliorating impact on global climate change.

- » The project will have numerous benefits during both the construction and the operation phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed **Kabi Vaalkop Solar III PV Facility** conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within **Appendix L3**.

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

12.3. Overall Recommendation

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

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

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F to K should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix L3 of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed

as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.

- » Use existing infrastructure where possible to minimise potential ecological impacts from disturbance of vegetation.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Alien invasive plants should be controlled on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

KABI VAALKOP SUBSTATION AND POWER LINE: CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 13

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, through the development of three phases, have a total generating capacity of up to **225 MW**. The Kabi Vaalkop facility is proposed to be developed as three phases of 75 MW each.

Each of the proposed phases as well as the substation and power line are to be developed under separate Special Purpose Vehicles (SPVs), and each receive a separate Environmental Authorisation (i.e. in order to accommodate the requirements the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa). The proposed development comprises the following applications:

- » 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

The conclusions and recommendations presented in this chapter are applicable to the **Vaalkop Substation and power line** (DEA ref: 12/12/20/2513/4). The Vaalkop Substation and power line to connect to the Eskom grid will be comprised of the following:

- » A new **on-site substation** (100m X 100m) to be shared with all three phases of the proposed development.
- » A new **overhead 132 kV power line** approximately 6 km long (with a servitude of 31 m wide) to connect directly to the Eskom Hermes Substation via the new on site substation. The power line will follow an existing corridor of 5 power lines feeding into Hermes Substation. The corridor of the new power line and the existing power lines becomes wedged between an old slimes dam and the R502 arterial road (refer to Figure 9.1). The new power line is to be used to evacuate the power from the Kabi Vaalkop Solar I and Kabi Vaalkop Solar III PV facilities.

The EIA for the proposed facility has been undertaken in accordance with the EIA Regulations published in Government Notice 33306 of 18 June 2010, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). As the proposed Kabi Vaalkop Solar I PV Facility forms part of a larger solar

energy facility development, a consolidated EIA process²⁷ has been undertaken with a single EIA report being produced to assess the potential environmental impacts associated with the larger development, as well as the potential cumulative impacts of all the proposed phases. Potential impacts associated with the Vaalkop Substation and power line have been assessed in Chapter 9 of this report. The EIA Phase aimed to achieve the following:

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

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

²⁷ The approach to undertake one consolidated EIA process has been accepted by DEA

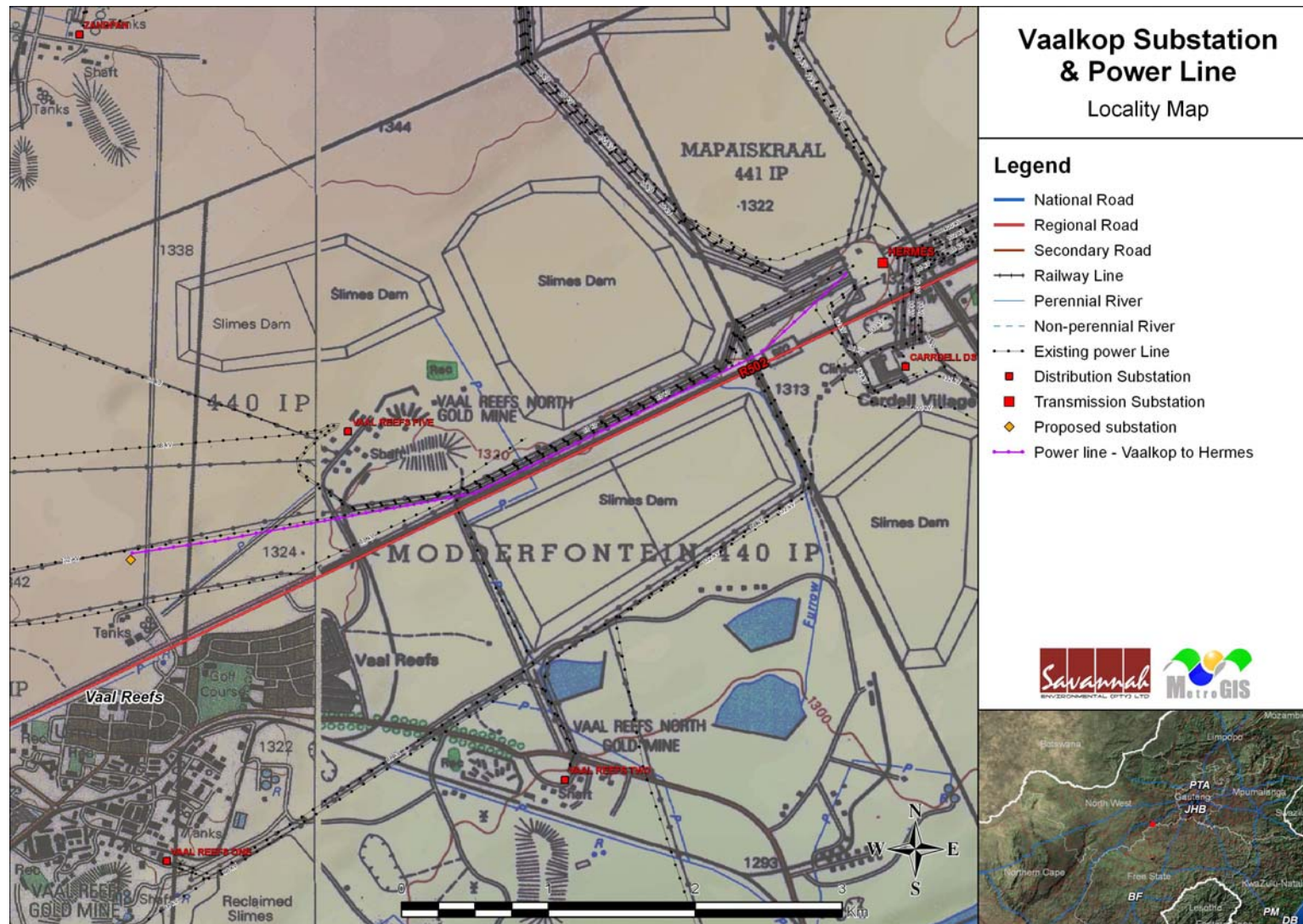


Figure 13.1: Locality map indicating the location of the Vaalkop Substation and power line corridor

13.1. Evaluation of the Proposed Kabi Vaalkop Solar I PV Facility

Chapter 9 of this report together with the specialist studies contained within Appendices F - K provide a detailed assessment of the potential impacts that may result from the proposed Vaalkop Substation and power line. This chapter concludes the EIA reporting for the Vaalkop Substation and power line by providing a summary of the conclusions of the assessment of the proposed site. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

The majority of impacts identified through the EIA are of low significance. In summary, the most significant environmental impacts associated with the proposed project, as identified through the EIA include:

- » Local site-specific impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Impacts on the social environment.

Table 13.1 below gives a summary of the potential impacts identified and assessed through the EIA process as well as their impact rating before and after mitigation.

Table 13.1: Summary of All Impacts

The following table provides a summary of the potential impacts identified and assessed through the EIA process with and without mitigation for the proposed Vaalkop Substation and power line.

<i>Nature</i>	Vaalkop Substation and power line	
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Impacts on Ecology</i>		
Loss or fragmentation of indigenous natural vegetation	Low	Low
Impacts on plant species of conservation concern	Low	Low
Loss of habitat for threatened animals	Low	Low
Establishment and spread of declared weeds and alien invader plants	Medium	Low
Bird collisions with overhead power lines	Low	Low
<i>Impacts on soils and agricultural potential</i>		
Disturbance of soils and impacts on existing land use due to construction of substation and power line	Medium	Low

Nature	Vaalkop Substation and power line	
	<i>Without mitigation</i>	<i>With mitigation</i>
Physical and chemical degradation (hydrocarbon spills) of the soil by construction vehicles	Low	Low
Impact of dust generation on site	Low	Low
Loss of agricultural potential and land capability owing to the construction of the substation and power line.	Low	Low
<i>Potential Heritage and Palaeontological resources</i>		
Impacts on heritage and Palaeontological resources	Low	Low
<i>Potential Visual Impacts</i>		
Potential visual impact of substation on observers in close proximity to the proposed site.	Low	Low
Potential visual impact of the proposed 132 kV power line on observers in close proximity to the power line.	low	Low
<i>Potential Social Impacts</i>		
Influx of jobseekers	Medium	Medium
Employment opportunities and employment equity	Medium (positive)	Medium (positive)
Skills development and capacity building during the construction phase, especially for the semi and higher skilled positions	Medium (positive)	Medium (positive)
Impacts on the local economy	Medium (positive)	Medium (positive)
Changes in the focus of the local and regional economies (from the primary sector to the secondary sector)	Low (positive)	Medium (positive)
Disruption in daily living and movement patterns	Medium	Medium
Potential health risks for workers and surrounding communities due to poor management of the construction process	Low	Low
Impacts on the 'sense of place'	Low	Low
Security related impacts during the operational phase	Medium	Medium

13.1.1. Local Site-specific Impacts

From the specialist investigations undertaken for the proposed solar energy facility development site, no 'no go' areas or areas of high sensitivity were identified. However, areas of medium sensitivity were identified. These potentially sensitive areas include:

» Areas of natural vegetation

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 natural vegetation across most of the site is therefore considered, from this perspective, to have moderately high conservation status. Local factors that may lead to parts of the study area being classified as sensitive 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.

In order to minimise potential impacts during construction on potentially sensitive areas within the site, the following recommendations have been made:

- » The construction impacts must be confined to the footprint of the infrastructure.
- » Avoid impacts on natural habitats outside the footprint of the proposed infrastructure.

13.1.2 Impacts on the Social Environment

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).

Impacts on the social environment are expected during both the construction phase and the operational phase of the solar energy facility. Impacts are expected at both a local and regional scale. Impacts on the social environment as a result of the construction of the solar energy facility can be mitigated to impacts of low significance or can be enhanced to be of positive significance to the region.

No construction crew camp will be established on the site, and construction workers will be housed in the town of Orkney or other available/existing accommodation. Construction activities on the site will be restricted to daylight hours, and the construction phase (for the Vaalkop Substation and power line) is anticipated to extend for a minimum 6-month period. Negative impacts during construction relate

mainly to impacts due to presence of construction workers and visual impact imposed by the facility on the local environment. There will be a positive impact due to employment creation, which is a much needed relief by the Matlosana Local Municipality (which has very high unemployment levels). The potential social negative impacts of the proposed development are offset by the potential positive impacts.

13.2. Conclusion (Impact Statement)

The viability of establishing the Vaalkop Substation and power line as part of the the proposed solar energy facility on a site near Orkney has been established by Kabi Solar. The positive implications of establishing the Vaalkop Substation and power line as part of the solar energy facility on the identified site include:

- » The project will have numerous benefits during both the construction phase by way of employment opportunities, skills development, and capacity building within the local communities.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed **Vaalkop Substation and power line** conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts can generally be reduced by implementing the recommended mitigation measures. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMP) included within **Appendix L4**.

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

13.3. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the impacts associated with the development of the proposed Vaalkop Substation and power line can be mitigated to an acceptable level. In

terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F to K should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Programme (EMP) as contained within Appendix L4 of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMP should be viewed as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.
- » Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
- » Alien invasive plants should be controlled on site.
- » A detailed geotechnical investigation should be undertaken before the engineering design phase to provide more detail. Specialist geotechnical input is recommended during the construction of foundations.
- » It is imperative that adequate storm water management measures be put in place as the underlying rock strata are prone to the formation of sinkholes
- » The management plan primarily focuses on the mitigation and management of potential secondary visual impacts, because the primary visual impact has very low mitigation potential. In this regard proper planning should be undertaken regarding the placement of lighting structures.

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