

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT ENVIRONMENTAL IMPACT REPORT

PROPOSED SAN SOLAR ENERGY FACILITY
& ASSOCIATED INFRASTRUCTURE ON A
SITE NEAR KATHU, NORTHERN CAPE

NORTHERN CAPE PROVINCE
(DEA Ref No: 14/12/16/3/3/2/273)

DRAFT FOR PUBLIC REVIEW
26 October 2012 - 26 November 2012

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PROJECT DETAILS

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Title	:	Environmental Impact Assessment Process Draft Environmental Impact Assessment Report: Proposed San Solar Energy Facility, Northern Cape Province
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PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

San Solar Energy Facility (Pty) Ltd is currently undertaking an Environmental Impact Assessment (EIA) process to determine the environmental feasibility of a proposed solar energy facility on a near Kathu, in the Northern Cape Province. San Solar Energy Facility (Pty) Ltd has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The EIA Report consists of eight sections:

- Chapter 1:** Provides background to the proposed facility and the environmental impact assessment.
- Chapter 2:** Provides a description of the proposed project.
- Chapter 3:** Provides an overview of the regulatory and legal context for electricity generation projects and the EIA process.
- Chapter 4:** Outlines the process which was followed during the EIA Phase, including the consultation program that was undertaken and input received from interested parties.
- Chapter 5:** Describes the existing biophysical and socio-economic environment.
- Chapter 6:** Presents the assessment of environmental impacts associated with the proposed facility.
- Chapter 7:** Presents the conclusions of the EIA, as well as an impact statement on the proposed project.
- Chapter 8:** Provides a list of references and information sources used in undertaking the studies for this EIA Report.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

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

INVITATION TO COMMENT ON THE DRAFT EIA REPORT

Members of the public, local communities and stakeholders are invited to comment on the draft EIA Report which has been made available for public review and comment at the following locations from **26 October 2012 to 26 November 2012**.

- » Kathu Public Library
- » Dibeng Public Library
- » www.savannahsa.com

Please submit your comments to
Shawn Johnston of Sustainable Futures ZA PO Box 749, Rondebosch, Cape Town, 7701
Tel: 083 325 9965 Fax: 086 510 2537 E-mail: swjohnston@mweb.co.za
The due date for comments on the Draft EIA Report is 26 November 2012

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

PUBLIC FEEDBACK MEETING

In order to facilitate comments on the draft EIA Report and provide feedback on the findings of the studies undertaken, a public feedback meeting will be held during the review period for the draft Scoping Report as follows:

Date: 12 November 2012
Time: 18:00 – 19:30
Venue: Namakwari Lodge, 1 Frikkie Meyer Road, Kathu

EXECUTIVE SUMMARY

San Solar Energy Facility (Pty) Ltd an Independent Power Producer, is proposing the establishment of a commercial solar energy facility for the purpose of electricity generation. Radiant energy from the sun, a renewable form of energy will be used to power the proposed **San Solar Energy Facility**.

The facility is proposed on Portion 4 of the Farm Wincanton 472, which falls within the Gamagara Local Municipality of the Northern Cape Province.

The proposed facility, which will be entirely contained within the identified farm portion, will have a developmental footprint of slightly less than the 8 km² extent of the site. The solar energy facility proposes to generate 75 MW of electricity (94 MW installed capacity) and will be comprised of the following infrastructure:

- » A single substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom electricity grid.
- » Internal access roads.
- » Gate house and security.
- » Warehouse.
- » Canteen and change rooms.
- » Office and Control centre.

The nature and extent of this facility, as well as potential environmental impacts associated with the

construction and operation of a facility of this nature are explored in more detail in this Environmental Impact Assessment (EIA) Report

In summary, the following conclusions have been drawn from the specialist studies undertaken:

- » In terms of ecology, the potential significance was rated as having a predominately medium significance.
- » In terms of geology, soil, and erosion potential, the potential significance was rated as having a predominately low to medium significance.
- » In terms of heritage resources, the potential significance was rated as having a predominately low significance.
- » In terms of visual impacts, the potential significance was rated as having a predominately medium significance. The potential impact on users of arterial and secondary roads and on residents of towns and homesteads in close proximity of the facility will be of high significance. It is important to note that there are two other proposed solar energy facilities that are located next to the proposed San Solar Energy Facility.
- » In terms of social impacts, the potential significance was rated as having a predominately medium significance.

No environmental fatal flaws were identified with the establishment of the proposed San Solar Energy Facility. However a number of issues requiring mitigation have been highlighted. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Plan (EMP) included within Appendix J.

OVERALL 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 Kathu has been established by San Solar Energy Facility (Pty) Ltd. The positive implications of establishing a solar energy facility on the identified site within the Northern Cape include:

- » The injection of electricity into the grid, at the proposed point,

would serve to strengthen the power supply in the area.

- » Solar 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 to observers.
- » The facility could become a major tourist attraction in its own right and could complement the existing tourism attractions in the area, thereby resulting in promoting a positive image of the area with resultant positive impact on the local tourism industry, economy, and environment.
- » 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 significance levels of the majority of identified negative impacts can generally be reduced by

implementing the recommended mitigation measures. 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.

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 application for the proposed San Solar Energy Facility can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

Potential sensitive areas have been identified through the environmental scoping study and are listed below. In order to reduce the potential for on-site environmental impacts, these areas should be avoided as far as reasonably possible.

- » Small saline pans: Construction activities may lead to some direct or indirect loss of or damage to some of these areas or changes to the catchment of these areas. The saline pans are not within the proposed construction area.

- » Potential impacts on heritage sites relate to the findings of scatterings of surface stone tools, however these were not concentrated enough to be classified as a Stone Age Site. These findings were located outside the study area.

- » The visual impacts associated with the proposed facility will be largely contained within the broader region itself. However, there are two proposed solar energy facilities that are proposed next to the proposed San Solar Energy Facility. (Refer to figure 2).

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

- » The preferred power evacuation option (i.e. the loop-in/loop-out with the Eskom Umtu-Ferrum 132kV power line).
- » All mitigation measures detailed within this report and the specialist reports contained within Appendices E to I should be implemented to limit the negative impacts and enhance the positives.
- » The draft Environmental Management Plan (EMP) as contained within Appendix J 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.

- » Alien invasive plants should be controlled on site. Currently, the site contains very little alien vegetation. It is important to maintain this situation and not allow alien species to become established on site.
- » A permit is required for removal of protected trees as a large number of protected Camel Thorn occurs 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.
- » Earthwork related mitigation measures should be included in the EMP and implemented during the construction phase to limit impacts on geology and soil.
- » 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.

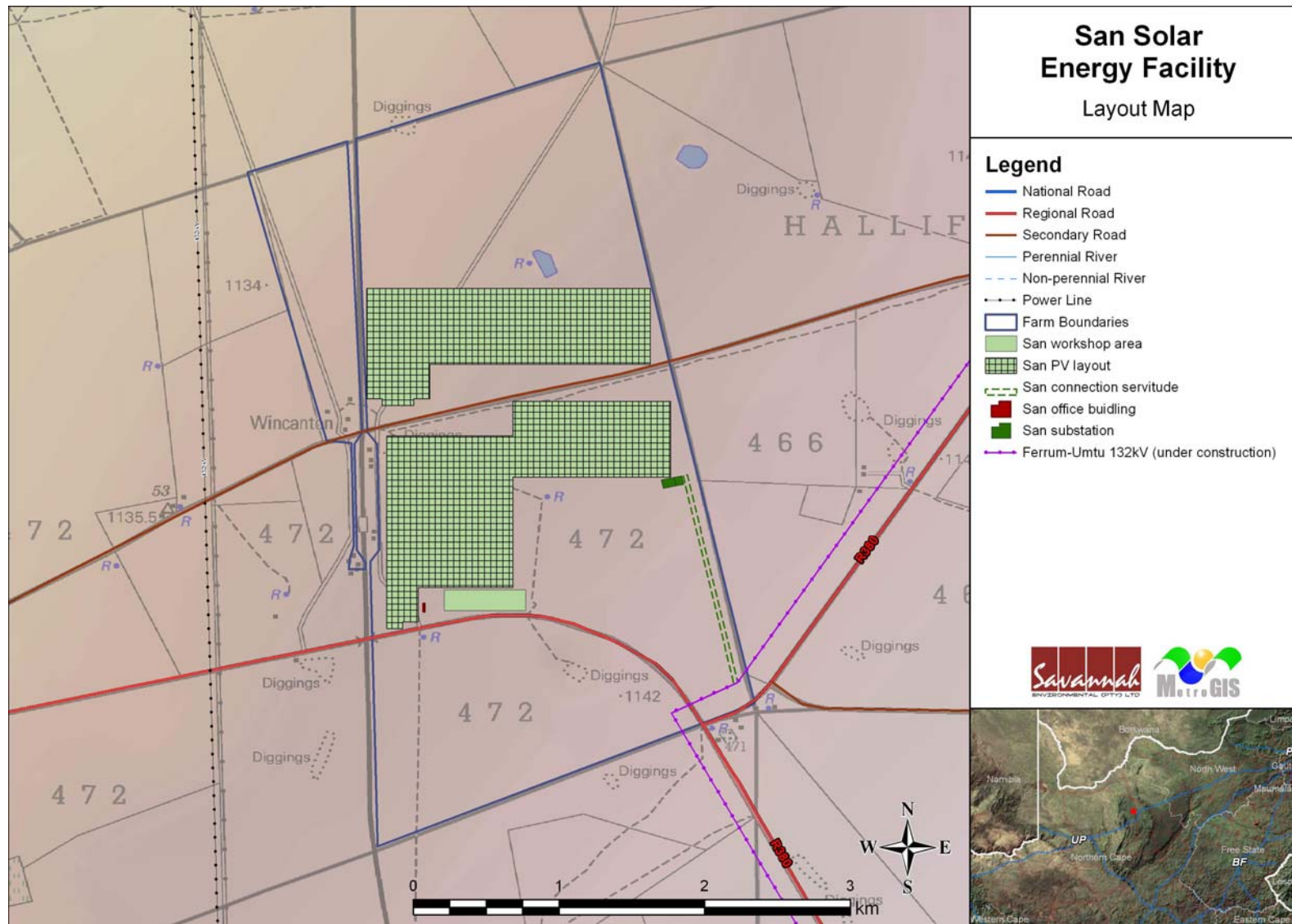


Figure 1: Locality Map

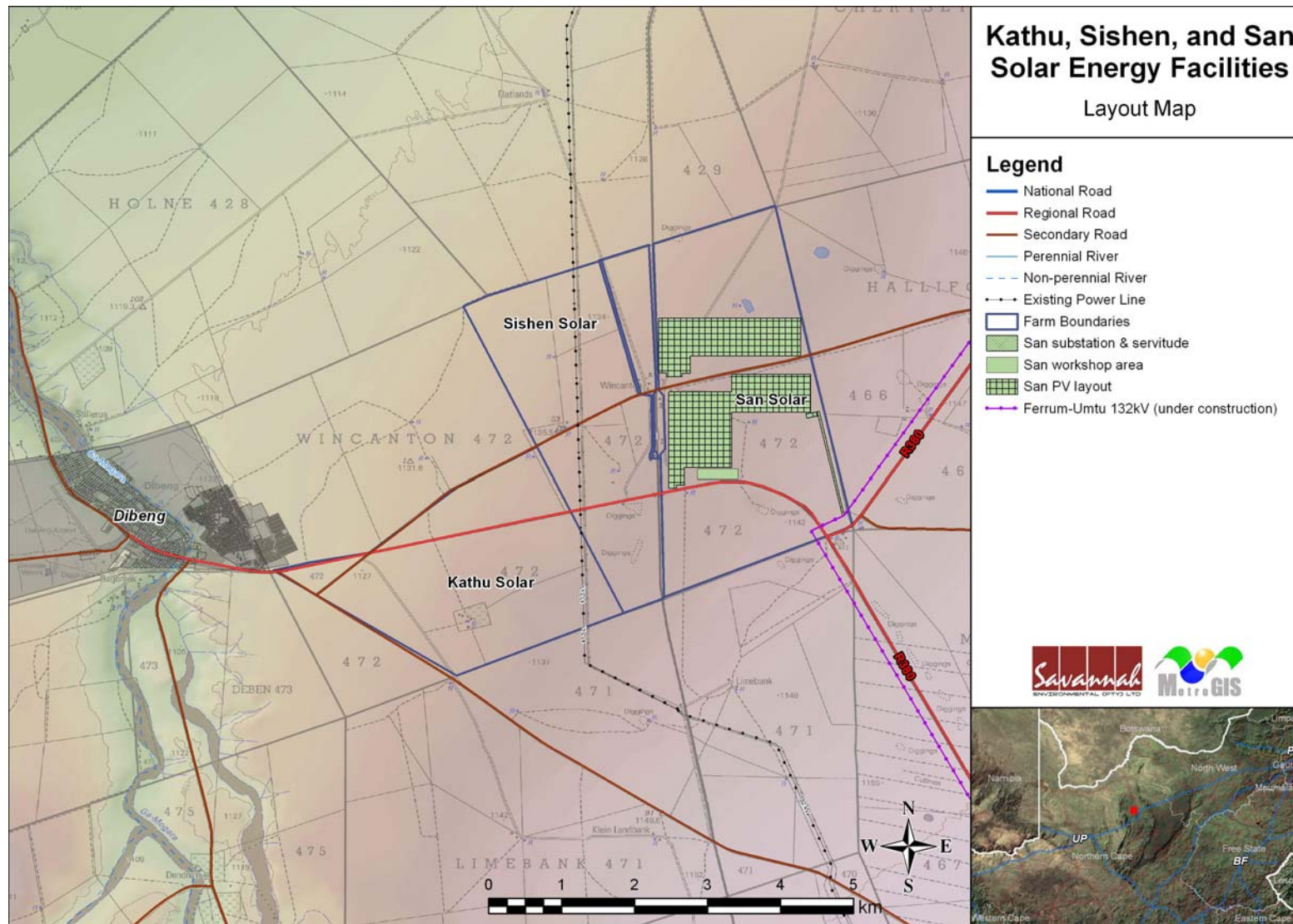


Figure 2: Locality map 2 showing the adjacent Solar Energy Facilities proposed adjacent to San Solar Energy Facility

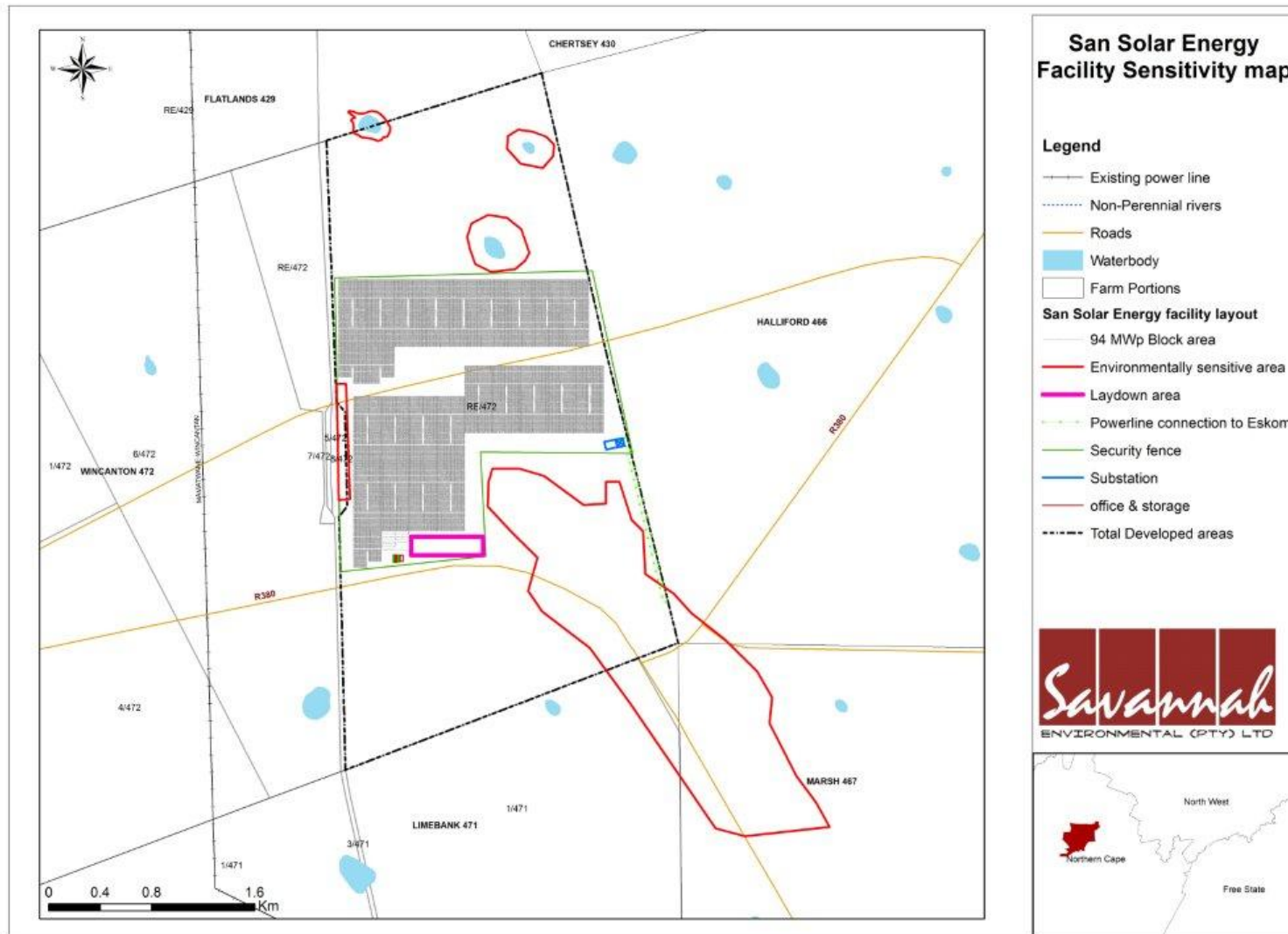


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DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:

- i. The land, water and atmosphere of the earth;
- ii. Micro-organisms, plant and animal life;
- iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and

- iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

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

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

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

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

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

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

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

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

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

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

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CO ₂	Carbon dioxide
DEA	National Department of Environmental Affairs
DEADP	Department of Environment Affairs and Development Planning
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GHG	Green House Gases
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km ²	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
MAR	Mean Annual Rainfall
m ²	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NGOs	Non-Governmental Organisations
NWA	National Water Act (Act No. 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

INTRODUCTION

CHAPTER 1

San Solar Energy Facility (Pty) Ltd proposes to establish a commercial solar energy facility with associated infrastructure on the remaining extent of the farm Wincanton 472 which falls within the Gamagara Local Municipality of the Northern Cape Province. The proposed site lies 16 km south east from Kathu. The proposed facility and associated infrastructure (i.e. the development footprint) would be constructed over an area of approximately 500 hectares (ha) in extent. The larger project development site covers an area of approximately 800 ha. **Figure 1.1** indicates the entire farm portion that is currently being assessed as part of this Environmental Impact Assessment (EIA) (farm portion shown in blue).

The proposed project development site is preferred from a technical perspective due to the following site characteristics:

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

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 EIA Report. The Draft EIA Report consists of eight chapters, which include:

- Chapter 1:** Provides background to the proposed facility and the environmental impact assessment.
- Chapter 2:** Provides a description of the proposed project.
- Chapter 3:** Provides an overview of the regulatory and legal context for electricity generation projects and the EIA process.
- Chapter 4:** Outlines the process which was followed during the EIA Phase, including the consultation process that was undertaken and input received from interested parties.
- Chapter 5:** Describes the existing biophysical and socio-economic environment.

- Chapter 6:** Presents the assessment of environmental impacts associated with the proposed facility.
- Chapter 7:** Presents the conclusions of the EIA, as well as an impact statement on the proposed project.
- Chapter 8:** Provides a list of references and information sources used in undertaking the studies for this EIA Report.

1.1. Summary of the proposed Development

The San Solar Energy Facility is proposed to accommodate several arrays of photovoltaic (PV) panels with associated infrastructure in order to generate up to **75 MW** (94 MW installed capacity) of electricity. The facility will comprise of PV panels and associated infrastructural requirements which will include:

- » A single substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom electricity grid.
- » Internal access roads.
- » Gate house and security.
- » Workshop, office and change house, and control centre.

This San Solar Energy Facility is located adjacent to two other approved solar energy facilities, i.e. the Kathu Solar Energy facility and the Sishen Solar Energy Facility. Both of these facilities have been authorised by the Department of Environmental Affairs, and have been awarded preferred bidder status by the Department of Energy (DoE) in the DoE's competitive bidding process. The development of the all three projects in this area will result in a solar energy hub for the Northern Cape and will concentrate solar projects in a single location.

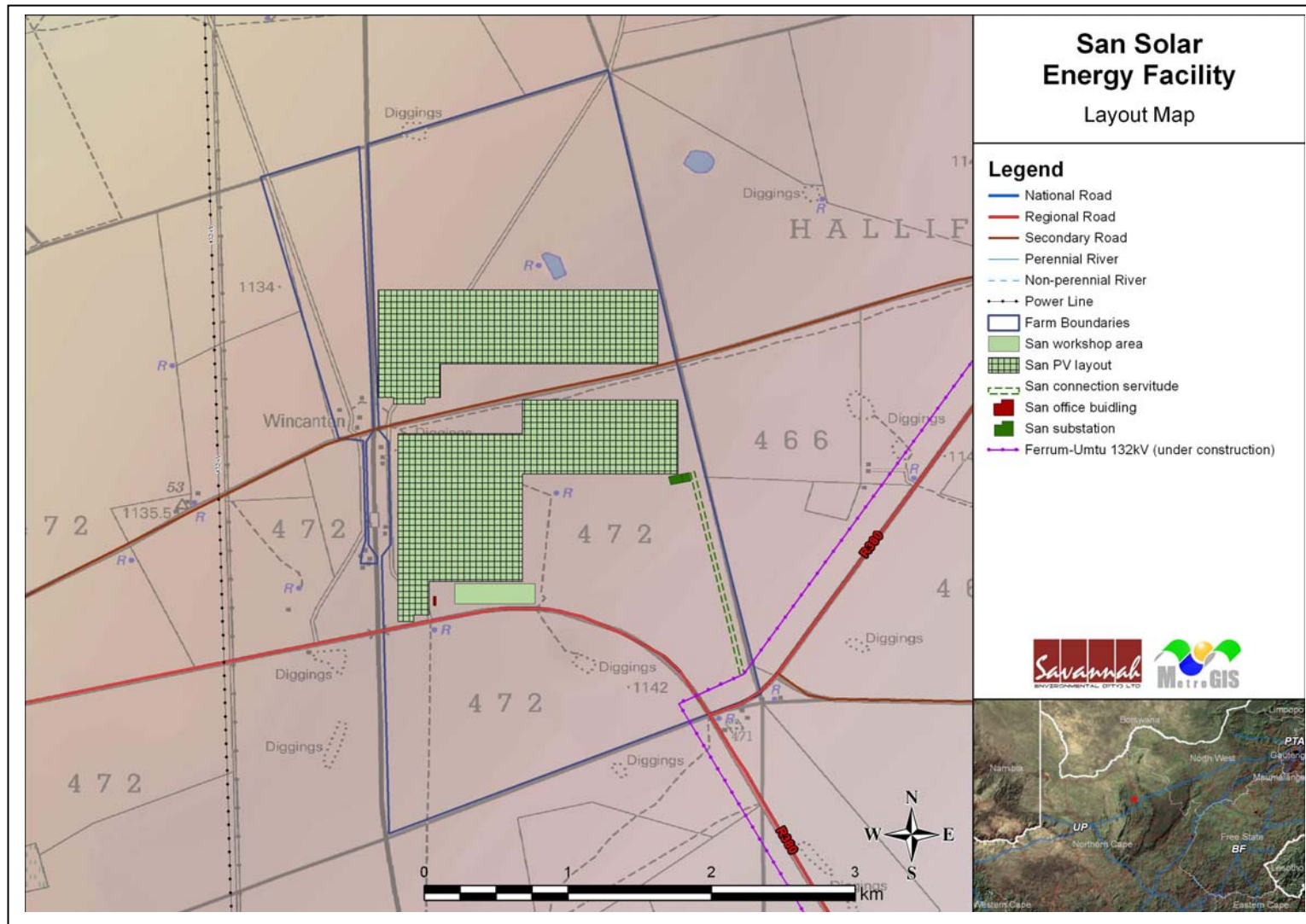


Figure 1.1: Locality map illustrating the location of the assessed development site for the proposed San Solar Energy Facility

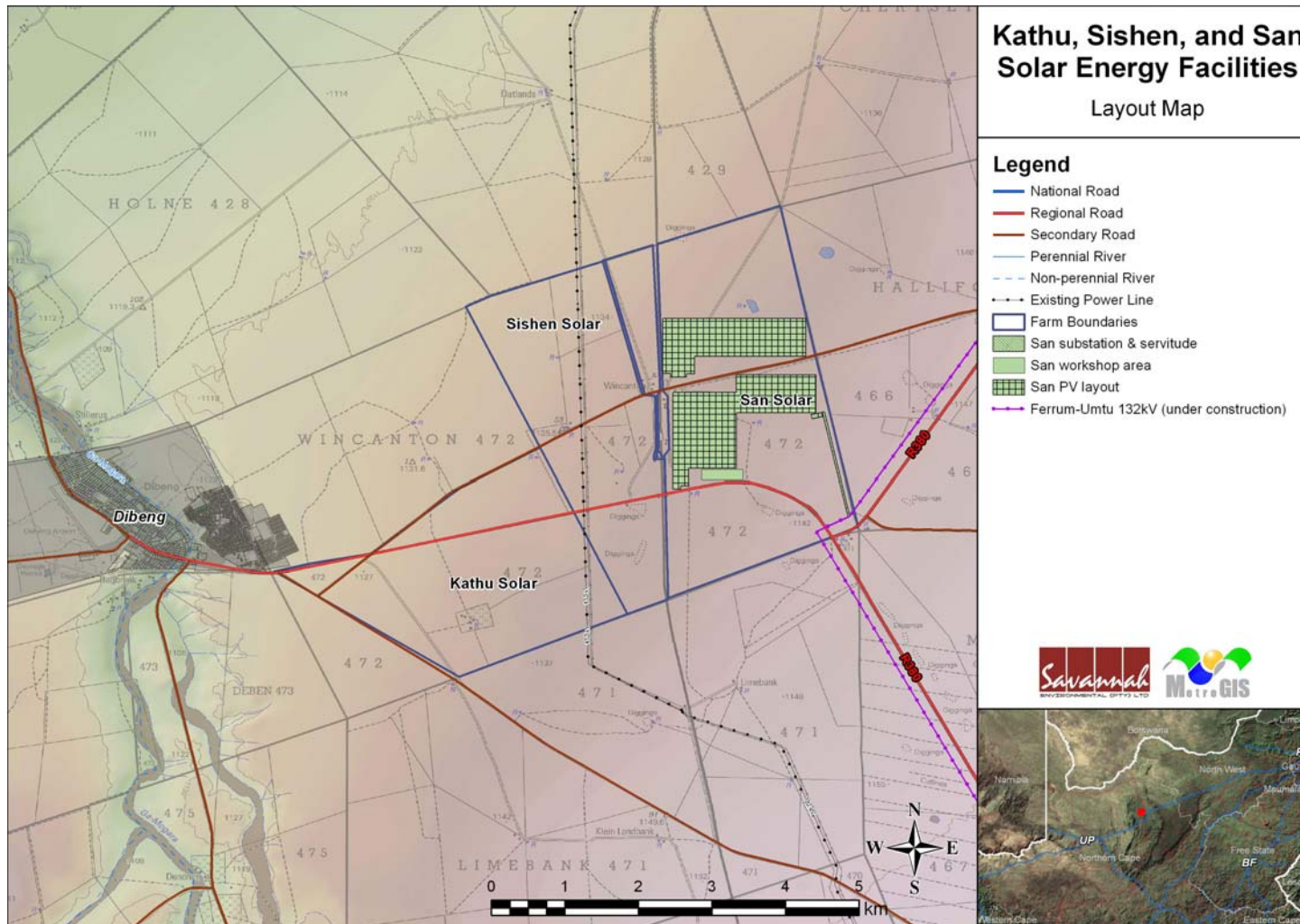


Figure 1.2: Locality map illustrating the location of the two solar energy facilities to be constructed adjacent to the San Solar Energy Facility site. Both the Kathu and the Sishen Solar Energy Facilities are authorised and have been selected by the Department of Energy to be constructed

Table 1.1 provides the status of the environmental applications adjacent to the San Solar Energy Facility submitted to DEA for authorisation.

Table 1.1: Status of solar and related projects in the vicinity of the San Solar Energy Facility

Project	DEA Reference Number	Status
Kathu Solar Energy Facility – 100MW facility	12/12/20/1858/1 and 2	Received environmental authorisation from DEA on the 26/09 /2011. A 75MW plant awarded Preferred Bidder status in November 2011 (Round 1).
Sishen Solar Energy Facility – 100 MW facility	12/12/20/1860	Received environmental authorisation from DEA on the 03/10 /2011. A 75MW plant awarded Preferred Bidder status in May 2012 (Round 2).
132 kV power line connecting the solar energy facilities to the Ferrum MTS - Umtu Klip Kop 132 kV power line, Northern Cape.	12/12/20/2588	Received environmental authorisation from DEA on the 09/07/2012.
A second 132 kV power line connecting the Sishen solar energy facility to the Ferrum MTS - Umtu Klip Kop 132 kV power line, Northern Cape	14/12/16/3/3/1/574	Final Basic Assessment report ready for submission to DEA.

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

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

1.2. Conclusions from the Scoping Phase

The full extent of the project development site (i.e. the entire extent of the farm portion) was evaluated within the scoping study. It was found that:

- » Some sections of the study site are degraded, having lost their grazing value and hence agricultural potential due to extensive bush encroachment over the past decades. The site is currently used extensively for livestock and –game farming

- » Protected trees do occur on the site, as well as within the larger study area. Some protected trees would be required to be removed with the implementation of the development. However, the layout could be planned to avoid the larger groves of Camel Thorn trees that were observed on site. There is a Camel thorn grove, which extends beyond the study area (refer to Figure 1.3).
- » The development footprint can be planned so as to avoid the small pan-like areas (sensitive areas) (refer to Figure 1.3).
- » The study site falls within the expanses of the Kalahari, and is covered entirely by the Kathu Bushveld vegetation type, regarded as least threatened.
- » The only sign of sites of heritage potential on the site were the limited scatterings of quartzite, Late Stone Age tools found in one area, outside the study area

No environmental fatal flaws were identified to be associated with the site. It was recommended that infrastructure should be placed considering the implementation of mitigation measures to minimise impacts to identified sensitive areas. These areas of sensitivity relate only to the ecological aspects of the site and are illustrated in the sensitivity map (refer to Figure 1.3). The soil sensitivity for the entire site is of medium sensitivity and the finds from the Heritage Impact Assessment (HIA) revealed one area outside of the study area where scatterings of surface stone tools were noticed, however these were not concentrated enough to be classified as a Stone Age Site. Their presence does indicate that such sites could still be found sub-surface within the study area.

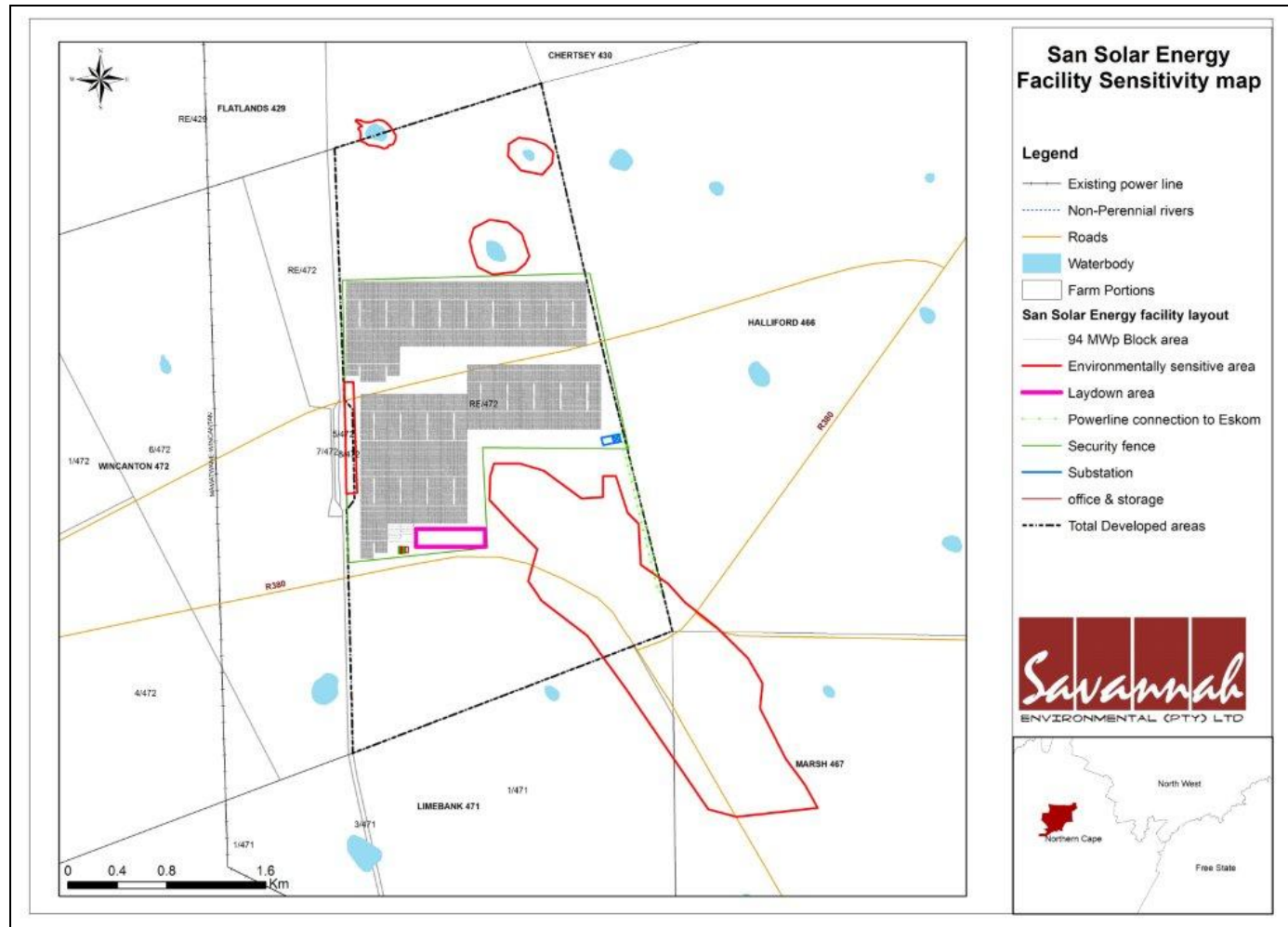


Figure 1.3: Preliminary environmental sensitivity map for the proposed San Solar Energy Facility indicating only ecological sensitivity

From the conclusions of the Scoping Study, the potentially significant issues identified as being related to the **construction** of the San Solar Energy Facility include, *inter alia*:

- » Effects on protected flora and fauna (local and site specific)
- » Impacts on agricultural potential and soils
- » Socio-economic impacts, both positive and negative (including job creation and business opportunities, impacts associated with construction workers in the area)

The potentially significant issues related to the **operation** of the San Solar Energy Facility include, *inter alia*:

- » Visual impacts and impacts on "sense of place" on nearby residential areas and observers travelling on main roads
- » Positive socio-economic impacts
- » Impacts on agricultural potential and land use of the site
- » Increased use of clean, renewable energy (positive)

1.3. Requirement for an Environmental Impact Assessment Process

The proposed solar energy facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, 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 Northern Cape Department of Environmental and Nature Conservation (DENC) will act as a commenting authority for the application. An application for authorisation has been accepted by DEA under application reference number **14/12/16/3/3/2/273**.

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. San Solar Energy Facility (Pty) Ltd 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 this proposed project as the proposed project includes the following "listed activities" in terms of GN R544, R545 and R546 (GG No 33306 of 18 June 2010).

Relevant Notice	Activity No	Description of listed activity	Description of relevance
GN 544, 18 June 2010	10 (i)	The construction of facilities or infrastructure for the transmission and distribution of electricity – i. Outside urban areas or industrial complexes with a capacity of more than 33kv but less than 275kv; ii. Inside urban areas or industrial complexes with a capacity of 275kv or more.	The substation and distribution line associated with facility will have a capacity of more than 33kv but less than 275kv.
GN 545, 18 June 2010	1	The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.	Facility is proposed to generate 75 MW (94MW installed capacity).
GN 545, 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;	The proposed solar energy facility would transform an area greater than 20 ha.

Relevant Notice	Activity No	Description of listed activity	Description of relevance
		except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply.	

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

1.4. Objectives of the EIA Process

The Scoping Phase was completed in October 2012 with the receipt of the acceptance of scoping from DEA. The scoping phase 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 to San Solar Energy Facility (Pty) Ltd 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 to San Solar Energy Facility (Pty) Ltd. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

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

The EAPs from Savannah Environmental who are responsible for this project are:

- » 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.
- » Umeshree Naicker – The principle author of this report, holds an Honours Bachelor of Science degree in Environmental Science and has 4 years experience in environmental management.

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed the following specialist sub-consultants to conduct specialist impact assessments:

- » Ecology – Marianne Strohbach of Savannah Environmental;
- » Geology, soils, and erosion potential – Iain Paton of Outeniqua Geotechnical Services;
- » Heritage resources – Stephan Gaigher of GA Heritage;
- » Visual – Lourens du Plessis of MetroGIS; and
- » Social – Tony Barbour of Tony Barbour Environmental Consulting and Research.

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

DESCRIPTION OF THE PROPOSED PROJECT

CHAPTER 2

This chapter provides an overview of the proposed San Solar Energy Facility on a site located approximately 16 km south east of Kathu in the Northern Cape. 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.

2.1. Description of the Proposed Solar Energy Facility

The facility is proposed to accommodate several photovoltaic (PV) arrays, to make use of the solar resource on the site. The facility is proposed to have a generating capacity of up to 75 MW (94 MW installed capacity). An area of approximately 500 ha in extent is being investigated within the EIA process within which the facility is proposed.

The following table details the project components

Component	Description
Location of the site	~ 16 km south east of Kathu
Municipal Jurisdiction	» Gamagara Local Municipality » John Taolo Gaetsewe District Municipality
Extent of the proposed development footprint	<500 ha
Extent of broader site available for development	~800 ha
Site access	Existing direct road access via the R380. The R380 branches of the N12
Generating capacity	75 MW (94 MW installed capacity)
Proposed technology	Photovoltaic panels
Associated infrastructure	» An on-site generator transformer and a single substation to facilitate the connection between the solar energy facility and the Eskom Umtu-Ferrum power line. » An overhead power line turning into and out of the Eskom Umtu-Ferrum 132kV power line » Internal access roads (~4m wide x 5000m in length)

Component	Description
	» Workshop, office and change house, and control centre.
Water use	<ul style="list-style-type: none"> » ~12 000m³ required during the construction phase and 7000m³ for annual operations. » No effluent will be produced except for the normal sewage from site and operations staff. This will be treated as per normal standards with a septic tank and disposed of at a facility off-site.

A preliminary layout of the proposed facility has been provided by the project developer, and is indicated in Figure 2.1. This is the layout which has been assessed within this EIA Report.

2.2. Purpose of the Proposed Project

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

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

In responding to the growing electricity demand within South Africa, as well as the country's targets for renewable energy, San Solar Energy Facility (Pty) Ltd is proposing the establishment of the San Solar Energy Facility to add new capacity to the national electricity grid. San Solar Energy Facility (Pty) Ltd will be required to apply for a generation license from the National Energy Regulator of South Africa (NERSA), as well as a power purchase agreement from Eskom (typically for a period of 20 years) in order to build and operate the proposed facility. As part of the agreement, the San Solar Energy Facility (Pty) Ltd will be remunerated per kWh

by Eskom who will be financially backed by government. Depending on the economic conditions following the lapse of this period, the facility can either be decommissioned or the power purchase agreement may be renegotiated and extended.

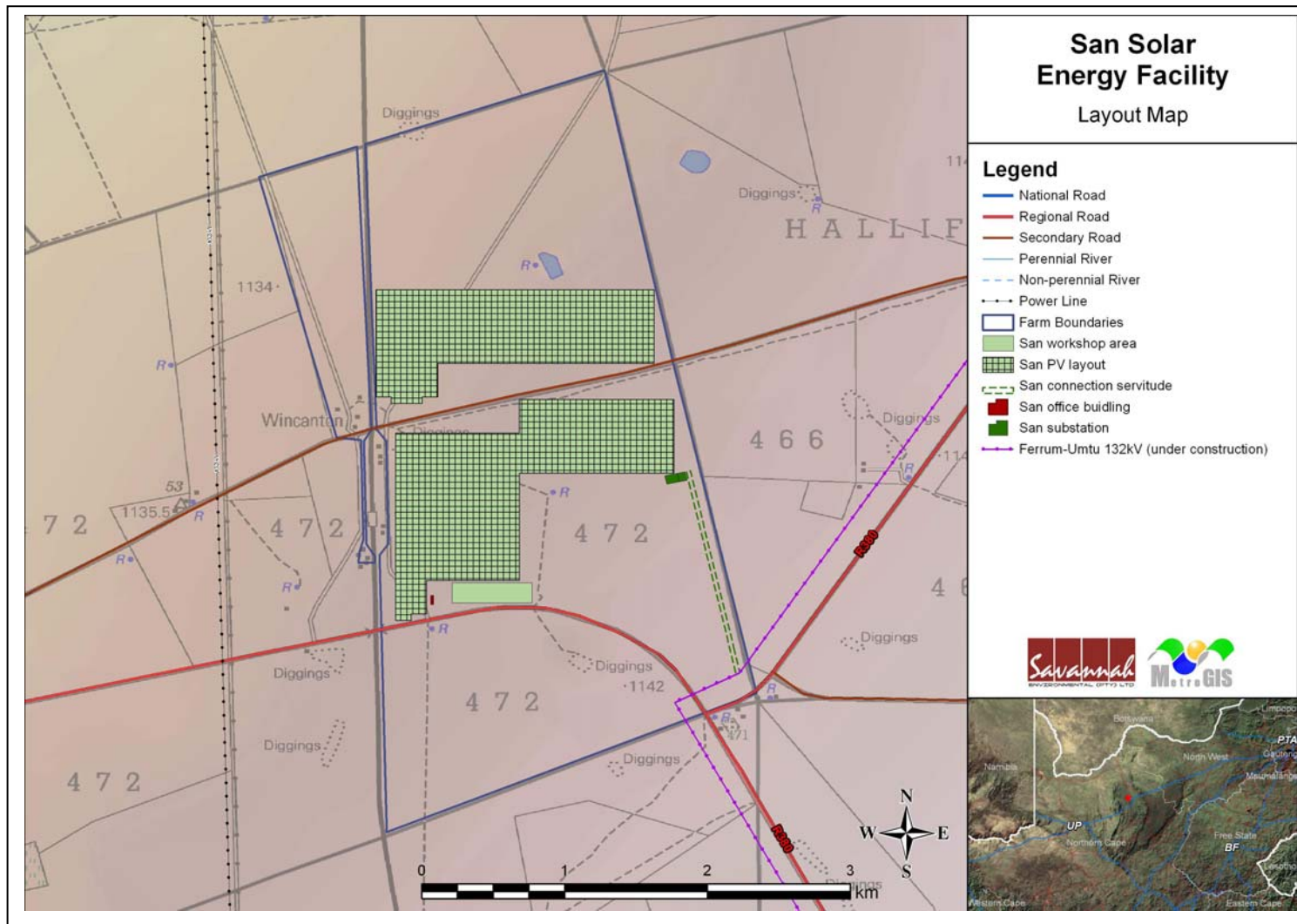


Figure 2.1: Preliminary layout for the proposed San Solar Energy Facility.

It is considered viable that long-term benefits for the community and/or society in general can be realised should the site identified prove to be acceptable from a technical and environmental perspective for the establishment of the proposed PV facility. The San Solar Energy Facility has the potential to contribute to national electricity supply and to increase the security of supply to consumers. In addition, it may provide both economic stimulus to the local economy through the construction process and long term employment (i.e. management and maintenance) during the operation phase.

2.3. Solar Energy as a Power Generation Technology

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

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

2.3.1 How do Grid Connected Photovoltaic Facilities Function?

Solar energy facilities, such as those using PV technology use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect (see Figure 2.1). This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity. This is achieved using the following components:

The Photovoltaic Cell

Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel. Other technologies that can be used include thin film.

The Inverter

The photovoltaic effect produces electricity in direct current. Therefore an inverter must be used to change it to alternating current.

The **Support Structure**

The photovoltaic (PV) panels will be attached to a **support structure approximately 6 meters off the ground** set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.



Figure 2.2: Illustration of a photovoltaic solar facility

2.4. Project Alternatives

Due to the nature of the development (i.e. a renewable energy facility), the location of the project is largely dependent on technical factors such as solar irradiation (i.e. the fuel source), climatic conditions, available extent and the relief/topography of the site, and available grid connection. The proposed site was identified by the proposed developer as being technically feasible.

The following characteristics were considered in determining the feasibility of the proposed site. Based on these considerations, San Solar Energy Facility (Pty) Ltd considers the proposed site as their highly preferred site for the development of the San Solar Energy Facility.

Site extent: Space is a restraining factor for a PV solar facility installation. The PV solar facility of 75 MW will require an area < 500 ha. There is sufficient space for the proposed project within the area under consideration.

Site access: The site can be directly accessed via the R380 provincial route. The R380 branches off the National Road 14, south of Kathu.

Climatic conditions: The economic viability of a PV facility is directly dependent on the annual direct solar irradiation values. The Northern Cape receives the highest average daily direct normal irradiation in South Africa which indicates that the regional location of the project is appropriate to a solar energy facility.

Site slope and aspect: A level surface area (i.e. with a minimal gradient in the region of 1%) is preferred for the installation of PV panels (Fluri, 2009) (refer to Figure 2.3).

Technology Alternatives: Static or Tracking PV technology is being considered for the project. Photovoltaic Solar Panels point directly due south or due north depending upon their location. In order to increase efficiency the photovoltaic panel needs to produce the maximum amount of solar energy for the maximum amount of time during sunlight hours. Static PV panels are fixed at an angle and do not "track" the sun. However, tracking PV panels follow the sun's rotational path all day, every day of the year giving it the best solar panel orientation and generating the maximum possible output power



Figure 2.3: Illustration of a tracking photovoltaic panel

2.4.1 Electricity Evacuation Infrastructure

Energy generated by the San Solar Energy Facility will be evacuated to the national grid via a new on-site substation; a line will be constructed from the new substation to loop in and loop out of the Eskom Ferrum-Umtu 132kV power line (which is currently under construction). The Eskom Ferrum-Umtu 132kV power line will connect to the Ferrum Station, which is located south east of the proposed San Solar Facility.

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.

2.4.1. Construction Phase

The construction of the facility is unlikely to be phased, with the full 75 MW (94 MW installed capacity) most likely being installed in one phase (75 MW is the current limit for solar projects set by the Department of Energy). The construction phase is expected to extend over a period of 21 months and create approximately 400 employment opportunities at peak construction. It is anticipated that approximately 30% (120) of the employment opportunities will be available to low skilled (construction labourers, security staff etc), 45% (180) semi-skilled workers (drivers, equipment operators etc) and 25% (100) to skilled personnel (engineers, land surveyors, project managers etc). The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area, specifically residents from the town of Kathu. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. This would represent a significant positive social benefit in an area with limited employment opportunities

The construction phase will 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, substation and the plant's associated infrastructure) and a geotechnical survey. Geotechnical surveys are executed by geotechnical engineers and geologists to acquire information regarding the physical characteristics of soil and rocks underlying a proposed site. The purpose is to design earthworks and foundations for structures and to execute earthwork repairs necessitated due to changes in the subsurface environment.

A power line servitude survey will also be conducted for the proposed Eskom Umtu-Ferrum 132kV power line. If necessary, a walk through survey will be undertaken for ecological, archaeology and heritage resources which may necessitate certain towers to be shifted to avoid on-the-ground sensitivities.

Establishment of Access Roads

The R380 provincial route runs parallel to the site. Access to the site will be directly from this road. Within the site itself, access will be constructed to the individual facility components for construction purposes (and later limited access for maintenance). Access track construction would normally comprise of compacted rock-fill with a layer of higher quality surfacing stone on top.

Undertake Site Preparation

Site preparation activities will include clearance of vegetation for most of the proposed area. In addition, site preparation 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 to one slope. Rocks may also be removed.

Transport of Components and Construction Equipment to Site

The components for the proposed facility will be transported to site 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)¹ by virtue of the dimensional limitations (i.e. size and weight). The typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.), as well as the components required for the establishment of the substation and power line.

Establishment of Construction Equipment Camp

Once the required equipment has been transported to site, a construction equipment camp will need to be established. 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.

Establishment of the PV Panels

The PV panels will be mounted via earth screws and/or H bars. This will not require the use of concrete foundations.

Establishment of Ancillary Infrastructure

¹ A permit will be required for the transportation of these abnormal loads on public roads.

Ancillary infrastructure for the proposed development includes; Workshop, office and a change house. The establishment of these facilities/buildings will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

Construct on-site substation and Power line

An on-site substation of approximately 120 m x 70 m will be required to be established on the site. The construction of the substation would include the construction of the foundations, erection and installation of equipment (including the transformer) and connection of the necessary conductors.

A new power line will connect the new substation to the Eskom Umtu-Ferrum 132kV power line.

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.

2.4.2. Operational Phase

A loop-in, loop-out connection on the Eskom Ferrum-Umtu 132kV power line which is immediately east of the proposed site, will evacuate the facility to the Eskom grid.

The proposed operational phase is expected to extend for a period of approximately 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 (using water and/or pressurised air). 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. No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed.

2.4.3. Decommissioning Phase

Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended.

If it is deemed financially viable to continue, existing components would be disassembled and replaced with more appropriate technology/infrastructure available at that time. 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 Remove 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.

REGULATORY AND LEGAL CONTEXT

CHAPTER 3

3.1 Policy and Planning Context

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

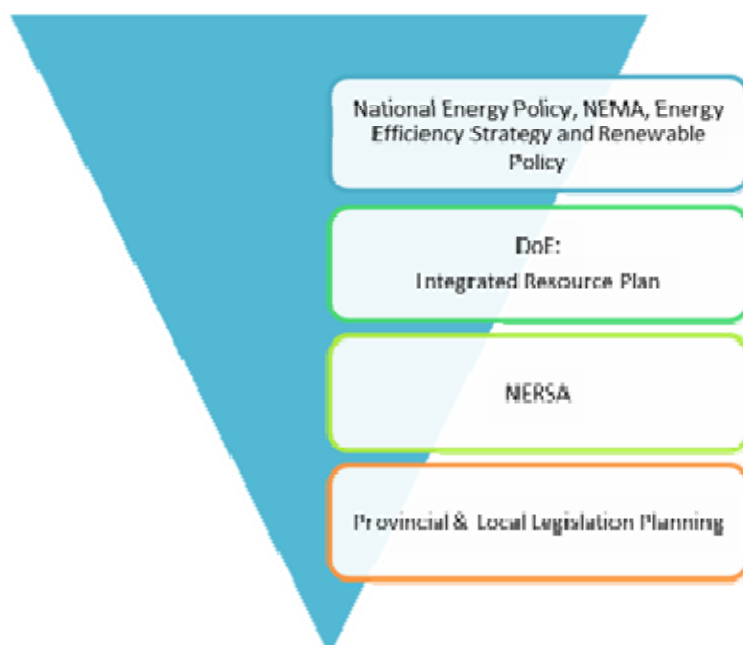


Figure 3.1: Hierarchy of electricity policy and planning documents

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

Internationally there is increasing development of the use of renewable technologies for the generation of electricity due to concerns such as climate change and exploitation of resources. In response, the South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol, the enabling mechanism for the convention, in August 2002. In addition, national response strategies have been developed for both climate change and renewable energy.

Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by the National Energy Policy (DME, 1998). This policy recognises that renewable energy applications have specific characteristics which need to be considered. The Energy Policy is *“based on the understanding that renewables are energy sources in their own right, and are not limited to small-scale and remote applications, and have significant medium- and long-term commercial potential.”* In addition, the National Energy Policy states that *“Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future”*.

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. It also informs the public and the international community of the Government’s vision, and how the Government intends to achieve these objectives; and informs Government agencies and organs of their roles in achieving the objectives.

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. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

Government policy on renewable energy is therefore concerned with meeting the following challenges:

- » Ensuring that economically feasible technologies and applications are implemented;

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

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."*

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; and
- » 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 the same month. 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 awarded electricity generation licences for new generation capacity projects under the IPP procurement programme.

3.1.5 Northern Cape Provincial Spatial Development Framework (2011)

The Provincial Spatial Development Framework (PDSF) for the Northern Cape Province (NCP) is was completed on 31 July 2012 and is valid from the date of approval by the Member of the Executive Council (MEC) for the Department of Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA).

The PSDF is the product of an integrated process facilitated by a dedicated organisational structure. The latter comprised three forums which collectively represented and addressed the interests and mandates of the full spectrum of government departments, district and local municipalities, and key Non-Governmental Organisations (NGOs). All of the institutions that formed part of the project forums have endorsed the PSDF and are accordingly committed to the implementation thereof. The purpose and function of the PDSF is to;

- » Spatial land use directive which aims to promote environmental, economic, and social
- » sustainability through sustainable development.
- » Guideline for instilling a developmental state.
- » Basis for prioritising governmental programmes and projects.
- » Premise for governmental performance management.
- » Manual for integrated land use planning.

Renewable Energy

The PSDF (Volume 2) notes that, at present, the Eskom Vanderkloof hydro station on the Orange River (240 MW) represents the only large energy-generating facility

in the NCP. Most of the energy used in the Province is generated by Eskom plants located elsewhere in South Africa, mainly Mpumalanga Province. The PSDF therefore notes that the NCP's major energy challenges include securing energy supply to meet growing demand, providing everybody with access to energy services and tackling the causes and impacts of climate change (as per Provincial Growth and Development Strategy). In this regard, the development of large scale renewable energy supply schemes is strategically important for increasing the diversity of domestic energy supplies for the NCP, and avoiding energy imports while minimising the environmental impacts.

The PSDF further notes that renewable energy has been identified as a mechanism to diversify the economy and thereby promoting a green economy in the province. According to the Provincial Growth and Development Strategy (PGDS), greening the economy is characterised by substantially increased investments in economic sectors.

Tourism

The PSDF notes that the tourism sector is identified in the Draft 4 PGDS as one of the key sectors with the capacity to 'grow, transform and diversify the provincial economy'. According to the PGDS, the vision for tourism is underpinned by a number of broad, essential and specific drivers. The 'broad drivers' consider the 'big picture' focusing on tourism's contribution to a larger development purpose, including overall economic growth, addressing social upliftment and poverty alleviation through facilitating job creation, and striving for more equitable ownership and participation in tourism through transformation.

Comparative advantages of the NCP are identified as mainly eco-tourism opportunities, including unique sectoral or nature-based routes; National parks, nature reserves and game reserves, Natural and cultural manifestations, as well as festivals and cultural events (PGNC; 2011b).

3.2 District Level Planning and Spatial Policy Context

3.2.1. John Taolo Gaetsewe District Municipality Integrated Development Plan (2007-2011)

The Integrated Development Plan (IDP) lists a number of Key Performance Areas (KPA's). The KPA's that have a bearing on the proposed San Solar Energy Facility include:

KPA 1: Basic service delivery and infrastructure investment Electricity

This issue relates to the current backlogs in terms of energy provision, with specific reference to the need to deal with those members of the community that still do

not have access to electricity for cooking, heating and lighting purposes. In its broadest definition, this include energy saving.

KPA 2: Local Economic Development

It will also promote the economic growth of the area through LED, mining, agriculture and other related economic potentials and drivers and support SMME Development.

The IDP identifies also four strategic objectives, within which the thirteen anchor projects were identified:

- » Providing services to struggling communities;
- » Developing infrastructure;
- » Capacity building within the District Municipality;
- » Local Economic Development

The IDP also refers to the District Growth and Development Strategy (DGDS) which aims to provide a framework for sustainable growth and economic development for the District over the next ten years. The key targets that are relevant to the proposed San Solar Energy Facility include:

- » Maintain an average provincial annual growth rate of between 4%-6%;
- » Halve the unemployment rate by 2014;
- » Reduce the number of households living in absolute poverty by 5% per annum;
and
- » Provide adequate infrastructure for economic growth and development by 2014

The Growth and Development Strategy (DGDS) focuses on 6 thrusts considered to be the main economic drive of the area. The following are of potential relevance to the proposed San Solar Energy Facility, specifically in terms of the establishment of a Community Trust.

Agriculture: Stimulate the agricultural sector through the sustenance of commercial farming by expanding the sector through variety of value adding initiatives. Linked to this is the transformation and development of subsistence farming through capacity-building, facilitating access to markets, finance, infrastructure, machinery, agro-processing technology and skills.

Infrastructure development: Identify infrastructure backlogs to enable the district municipality to intervene decisively through the provision of infrastructure services. The emphasis is in developing road networks that links economic activities within the District Municipality to cut the costs of doing business. Tied to this is the provision of basic services such as housing, telecommunications, water and sanitation, which are critical in jettisoning economic growth within the municipality.

Manufacturing: Identify manufacturing opportunities from other sectors, particularly mining and agriculture, linking such with the overall SMMEs strategy in the municipality. Create export markets for regionally produced goods, both at national and international levels.

SMME development: Set clear SMME developmental goals in financing and supporting SMME's, targeting previously disadvantaged people, women, youth and people living with disabilities. This must find practical expression in municipal institutional arrangements and all social partners' outsourcing and procurement policies.

Tourism: Appraise the entire district tourism sector, including operators, products and services to enable social partners to identify critical intervention areas.

3.3. Regulatory Hierarchy for Energy Generation Projects

The South African energy industry is evolving rapidly, with regular changes to legislation and industry role-players. The regulatory hierarchy for an energy generation project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and local levels. As solar energy development is a multi-sectorial issue (encompassing economic, spatial, biophysical, and cultural dimensions) various statutory bodies are likely to be involved in the approval process for solar energy facility project and the related statutory environmental assessment process.

3.3.1. Regulatory Hierarchy

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

- » *Department of Energy:* 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)
- » *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for solar energy developments to generate electricity.
- » *Department of Environmental Affairs (DEA):* This department is responsible for environmental policy and is the controlling authority in terms of NEMA and the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.
- » *The South African Heritage Resources Agency (SAHRA):* The National Heritage Resources Act (Act No 25 of 1999) and the associated provincial regulations

provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.

- » *National Department of Agriculture, Forestry, and Fisheries (DAFF)*: This department is responsible for activities pertaining to subdivision and rezoning of agricultural land. The forestry section is responsible for the protection of tree species under the National Forests Act (Act No 84 of 1998).
- » *South African National Roads Agency (SANRAL)*: This department is responsible for all national routes.

At the Provincial Level, the main regulatory agencies are:

- » *Provincial Government of the Northern Cape – Department of Environmental and Nature Conservation (DENC)*: This department is the commenting authority for this project.
- » *Department of Transport and Public Works*: This department is responsible for roads and the granting of exemption permits for the conveyance of abnormal loads on public roads.
- » *Provincial Department of Water Affairs*: This department is responsible for water use licensing and permits.
- » *Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority)*: This body is responsible for all heritage related issues in the Northern Cape Province.
- » *The Department of Agriculture*: This Department is responsible for all matters which affect agricultural land.

At the local level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Northern Cape, both the local and district municipalities play a role. The local municipality is the Gamagara Local Municipality which forms part of the John Taolo Gaetsewe District Municipality. There are also numerous non-statutory bodies such as environmental non-governmental organisations (NGOs) and community based organisations (CBO) working groups that play a role in various aspects of planning and environmental monitoring that will have some influence on proposed solar energy development in the area.

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

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

- » National Environmental Management Act (Act No 107 of 1998).
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR543, GNR544, GNR545, and GNR546 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

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 3.1**.

Table 3.1: Relevant legislative permitting requirements applicable to the proposed solar energy facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<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>Department of Environmental and Nature Conservation (DENC)- 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>
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<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 duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p>	<p>Department of Environmental Affairs</p>	<p>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</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs Department of Environmental and Nature Conservation (DENC)- Local Authorities	the project. 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	Department of Water Affairs	A water use license (WUL) is required to be obtained

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required).</p> <p>Consumptive water uses may include the taking of water from a water resource - Sections 21a and b.</p> <p>Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.</p>	<p>Provincial Department of Water Affairs</p>	<p>if wetlands or drainage lines are impacted on, or if infrastructure lies within 500m of such features. Pans occur on the project site, but outside of the development footprint.</p> <p>Should water be abstracted from ground water/ a borehole on site for use within the facility, a water use license may be required.</p>
<p>Minerals and Petroleum Resources Development Act (Act No 28 of 2002)</p>	<p>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.</p> <p>Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</p> <p>S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed</p>	<p>Department of Mineral Resources</p>	<p>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.</p> <p>A Section 53 application will be submitted the Northern Cape DMR office.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	activities do not sterilise a mineral resources that might occur on site.		
National Environmental Management: Air Quality Act (Act No 39 of 2004)	<p>Measures in respect of dust control (S32) – no regulations promulgated yet.</p> <p>Measures to control noise (S34) - no regulations promulgated yet.</p>	Department of Environmental Affairs	<p>No permitting or licensing requirements arise from this legislation.</p> <p>The Act provides that an air quality 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.</p>
National Heritage Resources Act (Act No 25 of 1999)	<ul style="list-style-type: none"> » Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). » Requires the compilation of a Conservation 	South African Heritage Resources Agency	An HIA and PIA has been undertaken as part of the EIA Process to identify heritage sites.(See Appendix G)

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).		
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	<ul style="list-style-type: none"> » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). 	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 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. This report is contained in Appendix E.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. 		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	<ul style="list-style-type: none"> » Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048). 	Department of Agriculture	<p>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>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.</p>
National Forests Act (Act No. 84 of 1998)	According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that no person may cut, damage, disturb, destroy or remove any protected	National Department of Forestry	There are a few scattered Camel Thorn trees on the proposed development site. These trees are

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister’.		protected and therefore a permit is required to remove them.
GN727: Declaration of Kathu Forest as a Protected Woodland Under Section 12(1)(C) of The National Forests Act, 1998 (Act No 84 Of 1998).	<p>Minister of Agriculture, Forestry and Fisheries hereby declares the Kathu forest as a Protected Woodland in terms of section 12 (1)(c) of the National Forests Act,1998 (Act No 84 of 1998).</p> <p>In terms of section 15(1) of the National Forests Act, 1998, no person may.</p> <p>a) Cut, disturb. damage or destroy any protected tree; or</p> <p>b) Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except:</p> <p>(i) under a license granted by the Minister; or</p> <p>(ii) in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.</p>	National Department of Forestry	The proposed area does not fall within the Kathu Forest area.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this act will find application during the construction and operational phase of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>		<p>project.</p>
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<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 Group IV: any electronic product; and 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>	<p>Department of Health</p>	<p>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.</p>
<p>Development Facilitation Act (Act No 67 of 1995)</p>	<p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p>	<p>Local Municipality</p>	<p>The applicant must submit a land development application in the</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	S (2 - 4) provide general principles for land development and conflict resolution.		prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province	Department of Agriculture	Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	<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</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 K).</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>identified listed activities.</p> <p>Any person who stores waste must at least 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. 		<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>National Road Traffic Act (Act No 93 of 1996)</p>	<ul style="list-style-type: none"> » The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort 	<ul style="list-style-type: none"> » South African National Roads Agency Limited (national roads) » Provincial Department of Transport 	<p>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</p> <p>Transport vehicles exceeding the dimensional</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<p>requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>		<p>limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</p>
<p>Promotion of Access to Information Act (Act No 2 of 2000)</p>	<p>All requests for access to information held by state or private body are provided for in the Act under S11.</p>	<p>Department of Environmental Affairs</p>	<p>No permitting or licensing requirements.</p>
<p>Promotion of Administrative Justice Act (Act No 3 of 2000)</p>	<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 a right to be heard.</p>	<p>Department of Environmental Affairs</p>	<p>No permitting or licensing requirements.</p>
Provincial Legislation			
<p>Northern Cape Nature Conservation Act, Act No. 9 of 2009</p>	<p>This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project:</p>	<p>Provincial Department of Environmental Affairs</p>	<p>Permitting or licensing requirements arise from this legislation for the proposed activities to be undertaken for the proposed project.as there are a few scattered Camel Thorn protected trees on the proposed development site. A permit is required to</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	<ul style="list-style-type: none"> » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species. » The Act provides lists of protected species for the Province. 		remove the trees.

APPROACH TO UNDERTAKING THE EIA PHASE

CHAPTER 4

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

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

4.1. Phase 1: Scoping Phase

The Scoping Study, which was completed in October 2012 with the acceptance of Scoping by the DEA, served to identify potential issues associated with the proposed project, and define the extent of studies required within the EIA Phase. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs).

I&APs were provided with the opportunity to receive information regarding the proposed project, to participate in the process and to raise issues or concerns. Furthermore, the Draft Scoping Report was made available at the Kathu and Dibeng Public Library and on the Savannah Environmental website for I&AP review and comment for a 30-day period. All the comments, concerns, and suggestions received during the Scoping Phase and the review period were included in the Final Scoping Report.

The Scoping Report was submitted to the National Department of Environmental Affairs in August 2012. The Final Scoping Report and Plan of Study for the EIA were accepted by the DEA, as the competent authority, in October 2012. In terms of this acceptance, an EIA was required to be undertaken for the proposed project.

4.2. Phase 2: Environmental Impact Assessment Phase

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

- » Provide a comprehensive assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- » Assess potentially significant impacts (direct, indirect, and cumulative, where required) associated with the proposed facility.
- » Comparatively assess any alternatives put forward as part of the project (i.e. in this case the options of storage versus no storage were assessed).
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public participation process to ensure that I&AP are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA Report addresses potential direct, indirect, and cumulative² impacts (both positive and negative) associated with all phases of the project including design, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

4.2.1. Tasks to be completed during the EIA Phase

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

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

² "Cumulative environmental change or cumulative effects may result from the additive effect of individual actions of the same nature or the interactive effect of multiple actions of a different nature" (Spaling and Smit, 1993).

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

4.2.2 Authority Consultation

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

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

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

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

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

4.3.1 Public Involvement and Consultation

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

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

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

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

Identification of I&APs was undertaken by **Sustainable Futures** (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	<ul style="list-style-type: none"> » Northern Cape – Department of Environmental and Nature Conservation (DENC) » Northern Cape - Agriculture and Rural Development » Northern Cape - Public Works, Roads and Transport » Northern Cape - Water Affairs » South African Heritage Resources Agency National Department of Agriculture, Forestry and Fisheries » South African National Roads Agency » Department of Energy
Municipalities	<ul style="list-style-type: none"> » Gamagara Local Municipality » John Taolo Gaetsewe District Municipality
Public stakeholders	<ul style="list-style-type: none"> » Advertisement placed to inform the public of the availability of the report and public meeting
Parastatals & service providers	<ul style="list-style-type: none"> » Eskom Transmission and Distribution » South African Heritage Resources Agency – » Ngwao Boswa ya Kapa Bokone (Northern Cape Heritage Authority):
NGOs/Business forums	<ul style="list-style-type: none"> » Wildlife Environment Society of South Africa

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

has been on-going for the duration of the EIA Process and the project database has been updated on an on-going basis.

» **Newspaper Advertisements**

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

- * Gemsbok (07 March 2012)

During the EIA phase, a second round of newspaper adverts was placed to inform the public on the details of the availability of the Draft EIA Report for public review as well as the public meeting in the following newspapers:

- * Gemsbok (24 October 2012)
- * Kathu Gazette (27 October 2012)

» **Consultation**

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

- * Focus group meetings (stakeholders invited to attend)
- * Public meeting (advertised in the local press)
- * Written, faxed or e-mail correspondence

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

- * **Date:** 12 November 2012
- * **Time:** 18.00pm – 19.30pm
- * **Venue:** Namakwari Lodge, 1 Frikkie Meyer Road, Kathu

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

4.3.2 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.

4.3.3 Assessment of Issues Identified through the Scoping Process

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

Table 4.1: Specialist studies undertaken within the EIA Phase

Specialist	Area of Expertise	Refer Appendix
Marianne Strohbach of Savannah Environmental	Ecological impact assessment	Appendix E
Iain Paton of Outeniqua Geotechnical Services	Geology, soils, and erosion potential	Appendix F
Stephan Gaigher of GA Heritage	Heritage resources	Appendix G
Lourens du Plessis of MetroGIS	Visual impact assessment	Appendix H
Tony Barbour of Tony Barbour Environmental Consulting and Research	Social impact assessment	Appendix I

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

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

- * 4 is low and will cause a slight impact on processes
 - * 6 is moderate and will result in processes continuing but in a modified way
 - * 8 is high (processes are altered to the extent that they temporarily cease)
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- » The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
- * Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood)
 - * Assigned a score of 3 is probable (distinct possibility)
 - * Assigned a score of 4 is highly probable (most likely)
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures)
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- » The **status**, which is described as either positive, negative or neutral
- » The degree to which the impact can be reversed
- » The degree to which the impact may cause irreplaceable loss of resources
- » The degree to which the impact can be mitigated

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

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

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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

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

4.3.4 Assumptions and Limitations

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

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

Refer to the specialist studies in **Appendices E – I** for specialist study specific limitations.

DESCRIPTION OF THE RECEIVING ENVIRONMENT

CHAPTER 5

This section of the Draft EIA Report provides a description of the environment that may be affected by the proposed San Solar project. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is situated. Features of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the environmental and social specialist reports contained within **Appendices E – I**.

5.1 Regional Setting: Location of the Study Area

The study site is located on the remaining extent of the Farm Wincanton 472 within the north-eastern region (Kalahari and Diamond Fields Region) of the Northern Cape. The site lies approximately 5km east of Dibeng, 16 km south east of Kathu, 200 km north-east of Upington and 280 km north-west of Kimberley. The site lies on either side of the Dibeng-Kathu tar road, which branches off the R380 Kathu-Hotazel road.

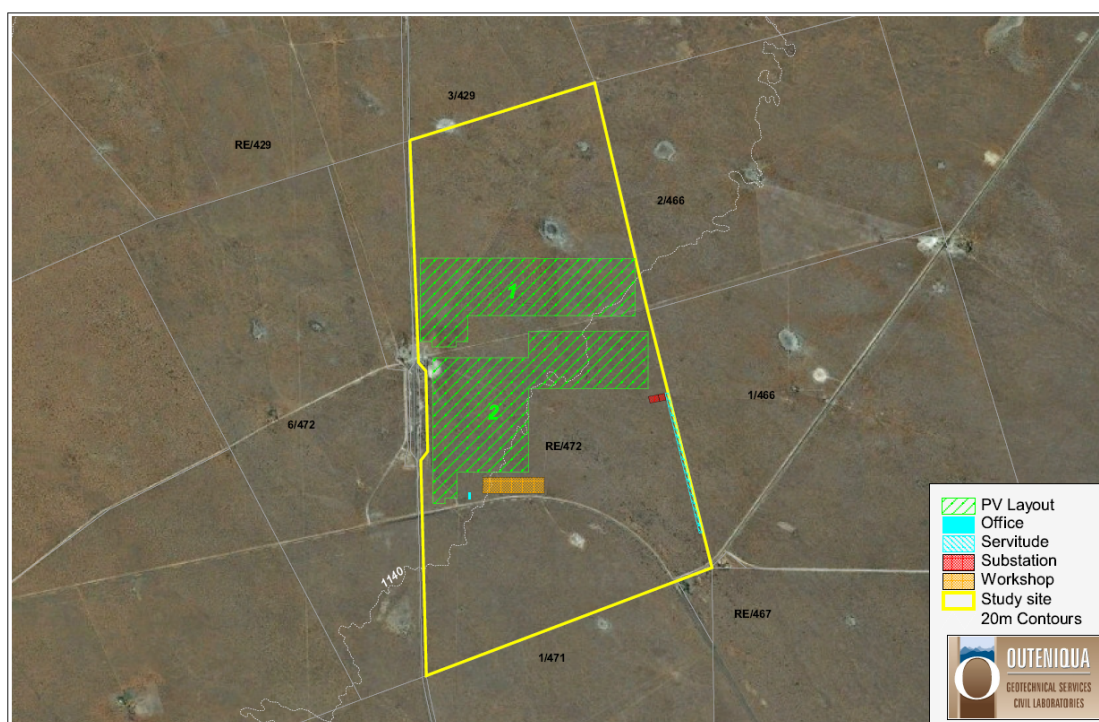


Figure 5.1: Aerial photo of the site

5.2 Climatic Conditions

The arid climate of the study area is typical of the Karoo interior, characterised by low, generally summer rainfall distribution, warm to hot summers and cold to very cold winters. Very warm temperatures of above 40°C may be experienced in summer, while frost in winter is not common, but may occur occasionally. Mean annual precipitation for this region is less than 200 mm and the annual potential evaporation is in excess of 2500 mm.

5.3 Biophysical Characteristics of the Study Area

5.3.1. *Topographical Profile*

The average elevation for the broader area is approximately 1130 m above sea level (asl). The broader region has a gentle westerly sloping topography towards the Ga Mogara River (a seasonally dry river bed that very occasionally flows in a south to north direction through Dibeng). A few minor ephemeral tributaries drain the proposed study area in a westerly direction towards this river.

5.3.2. *Geological Profile*

The bedrock geology of the broader area is covered by Quaternary red-brown wind-blown sands of the Gordonia Formation. Localised outcrops of dolomite, banded ironstone, chert, shale, quartzite, conglomerate, tillite of the Dolomite series, quartzite, shale, tillite, andesite, chert, jaspillite, limestone of the Pretoria Series, and lava, sandstone, conglomerate, sandstone, greywacke of the Waterberg System protrude through the sand cover within the broader area, but outside of the study site. Further to this, aerial photography indicates that rock outcrops are sparse in this area, and that the majority of the study area is covered in Quaternary unconsolidated sands.

5.3.3. *Ecological Profile*

The study area falls within the Karoo Biome with the single vegetation type occurring in the area (i.e. Kathu Bushveld) which extends in all directions from the site. This vegetation type occurs on the extensive, relatively flat plains between Kathu and the border of Botswana. It is characterised by open plains with Shepherd's Trees as the most prominent-occurring tree species, with Camel Thorn trees occurring in places. The shrub layer is generally the most important component of this vegetation type, dominated by species such as Black Thorn Acacia, Star Apple and Karee Thorn, while the grass layer is variable in cover.

Camel Thorn is relatively common in the area. As this species is protected, a permit would need to be obtained where the proposed infrastructure impacts on any individuals.

There are four plant communities could be identified; *Acacia mellifera* – *Stipagrostis*

uniplumis, *Pentzia calcarea* – *Cynodon dactylon*, *Ziziphus mucronata* – *Acacia mellifera*, and *Pentzia incana* – *Enneapogon desvauxii*.

- » The *Acacia mellifera* – *Stipagrostis uniplumis* bushlands occur on the majority of the plains where topsoils are sands, and surface calcrete and patches of accumulated loams are relatively limited. The Conservation status is considered as Least Concern with small area of Medium-Low. The Sensitivity rating is of Least Concern with small area of Medium-Low. Medium-Low rating is due to the presence of a grove of Camelthorn trees.
- » The *Pentzia calcarea* – *Cynodon dactylon* grasslands are limited to the small pan-like depressions. The Conservation status is low and the Sensitivity rating is Medium-Low.
- » The *Ziziphus mucronata* – *Acacia mellifera* bushlands are restricted to narrow but dense bands around pan-like depressions or watering holes. The Conservation status is Medium-Low and the sensitivity rating is Medium-Low.
- » The *Pentzia incana* – *Enneapogon desvauxii* dwarf shrublands are restricted to areas with prominent surface calcrete. The Conservation status is Low. The Sensitivity rating is of least concern. It is only least concern due to the extreme degradation state of this vegetation. Under less degraded conditions, these habitats usually have a higher sensitivity rating.

At a national scale Kathu Bushveld has been transformed by only a small amount and is therefore not considered to be a threatened vegetation type.

The site is not known to harbour alien plants in significant numbers. Mesquite is a potential problem in this region and can easily invade disturbed sites, after which it becomes difficult to eradicate and spreads into surrounding vegetation. There is therefore a potential for alien species to spread or become established within the development area following disturbance on site.

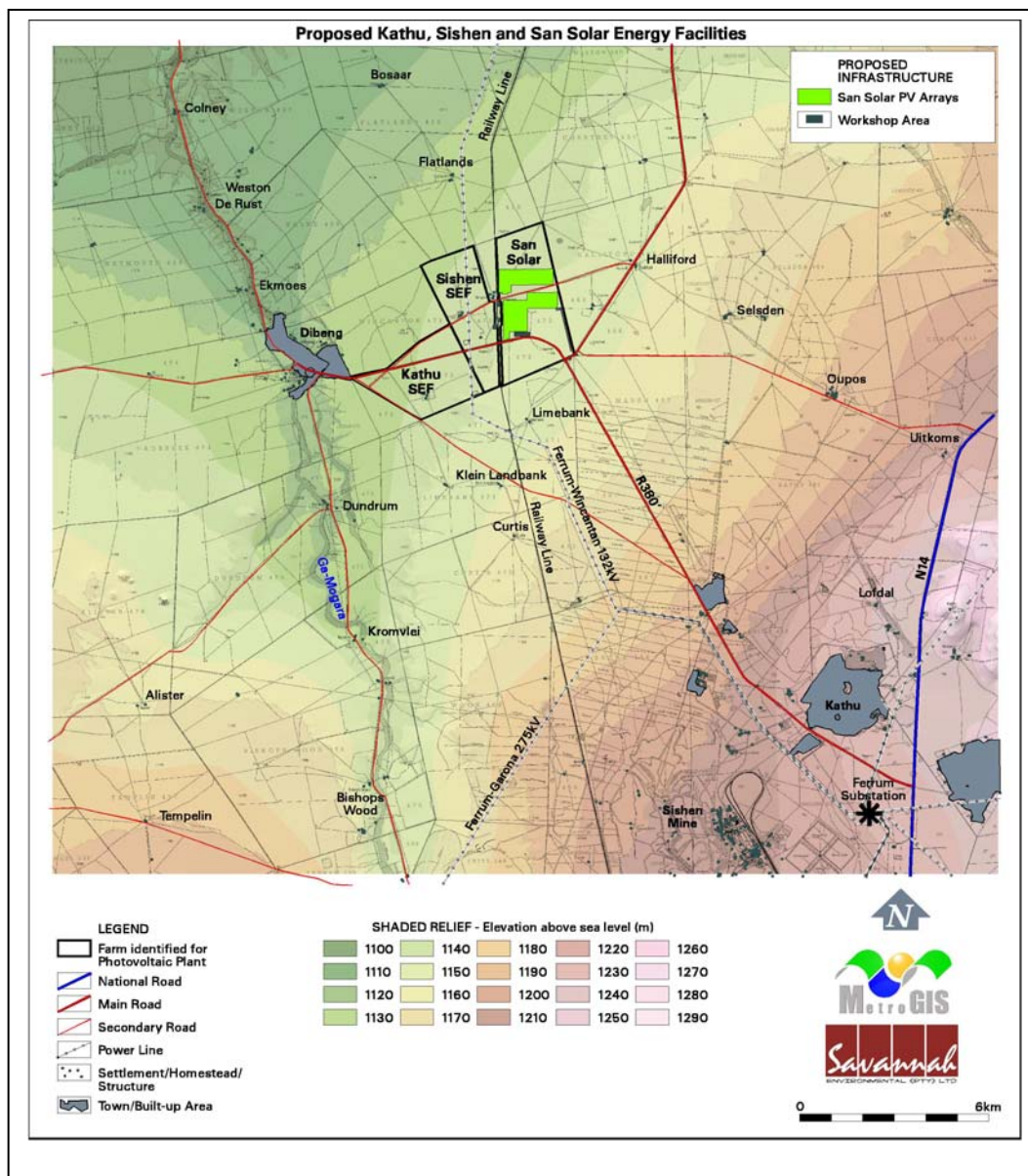


Figure 5.2: Shaded relief map (indicating topography and elevation above sea level) of the broader study area

Red Data Species

There are two species on the Red Data List³, both listed as Declining, which have a high probability of occurring on the study site, namely Camel Thorn and Wild Ghaap (*Hoodia gordonii*).

There are five mammal species of conservation concern that could occur in available habitats in the study area. This includes three species classified as near threatened (NT), i.e. the Honey Badger, the Southern African Hedgehog and Schreiber's Long-fingered Bat, and two species classified as data deficient (DD).

There are three threatened bird species, which are classified as Vulnerable (VU), that have a medium chance of utilising available habitats in the study area, either for foraging or breeding. The species most likely to use parts of the site for breeding is the Kori Bustard.

No frog or reptile species of conservation concern previously recorded in the grids in which the study area is located are likely to occur on site.

Protected Trees

Tree species protected under the National Forest Act that have a geographical distribution that includes the study area are Camel Thorn, Grey Camel Thorn and Shepherd's Tree.

Camel Thorn occurs in dry woodland areas along watercourses in arid areas where underground water is present as well as on deep Kalahari sands. Grey Camel Thorn occurs on deep Kalahari sand between dunes or along dry watercourses. Shepherd's Tree occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils (mostly Bushmanland Arid Grassland). Both Camel Thorn and Shepherd's Tree are relatively common in the study area.

5.3.4 Existing Land Cover

The majority of the proposed site is covered in thicket. In addition to thicket the site includes:

³ These are lists of species whose continued existence is threatened. Red Data Book species are classified into different categories of perceived risk. The threatened species categories now used in Red Data Books and Red Lists have been in place, with some modification, for almost 30 years. Since their introduction these categories have become widely recognised internationally, and they are now used in a whole range of publications and listings, produced by IUCN as well as by numerous governmental and non-governmental organisations.

- » A quarry ~150m² in size is located ~500m from the southern boundary of the site.
- » A reservoir located centrally on the proposed site.
- » Wet zones located towards the south and south west of the proposed site.
- » A Woodland area located north east of the proposed site.
- » Camel Thorn Tree grove which is located south east of the project.

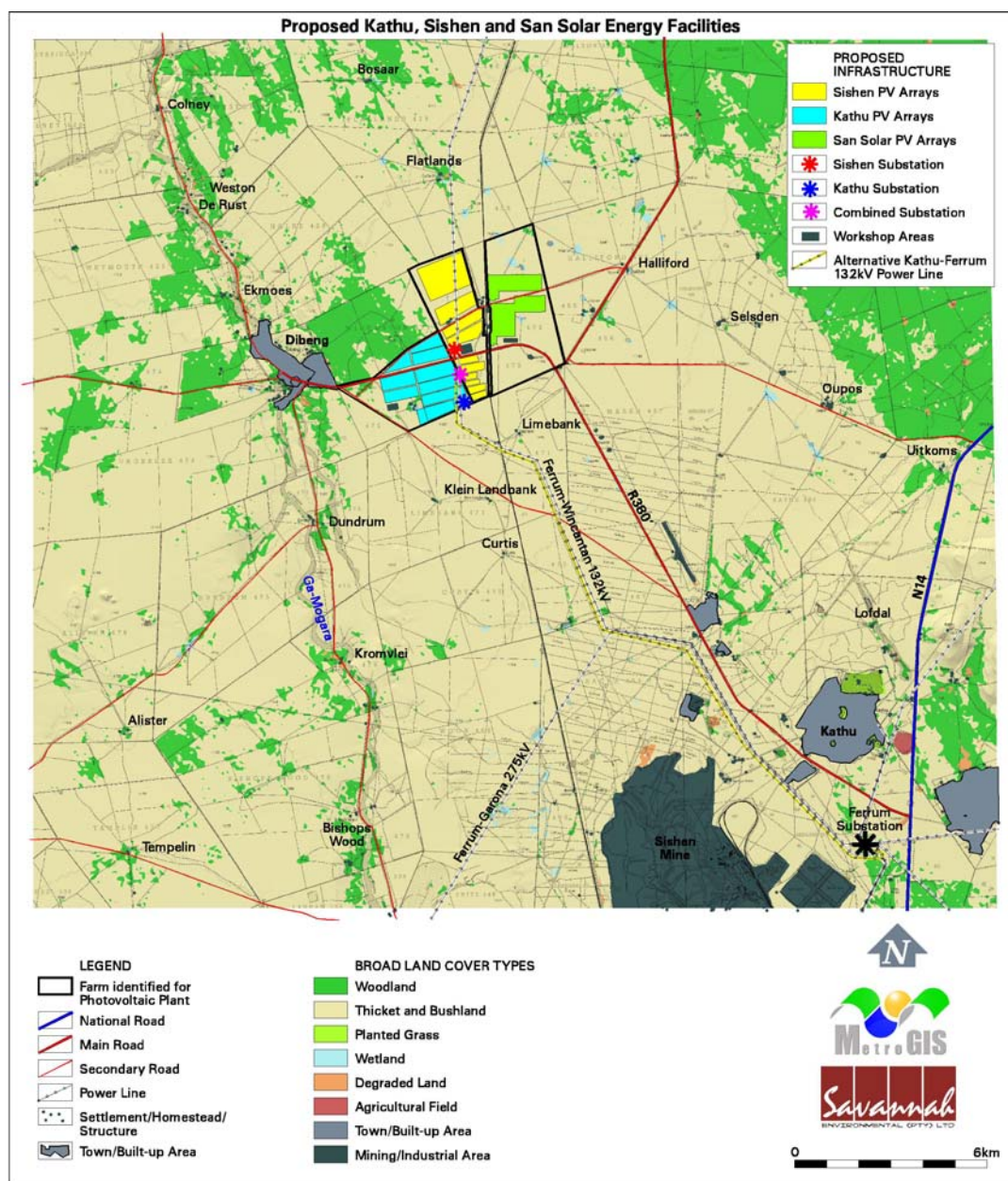


Figure 5.3: Land Cover for the proposed San Solar facility site, as well as the broader study area

5.3.5 Soils and Agricultural Potential

The study area is underlain by surficial deposits of unconsolidated aeolian sand (Quaternary) which is underlain by calcrete of Tertiary age. These relatively young deposits overlie much older sedimentary rocks of the Griqualand West Sequence which do not outcrop in the study area. The thickness of the younger sediments is unknown. Sporadic deposits of river terrace gravel may occur on the study area. These gravel deposits consist of a variable mixture of unconsolidated red silty sand, sub-rounded to sub-angular fragments of banded iron formation quartzite (re-worked Griqualand West Sequence).

The Griqualand West Sequence comprises a sequence of shale, dolomite, banded ironstone, jaspilite, quartzite, conglomerate which was deposited in a deep and extensive basin from waters rich in silica and carbonates some 2300 Ma ago. The sequence includes soluble carbonate rocks (dolomites) which can lead to the formation of sinkholes and dolines (compaction subsidence structures).

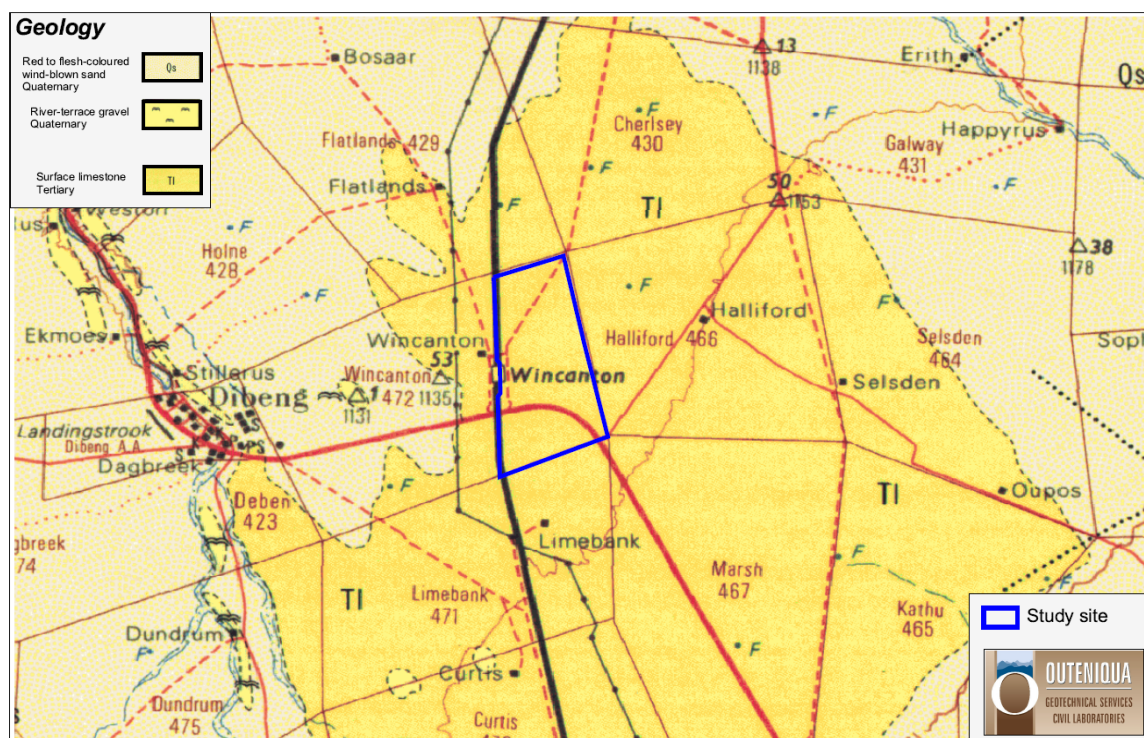


Figure 5.4: Geology for the proposed San Solar facility Site.

The whole study area is regarded as natural veld (Kathu Bushveld) which is used for livestock grazing (cattle, sheep, goats and game) and there is no sign of any crop cultivation or irrigation systems. Drinking water for livestock is obtained from boreholes and the grazing capacities ranges from 30 to 50 hectares per large stock unit.

The dominant soil type is fine sand Plooyburg form with depths ranging between 300 and 750mm. Minor soil types occurring is Askham form as well as Kimberley and Hutton forms. They are all very sandy and prone to wind erosion. Limestone/calcrete outcrops occur within the area with Coega form soils dominant.

In addition to the soil characteristics, climatic factors are also important because the annual rainfall needs to be adequate to sustain a viable crop production. The combined low rainfall and high evaporation rates result in a serious limitation to agricultural potential of the site. In summary, the agricultural potential is considered low and limited to 16 to 26 large stock units on the 800ha property.

5.4. Social Characteristics of the Study Area and Surrounds

The John Taolo Gaetsewe District Municipality (JTGDM) is located in the Northern Cape Province and borders on Botswana. The District Municipality (DM) consists of three local municipalities, namely the Ga-egonyana, Gamagara, and Moshaweng Municipalities. Before March 2006 the area was a cross-border municipal area which straddled the Northern Cape Province and the North West Province. However, after re-demarcating the provincial boundaries the entire John Taolo Gaetsewe area was located in the Northern Cape Province.

The north-eastern region is comprised principally of high-density rural and peri-urban areas while the western and southern areas are sparsely populated and consist mainly of commercial farms and mining activities. The district consists of 186 settlements, the majority being in the Moshaweng municipal area. The main towns and villages within the district borders are Kuruman, Kathu, Deben, Dingleton, Olifansthoek, Van Zylsrus, Bothitong, Churchill, Manyeding, Laxey, Batlharos, Mothibistad, Hotazel and Heuningvlei. The main economic activity is mining, followed by agriculture, tourism and retail.

5.4.1 Demographic Profile

Population

Based on the 2001 Census the total population for the DM was approximately 191 500, the majority of which reside in the Moshaweng municipal area. Of the total population 167 693 (87.5%) are Black African, 13 872 (7.2% are Coloured and 9 864 (5%) are white. The total population of the Gamagara LM was 23 202, which made up 12% of the total population of the DM. In terms of age structure, ~38% fall within the 0-14 age group, 57% within the economically active age group of 15-64 and the remaining 5% are older than 64. The gender split for the DM was 47.5% males and 52.5% females in 2001.

The data from the 2007 Census Survey indicates that the DM's population decreased to 173 454. However, the JTGDM IDP (2007-2011) indicates that the total population is in the region of 260 000, which represents a significant increase of ~ 65 000 people or 36% over the 2001 Census figure. It is assumed that the majority of this growth is linked to the recent rapid growth of the mining sector and expansion of Kathu. Setswana and Afrikaans, but specifically Setswana, are by far the dominant languages in the district.

Education

Based on the Census 2001 data the educational levels in the DM were relatively low, with 27.6% of the population having no formal education, while only 67.4% had some school education. Only 1.83% of the population has some tertiary education. The DM JTGDM IDP notes that these statistics have obvious implications for the employment potential of the population, and therefore also for the district's local economic development and job creation initiatives.

Income

Based on the 2001 Census 63% of the DMs households earned less than R800 per month, which is the figure used in South Africa to determine the poverty line. Of this total, 51% of the households had no source of income. This is equivalent to ~ 32% of district's households. The JTGDM IDP (2007-2011) indicates that this is extremely high and places extreme pressure on the Municipalities operating in the district. The result of such high level of unemployment is that communities cannot pay for basic services and that severe pressure is put on municipal resources due to demands for services to a poverty-stricken population.

5.4.2 Economic Profile

The economies of the JTGDM and Gamagara Local Municipality (GLM) are largely dominated by mining, quarrying and agriculture. Recent expansions at the Kumba Sishen Iron Ore Mine and the establishment of the Khomani Mine contributed to the growth in the local economy. Furthermore, the agricultural sectors share in the local economy is also growing due to the promising grape production for export purposes, as well as the development taking place in the livestock and game farming sectors. Tourism is also fast becoming an important contributor to the local economy as more tourists are attracted to the distinguished desert landscape with relative accessibility.

5.4.3. Heritage

The archaeological record of this region reflects the long span of human history from Earlier Stone Age through the Middle Stone Age to the Later Stone Age. The last 2 000 years was a period of increasing social complexity with the appearance

of farming activities (herding and agriculture) alongside foraging and ceramic/metallurgical (Iron Age) technologies alongside an older trajectory of stone tool making.

At a local level, there is evidence of early mining of specularite, a sparkling mineral that was used in cosmetic and ritual contexts in from early times. Rock art is also evident in the form of rock engravings.

At a regional level, the sites of Wonderwerk Cave (east side of the Kuruman Hills) and the Kathu complex of sites provide important sequences against which to assess the age and significance of finds that may be made on the identified site for the proposed facility.

ASSESSMENT OF POTENTIAL IMPACTS

CHAPTER

6

This chapter serves to assess the significance of the positive and negative environmental impacts (direct, indirect, and cumulative) expected to be associated with the development of the proposed San Solar Energy Facility. This assessment is done for the 75 MW (94 MW installed capacity) facility and for all the facility's components which will comprise:

- » A single substation and overhead power line to facilitate the connection between the solar energy facility and the Eskom electricity grid.
- » Internal access roads.
- » Gate house and security.
- » Warehouse.
- » Canteen and change rooms.
- » Office and Control centre.

The development of the San Solar Energy Facility will comprise the following phases:

- » *Pre-Construction and Construction* – will include pre-construction 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 storm water management plan. This phase is expected to take approximately 21 months.
- » *Operation* – will include operation of the facility and the generation of electricity. The operational phase is expected to extend in excess of 20 years.
- » *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately within this chapter.

6.1. Methodology for the assessment of Potentially Significant Impacts

A broader site of 800 ha (i.e. on the remaining extent of the farm Wincanton 472) was identified by the project developer for the purpose of establishing the

proposed San Solar Energy Facility. However, the developmental footprint will cover an extent of <500ha.

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

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

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed solar energy 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/enhancement and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

6.2.1 *Potential Impacts on Ecology*

Solar energy facilities require relatively large areas of land for placement of infrastructure. This PV facility requires <500 hectares. The main expected negative impact will be due to loss of habitat which may have direct or indirect impacts on individual species. Potential impacts and the relative significance of the impacts are summarised below (refer to **Appendix E - Ecology Report** for more details). The sensitive areas have

The ecological sensitivity assessment identifies those parts of the study area that have high conservation value or that may be sensitive to disturbance. This sensitivity assessment is based on a desktop study, detailed field evaluation of the site and detailed analysis of aerial photography. A detailed methodology is in the Ecology report (See Appendix E).

(a) Summary of Ecological Impacts – PV Panels

The majority of impacts on ecology will occur during the construction of the proposed PV facility. A risk assessment was undertaken as part of the ecological impact assessment, which identified the main potential negative impacts on the ecological receiving environment. Potential impacts were identified as follows:

- » Loss or fragmentation of indigenous natural vegetation

- » Loss of individuals of threatened plants
- » Loss of individuals of protected tree species
- » Loss of individuals of other protected plants
- » Loss of habitat for threatened animals
- » Collisions of individuals of threatened bird species with overhead power lines
- » Impact on pans
- » Establishment and spread of declared weeds and alien invader plant

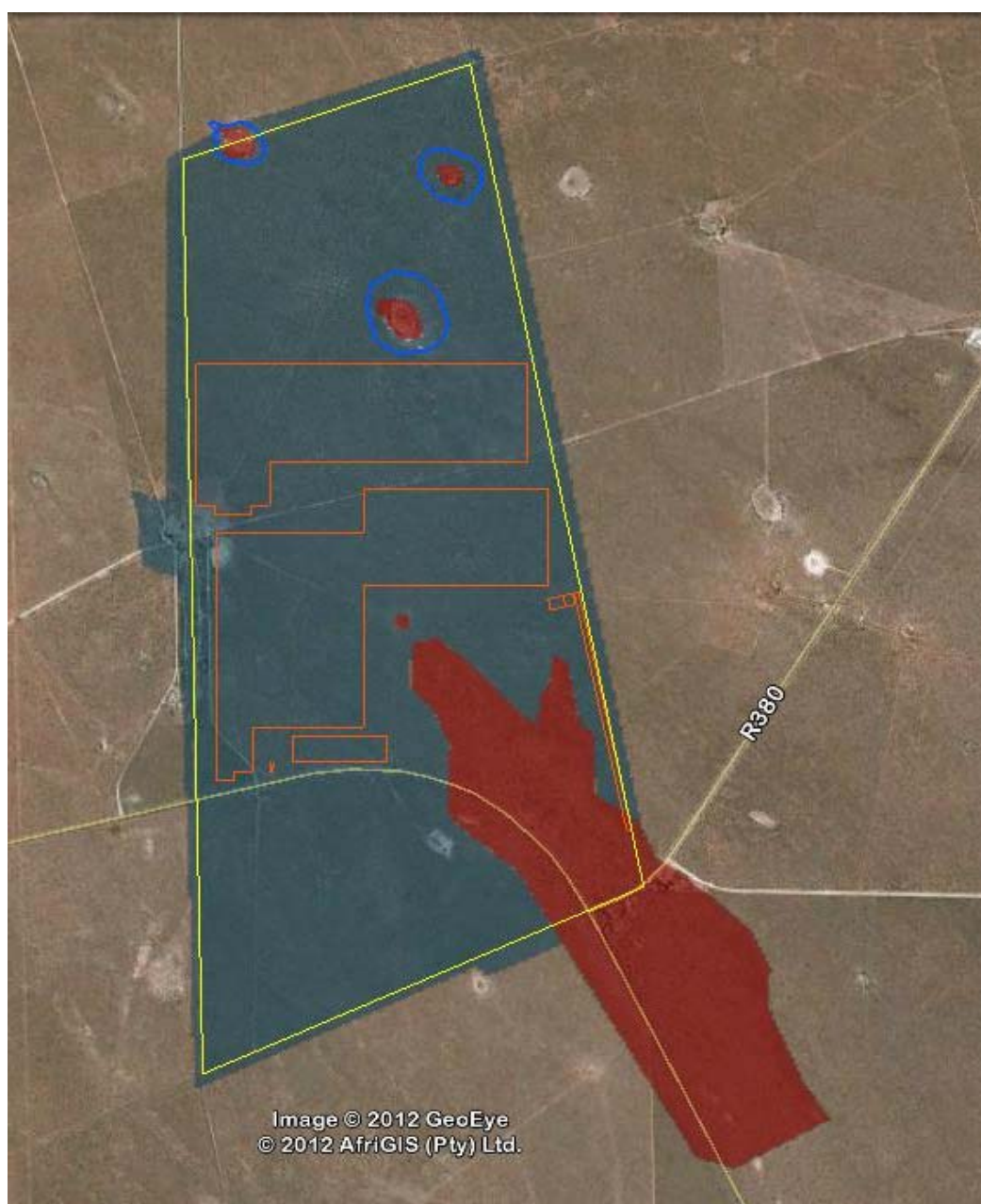


Figure 6.1:

Sensitivity map for the study area (outlined yellow). Red indicates areas with *Medium-Low Sensitivity* that should be avoided as far as possible, the remainder of the study area, including the proposed layout (all infrastructure, including the power line route (orange outline) of the solar energy facility has a *Least Concern Sensitivity* where development can take place. The layout also avoids all wetlands with a minimum buffer zone of 500 meters around them, the latter indicated by a blue outline.

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

Construction and operation of PV panels

<i>Nature: Removal of vegetation, compaction of soils, creation of localised runoff zones, artificial shading of vegetation</i>		
Loss of vegetation, alteration of microhabitats, altered vegetation cover, altered distribution of rainfall and resultant runoff patterns, increase in runoff and possible erosion.		
	Without mitigation	With mitigation
<i>Extent</i>	Local (2)	Local (1)
<i>Duration</i>	Long-term (4)	Long-term (4)
<i>Magnitude</i>	High (8)	Moderate (6)
<i>Probability</i>	Definite (5)	Definite (5)
<i>Significance</i>	High (70)	Medium (55)
<i>Status (positive or negative)</i>	Negative	Neutral
<i>Reversibility</i>	Partially reversible	Largely reversible
<i>Irreplaceable loss of resources?</i>	Probable	Probable
<i>Can impacts be mitigated?</i>	Reasonably	
<i>Mitigation:</i>		
<ul style="list-style-type: none"> » Keep areas affected to a minimum; however, clear out all indigenous encroaching bush and alien invasive species » Monitor the area below the PV panels regularly after larger rainfall events to determine where erosion may be initiated and then determine the most practical mitigation measure » Transplant bulbous species to suitable surrounding habitat should they be negatively affected by the shading » Aim to maintain a reasonable cover of indigenous perennial vegetation, preferably dwarf shrubs or grasses, but monitor the density as to not create a fire risk. Occasional mowing may be necessary if a dense high grass layer establishes » Prevent leakage of oil or other chemicals » Monitor the establishment of alien invasive species and remove as soon as detected, whenever possible before regenerative material can be formed 		
<i>Cumulative impacts:</i>		
<ul style="list-style-type: none"> » Possible erosion of areas below the edges of the PV panels » Possible spread and establishment of alien or indigenous invasive species » Possible alteration of species composition after encroaching shrub has been cleared 		
<i>Residual Impacts:</i>		
<ul style="list-style-type: none"> » Altered topsoil characteristics » Altered (improved) vegetation composition 		

Upgrading of external Access Road

Nature: Removal of vegetation, creation of runoff zone

Disturbance of vegetation, increase in runoff, clearing of alien invasive vegetation (positive impact).		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (0)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Low (28)	Low (20)
Status (positive or negative)	Neutral	Positive
Reversibility	Partially reversible	Partially reversible
Irreplaceable loss of resources?	Sturdy access road already exists	
Can impacts be mitigated? Reasonably		
Mitigation:		
<ul style="list-style-type: none"> » Reinforce portions of the track/or road that are prone to erosion, create structures underneath the track/or road where water would accumulate to allow free drainage where necessary » Prevent leakage of oil or other chemicals » Clear all surrounding alien invasive vegetation, ensuring that no regenerative material is spread further » Monitor the re-establishment of alien invasive species and remove as soon as detected, whenever possible before regenerative material can be formed » After decommissioning, if access roads will not be of further use to the landowner or the project, remove all foreign material and rip area to facilitate the establishment of vegetation 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Possible spread and establishment of alien invasive species or prevention thereof 		
Residual impacts:		
<ul style="list-style-type: none"> » Improved vegetation composition and structure » Small potential for erosion 		

Fencing area and associated clearance strip for fire-break

Nature: Removal of vegetation , Loss of vegetation, loss of micro-habitat, window of opportunity for the establishment of alien invasive species, altered topsoil characteristics and possibility of erosion, positive: clearing of invasive shrub to provide corridors for small wildlife.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (40)
Status (positive or negative)	Neutral	Neutral and Positive
Reversibility	Largely reversible	Largely reversible
Irreplaceable loss of resources?	No	Reversible

Can impacts be mitigated?	Reasonably
Mitigation:	
<ul style="list-style-type: none"> » Minimise area affected, especially during construction » Wherever possible, avoid large Camel thorn trees » Transplant bulbous species if present onto similar habitats » Prevent leakage of oil or other chemicals » Monitor the establishment of alien invasive species and remove as soon as detected, whenever possible <i>before</i> regenerative material can be formed 	
Cumulative impacts:	
<ul style="list-style-type: none"> » Possible erosion of cleared areas » Positive: reduced cover of invasive shrubs and hence new corridors for small wildlife 	
Residual Impacts:	
<ul style="list-style-type: none"> » Altered vegetation composition 	

Construction of associated buildings and substation

Nature: Removal of vegetation, compaction of soils, creation of runoff zone, possible contamination		
<p>Loss of vegetation, loss of micro-habitats, possibly altered chemistry of surrounding soils, window of opportunity for the establishment of alien invasive species. After decommissioning: altered topsoil characteristics and altered vegetation.</p>		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	Medium (60)	Medium (50)
Status (positive or negative)	Negative	Negative
Reversibility	Partially reversible	Largely reversible
Irreplaceable loss of resources?	Probable	Probable
Can impacts be mitigated?	Reasonably	
Mitigation:		
<ul style="list-style-type: none"> » Keep areas affected to a minimum; however, clear out invasive shrub as far as possible between structures. This will enable the re-establishment of a grass layer between structures that will also absorb excess runoff coming from new impervious surfaces » Wherever possible, avoid large Camel thorn trees » Clear out all invasive alien vegetation and take steps to prevent the spread of any regenerative material of such species » Remove topsoil and redistribute to mimic the micro-topography of the original vegetation to aid in revegetation » Remove all succulent and bulbous plants and replant onto the redistributed topsoil » Prevent leakage of oil or other chemicals or pollutants » Monitor the re-establishment of alien invasive species and remove as soon as detected, whenever possible <i>before</i> regenerative material can be formed 		

» After decommissioning, remove all foreign material, rip to loosen topsoil, undertake active revegetation, monitor and prevent new bush-encroachment
Cumulative impacts:
» Possible erosion
» Possible contamination of surrounding areas
» Possible spread and establishment of alien invasive species to wider areas
Residual Impacts:
» Altered (improved) vegetation composition
» Altered topsoil characteristics
» Very slow recovery of large trees

Construction of power line

Nature: Removal of vegetation, compaction of soils		
Loss of vegetation, increase in runoff and erosion.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Small (0)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (15)
Status (positive or negative)	Neutral	Positive
Reversibility	Largely reversible	Largely reversible
Irreplaceable loss of resources?	Improbable	Improbable
Can impacts be mitigated?	Reasonably	
Mitigation:		
» Place pylons in a way to avoid the damage to large indigenous trees		
» Clear out all alien invasive species and encroaching shrubs underneath the line and in close proximity thereof		
» Prevent spillage of construction material beyond area affected		
» Monitor the re-establishment of alien invasive species and remove as soon as detected, whenever possible before regenerative material can be formed		
Cumulative impacts:		
» Improvement of grass layer and source of grass seed for surrounding areas (positive)		
Residual Impacts:		
» Very localised alteration of soil surface characteristics		
» Improved vegetation composition		

Implications for Project Implementation

- » The extent to which the vegetation will be impacted will not greatly affect the survival of the species concerned, even if taking the adjacent developments (Kathu and Sishen Solar) into consideration. Whilst some protected trees will be sacrificed, the layout has been planned to avoid the larger groves of Camelthorn trees that were observed on site, as well as the small pan-like areas

- » Small like pans are located outside the project area. Measure should be followed to prevent any contamination. There is a 500 m buffer around these pans.
- » The extent to which the vegetation will be impacted will not greatly affect the survival of the species concerned, even if taking the additional developments (Kathu and Sishen Solar) adjacent to San Solar into consideration
- » The study area does not fall within critical biodiversity areas (BGIS)
- » Management and mitigation measures are essential for reducing impacts on ecology. If these measures are applied, there will be no significant impacts on ecology.

6.2.2 Potential Impacts on Geology and Soils and Agricultural Potential

The proposed activity could carry potentially negative direct impacts in terms of soil degradation (erosion, soil removal, loosening, compaction, contamination/pollution, etc.) and agricultural potential. The activity may also lead to indirect impacts such as dust pollution and siltation away from the site. Negative impacts on soil would mainly occur during the construction phase. During the post construction and decommissioning phases the potential impacts are likely to be insignificant.

Potential positive impacts could potentially include a reduction in soil erosion in areas where new engineering solutions are put in place to rectify certain existing problems, such as improved drainage along poorly constructed and maintained roads. Other positive impacts relating to the geological environment on a regional/national scale could include a reduction in the demand for non-renewable energy sources (such as coal or uranium).

Erosion sensitivity can be broadly mapped according to the potential severity of erosion if land disturbing activities occur and this is generally affected by the geology, soil types and topography.

The entire site is considered to have medium erosion sensitivity as described in **Table 6.1**. During peak rainfall events, run-off may result in some erosion along small drainage lines and in areas that are cleared of vegetation, although in the case of the proposed development, full vegetation clearing is not envisaged across the entire site (vegetation will be shortened/maintained to prevent spread of fire and shadows on the panels).

Table 6.1: Water erosion sensitivity

Sensitivity Level	Topography/Geology	Comments/Recommendations
High	Natural drainage lines/watercourses, steep slopes (high relief areas), and	No-go areas without special mitigating measures. Erosion

	areas with thick deposits of unconsolidated soil	presently taking place.
Medium	Moderately to gently undulating hills and plains (low relief areas) where some unconsolidated sediment occurs	Moderate levels of erosion will occur if land-disturbing activities take place (construction). Mitigating measures to be applied to minimise impact.
Low	Areas with very little or no soil cover	Minor erosion will naturally occur. Normal mitigating measures apply.

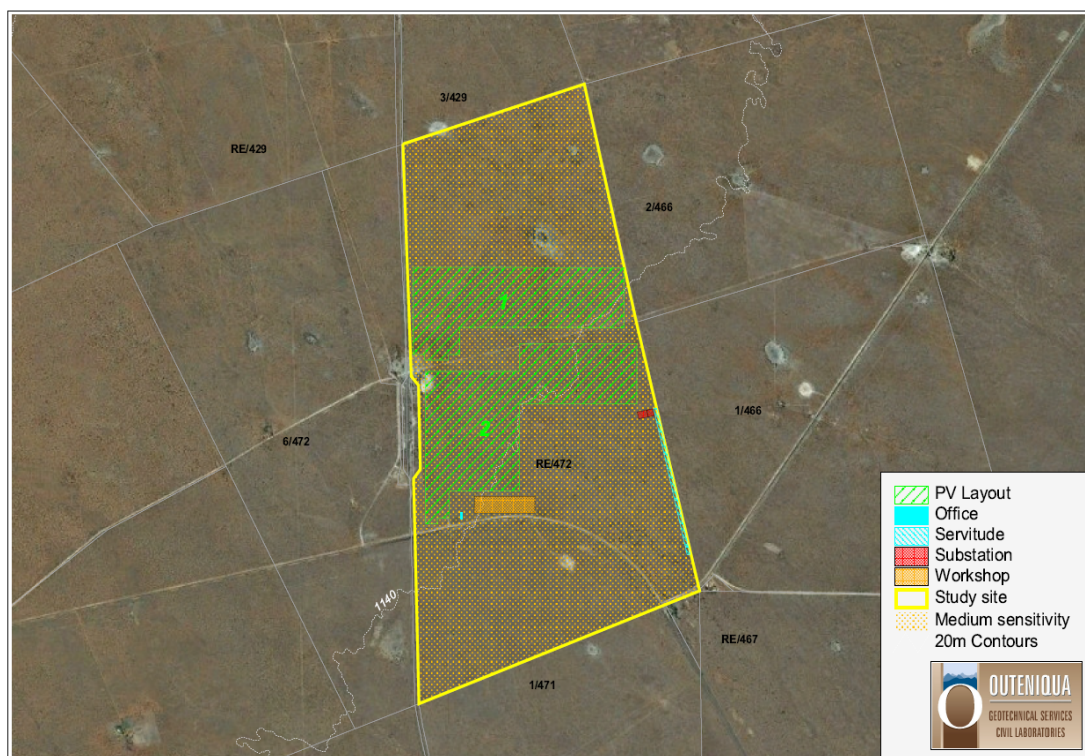


Figure 6.2: Erosion sensitivity map

The whole study area is regarded as natural veld (Kathu Bushveld) which is used for livestock grazing (cattle, sheep, goats and game) and there is no sign of any crop cultivation or irrigation systems. Drinking water for livestock is obtained from boreholes and the grazing capacities ranges from 30 to 50 hectares per large stock unit.

The potential impact on the existing and future land use and the agricultural potential is the loss of 500 hectares of the total of 800 hectares of grazing land. The proposed site has a low agricultural potential.

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

<i>Nature: Soil degradation (soil removal, mixing, compaction, etc.) due to the construction of foundations for structures (PV panels, buildings, substations, power lines)</i>		
	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Local (1)	Local (1)
Duration	Short term (2)	Very Short term (1)
Magnitude	Minor (2)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Low (25)	Low (20)
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes.	
Mitigation:		
» Rehabilitate topsoil & vegetation around site and between panels after construction.		
Cumulative impacts:		
» The cumulative impact of earthworks in the area is considered low at this stage due to the low density of development in the area. Further development of the area may have increasing impact on the natural soil.		
Residual impacts:		
» Minor loss of soil under buildings		

<i>Nature: Soil degradation (soil removal, mixing, compaction, etc.) due to the construction of access roads</i>		
	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (2)
Probability	Definite (5)	Definite (5)
Significance	Medium (45)	Medium (35)
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes.	
Mitigation:		
» Use existing roads if possible/practical.		
» Minimise the length and width of new access roads (preferably just gravel tracks).		
» Maintain access roads in good condition, preventing detours due to bad road conditions.		
Cumulative impacts:		
» The cumulative impact of earthworks in the area is considered low at this stage due to the low density of development in the immediate vicinity. Further development of the area may have an increasing impact on the natural soil.		

Residual impacts:

- » Minor loss of soil under roads.

Nature: Soil degradation due to pollution of soil by contaminants used on site during construction (e.g. fuel, oil, chemicals, cement)

	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Local (1)	Local (1)
Duration	Medium term (3)	Short term (2)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (18)	Low (15)
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation:

- » Control use and disposal of potential contaminants or hazardous materials.
- » Remove contaminants and contaminated topsoil and replace topsoil in affected areas.

Cumulative impacts:

- » The cumulative impact of soil pollution is considered low at present due to the undeveloped nature of the immediate vicinity but further development may have an increasing impact.

Residual impacts:

- » Slow regeneration of topsoil

Nature: Soil degradation due to increased soil erosion by wind and/or water on construction areas

	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Local (1)	Local (1)
Duration	Long term (4)	Short term (1)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (12)
Status	Negative	Negative
Reversibility	Practically irreversible	Practically irreversible
Irreplaceable loss of resources?	Practically irreplaceable	Practically irreplaceable
Can impacts be mitigated?	Yes.	

Mitigation:

- » Minimise size of the construction footprint/camp.
- » Restrict activity outside of construction camp areas.
- » Implement effective erosion control measures around site.
- » Carry out earthworks in phases across site to reduce the area of exposed ground at any one time.
- » Protect and maintain denuded areas and material stockpiles to minimise erosion and

instability.
Cumulative impacts:
» The cumulative impact of soil erosion is considered low at present due to the undeveloped nature of the area but further development may have an increasing impact on soil erosion
Residual impacts:
» Minor localised erosion.

An assessment of the potential indirect impacts associated with the proposed development is tabulated in *Degradation of waterways due to increased siltation downstream from site*.

Nature: Degradation of waterways due to increased siltation downstream from site		
	Without mitigation	With mitigation
Extent	Regional (3)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (21)
Status	Negative	Negative
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
» Install anti-erosion measures such as silt fences, geosynthetic erosion protection, and/or flow attenuation along watercourses below construction sites.		
» Strictly control activity near water courses/natural drainage lines as sediment transport is higher in these areas.		
» Minimise increased run-off from hard surfaces (PV panels) by channelising and capturing rainwater for re-use (rainwater harvesting)		
Cumulative impacts:		
» The cumulative impact of siltation in the area is considered low at present but further development may have an increasing impact on siltation of waterways		
Residual impacts:		
» Minor localised movement of soil across site		

Nature: Increased dust pollution from construction sites affecting surroundings		
	Without mitigation	With mitigation
Extent	Regional (2)	Local (1)
Duration	Short term (1)	Very short term (1)
Magnitude	Low (4)	Minor (2)
Probability	Highly probable (4)	Highly probable (4)
Significance	Low (28)	Low (16)
Status	Negative	Negative
Reversibility	Irreversible	Irreversible

Irreplaceable loss of resources?	Yes, minor	Yes, insignificant
Can impacts be mitigated?	Yes	
Mitigation:		
» Apply dust control measures such as straw bales or dampen dusty denuded areas.		
» Clear vegetation in stages to minimise exposure at any one time		
Cumulative impacts:		
» The cumulative impact of dust in the area is considered low.		
Residual impacts:		
» Minor localised dust pollution		

Nature: Impact on existing land-use	
	Without mitigation
Extent	Local (1)
Duration	Long term (4)
Magnitude	Minor (2)
Probability	Probable (4)
Significance	Low (28)
Status	Negative
Reversibility	Reversible
Irreplaceable loss of resources?	No
Can impacts be mitigated?	No
Mitigation:	
» None practical.	
Cumulative impacts:	
» The cumulative impact on land use is considered low at present due to the low intensity land-use practised on the site.	
Residual impacts:	
» Loss of grazing land while facility is in use.	

Nature: Reduction in agricultural potential	
	Without mitigation
Extent	Local (1)
Duration	Long term (4)
Magnitude	Minor (2)
Probability	Probable (4)
Significance	Low (28)
Status	Negative
Reversibility	Reversible
Irreplaceable loss of resources?	No
Can impacts be mitigated?	No
Mitigation:	
» None practical.	
Cumulative impacts:	
» The cumulative impact of a reduction in the agricultural potential is considered low at	

present due to the low potential of the area.
Residual impacts:
» Minor loss of grazing land while facility is in use.

Nature: Reduction in demand for non-renewable energy sources	
	Without mitigation
Extent	National (3)
Duration	Long term (4)
Magnitude	Moderate (6)
Probability	Very probable (4)
Significance	Moderate (52)
Status	Positive
Reversibility	N/A
Irreplaceable loss of resources?	N/A
Can impacts be mitigated?	N/A
Mitigation: N/A	
Cumulative impacts:	
» The cumulative positive impact on a national scale is considered very high	
Residual impacts: N/A	

Implications for Project Implementation

- » The proposed development of a photovoltaic facility on the site will not have large impacts on the agricultural potential of the site due to the low potential of the soils coupled with climatic limitations.
- » The only significant potential negative impacts on the geological environment are soil degradation issues as a result of construction activity and its effect on soil stability and soil-forming processes. However, with effective implementation of mitigating measures, these impacts are considered to have a low to moderate significance, requiring diligent attention from the engineers, environmental officers and contractors, but not posing a threat to the status-quo or the feasibility of the development.
- » The potential positive impacts on the geological environment are considered to have a moderate significance on a local scale but the cumulative impact of a reduction in demand and extraction/mining of non-renewable energy sources on a national scale is very significant.

6.2.3 Assessment of Potential Impacts on Heritage Sites

Potential impacts on heritage sites relate to the direct loss of these features during construction or an indirect impact in terms of visual impacts during operation.

In one area outside of the study area scatterings of surface stone tools were noticed, however these were not concentrated enough to be classified as a Stone

Age Site. Their presence does indicate that such sites could still be found sub-surface within the study area.

Impact tables summarising the significance of impacts on heritage sites, or objects (with and without mitigation)

<i>Nature: Impact on paleontological sites</i>		
Paleontological sites could be affected if bedrock was to be disturbed during the excavation activities associated with the construction of the pylon foundations.		
	Without Mitigation	With Mitigation
<i>Extent</i>	Local (2)	Local (2)
<i>Duration</i>	Short term (2)	Long term (5)
<i>Magnitude</i>	Low (2)	Low (1)
<i>Probability</i>	Improbable (2)	Improbable (1)
<i>Significance</i>	Low (12)	Low (8)
<i>Status</i>	Negative	Positive
<i>Reversibility</i>	Irreversible	Reversible
<i>Irreplaceable loss of resources?</i>	Yes	No
<i>Can impacts be mitigated?</i>	No	Yes
<i>Mitigation</i>		
» No further mitigation is recommended provided bedrock is not to be disturbed.		
<i>Cumulative impacts:</i>		
» None		
<i>Residual impacts:</i>		
» None		

<i>Nature: Impact on artefacts</i>		
Artefacts may be unearthed during excavation during construction		
	Without Mitigation	With Mitigation
<i>Extent</i>	Local (2)	Local (2)
<i>Duration</i>	Short term (2)	Long term (5)
<i>Magnitude</i>	Low (2)	Low (1)
<i>Probability</i>	Improbable (2)	Improbable (1)
<i>Significance</i>	Low (12)	Low (8)
<i>Status</i>	Negative	Positive
<i>Reversibility</i>	Irreversible	Reversible
<i>Irreplaceable loss of resources?</i>	Yes	No
<i>Can impacts be mitigated?</i>	No	Yes
<i>Mitigation</i>		
» No further mitigation is recommended other than notifying the correct officials of any unearthed artefacts.		
<i>Cumulative impacts:</i>		

» None

Residual impacts:

» None

Implications for Project Implementation

- » From an archaeological perspective, the only sign of sites of heritage potential were the limited scatterings of surface stone tools outside the study area.
- » 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 such that an investigation and evaluation of the finds can be made.

6.2.4 Assessment of Potential Visual Impacts

(a) Visual Impact of the PV Facility – Operational Phase

The study area for the visual assessment encompassed visual assessment encompasses a geographical area of 812km² (extent of the maps) and includes a minimum 16km buffer zone from the proposed development area. The result of the visibility analysis for the proposed solar energy facility is shown on **Figure 6.3**.

The analysis was undertaken from a number of indicative vantage points within the site at an offset of 6m (i.e. the maximum height of the PV panels) above average ground level. This was done in order to determine the general visual exposure of the area under investigation, simulating the proposed structures associated with the solar energy facility. It must be noted that the viewshed analyses do not include the potential shielding effect of vegetation cover or existing structures on the exposure of the proposed facility, and it does not take into consideration the limitations of the human eye, therefore signifying a worst-case scenario. The following is applicable to the visual exposure analysis undertaken:

- » The analysis indicates the solar energy facility will potentially be visible from almost the entire area surrounding the development site, including a number of homesteads. Small areas protected from potential visual impact lie to the west and south west of this zone.
- » The viewshed for the proposed solar energy facility diminishes somewhat between 3km and 6km from the facility. Within this zone, areas potentially exposed to visual impact lie primarily in the north west, the west, the east and the south east. A number of homesteads will potentially be exposed to visual impact.

- » Beyond the 6km radius, potential visual exposure is further reduced. Again, only a handful of homesteads and the north western outlying parts of Kathu will be exposed to potential visual impact. Kathu itself and the Sishen Mine will not be exposed, nor is it expected that observers at Dibeng would have unobstructed views of the proposed development site.

- » The proposed solar energy facility is expected to be visible from the R380 for its entire length north east of Kathu (i.e. 15km from the site). Almost all of the secondary roads within 6km of the proposed facility may be expected to have views of the facility for relatively long continuous stretches. Potential visual exposure from the N14 is limited to short stretches at a distance exceeding 15km.

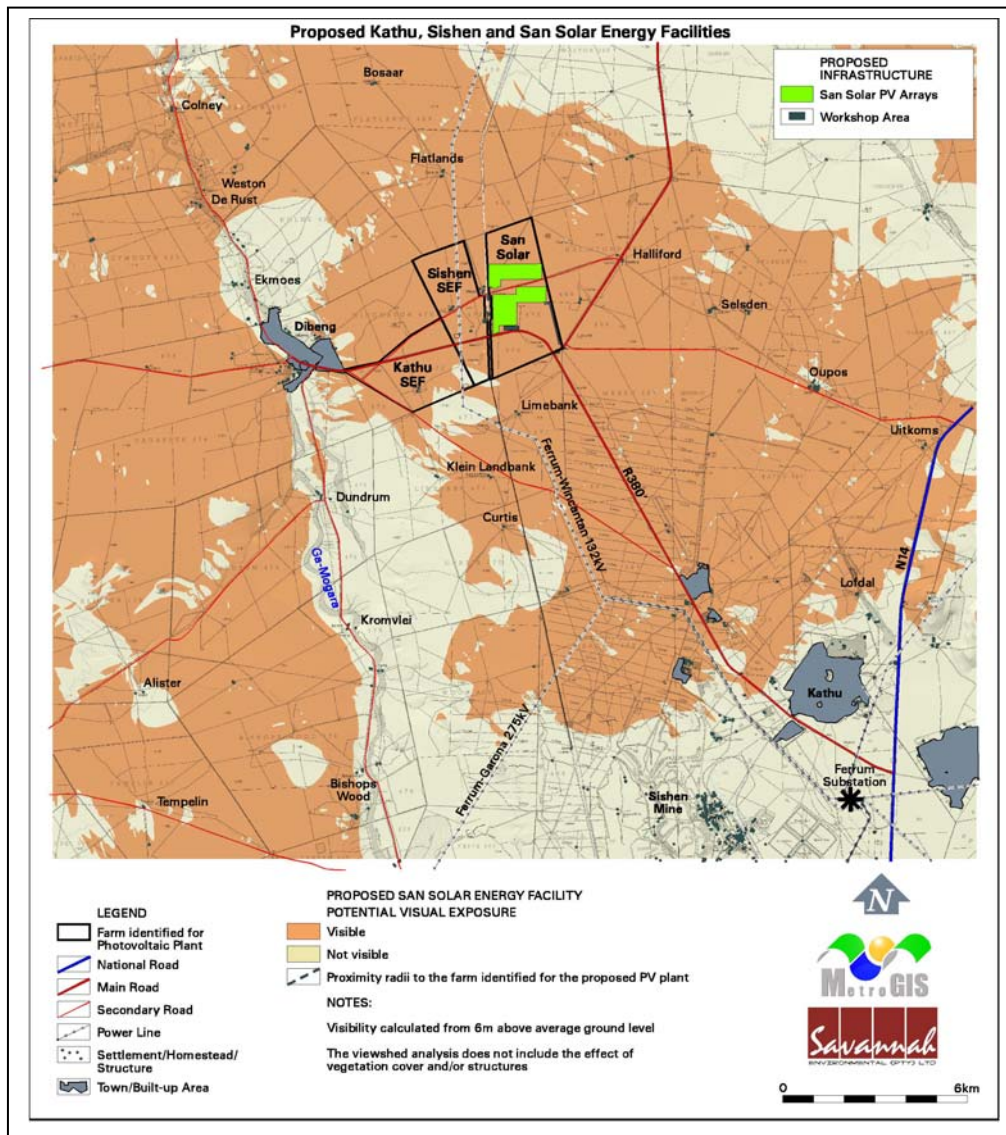


Figure 6.3: Potential visual exposure of the proposed San Solar Energy Facility

Visual impact index

The combined results of the visual exposure, viewer incidence / perception and visual distance of the proposed solar energy facility are displayed on **Figure 6.4**. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index. An area with short distance, a potential visual exposure to the proposed facility, a high viewer incidence, and a predominantly negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the areas of potential impact when evaluating the issues related to the visual impact.

The following is of relevance:

- » The index immediately gives a strong indication that observers in close proximity to the facility (within 3km) would have the highest visual experience of the facility and would be exposed to **high** visual impacts (where observers are present).
- » Observers travelling along the R380 and the secondary roads within 3km of the site could experience **high** visual impacts. The R380 passes south of the facility and the *Halliford* to *Wincanton* secondary road pass through the site.
- » The homesteads of *Flatlands*, *Wincanton* and *Halliford* fall within 3km of the proposed solar energy facility, and will experience a **high** visual impact. This impact will be considered high, only if the homesteads have an unobstructed view of the site.
- » Between 3km and 6km of the facility, observers making use of the arterial road and the secondary roads could be exposed to **moderate** visual impacts, especially east and south of the facility. Homesteads within this zone will also experience a **moderate** visual impact. These include *Limebank* and *Selsden*.
- » Settlements and roads beyond 6km (i.e. the R380 arterial road and the secondary roads) could experience **low** visual impacts where these lie within the viewshed. The western outskirts of Dibeng also fall within this zone of potentially **low** visual impact. It should also be noted that in the event that the Sishen and Kathu SEFs are constructed, these facilities would effectively obstruct all views from Dibeng to the San Solar facility.
- » The proposed facility will not be visible from the N14 except for a section in the east of the study area at distances exceeding 12km from the facility. The impact on this road is indicated as **very low** on the visual impact index.
- » Visual exposure beyond 12km of the proposed SEF is generally expected to be **very low** (where observers are present) and **negligible** where observers are generally absent.

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

<i>Nature: Potential visual impact on users of roads in close proximity of the San Solar Energy Facility</i>		
The potential visual impact on users of the arterial road (i.e. the R380) and the secondary roads in close proximity (i.e. within 3km) of the proposed solar energy facility is expected to be moderate both before and after mitigation.		
	<i>No mitigation</i>	<i>Mitigation considered</i>
<i>Extent</i>	Local (4)	Local (4)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	High (8)	High (8)
<i>Probability</i>	Probable (3)	Improbable(2)
<i>Significance</i>	Medium(48)	Medium (32)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Recoverable (3)	Recoverable (3)
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated</i>	Yes	
<i>Mitigation:</i>		
Planning:		
<ul style="list-style-type: none"> » Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site. » Retain and maintain natural vegetation in all areas outside of the development footprint. » Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible. 		
Construction:		
<ul style="list-style-type: none"> » Rehabilitation of all construction areas. » Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary buildings. 		
Operations:		
<ul style="list-style-type: none"> » Maintain the general appearance of the facility as a whole. » Maintenance of roads to avoid erosion and suppress dust. 		
Decommissioning:		
<ul style="list-style-type: none"> » Remove infrastructure and roads not required for the post-decommissioning use of the site. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions. 		
<i>Cumulative impacts:</i>		
The construction of the solar energy facility will increase the cumulative visual impact of industrial type infrastructure within the region.		

Existing infrastructure includes the Sishen Mine, located some 15km to the south east of the site, the railway line and the various distribution and transmission power lines.

Potential/future infrastructure includes the proposed Kathu and Sishen solar energy facilities on the adjacent sites (west of the railway line) as well as the proposed Kalahari CSP facility.

Residual impacts:

» None. The visual impact will be removed after decommissioning.

Nature: Potential visual impact on residents of homesteads in close proximity of the San Solar Energy Facility

The potential visual impact on residents of homesteads in close proximity (i.e. within 3km) of the proposed solar energy facility is expected to be **moderate** both before and after mitigation.

	No mitigation	Mitigation considered
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Improbable(2)
Significance	Medium(48)	Medium (32)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:

Planning:

- » Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.
- » Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.

Construction:

- » Rehabilitation of all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary buildings.

Operations:

- » Maintain the general appearance of the facility as a whole.
- » Maintenance of roads to avoid erosion and suppress dust.

Decommissioning:

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

<ul style="list-style-type: none"> » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions
<p>Cumulative impacts:</p> <p>The construction of the solar energy facility will increase the cumulative visual impact of industrial type infrastructure within the region.</p> <p>Existing infrastructure includes the Sishen Mine, located some 15km to the south east of the site, the railway line and the various distribution and transmission power lines.</p> <p>Potential/future infrastructure includes the proposed Kathu and Sishen solar energy facilities on the adjacent sites (west of the railway line) as well as the proposed Kalahari CSP facility.</p>
<p>Residual impacts:</p> <ul style="list-style-type: none"> » None. The visual impact will be removed after decommissioning.

Nature: Potential visual impact on sensitive visual receptors in the region(>3km) of the San Solar Energy Facility

The visual impact of the proposed solar facility on users of the arterial and secondary roads, as well as residents of homesteads within the region (i.e. which lie beyond 3km of the site) is expected to be **moderate** but may be considered **low** after mitigation.

	No mitigation	Mitigation considered
Extent	Regional (3)	Local (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	Medium (39)	Medium (26)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:

Planning:

- » Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site.
- » Retain and maintain natural vegetation in all areas outside of the development footprint.
- » Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.

Construction:

- » Rehabilitation of all construction areas.
- » Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary buildings.

Operations:

- » Maintain the general appearance of the facility as a whole.
- » Maintenance of roads to avoid erosion and suppress dust.

Decommissioning:

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

Cumulative impacts:

The construction of the solar energy facility will increase the cumulative visual impact of industrial type infrastructure within the region.

Existing infrastructure includes the Sishen Mine, located some 15km to the south east of the site, the railway line and the various distribution and transmission power lines.

Potential/future infrastructure includes the proposed Kathu and Sishen solar energy facilities on the adjacent sites (west of the railway line) as well as the proposed Kalahari CSP facility

Residual impacts:

- » None. The visual impact will be removed after decommissioning.

(b) Visual impact of the power line and ancillary infrastructure – Operational Phase

The table below illustrates the assessment of the anticipated visual impact associated with ancillary infrastructure on the site, which is likely to be of low significance if the mitigation measures are taken into consideration.

Impact tables summarising the significance of visual impacts of the power line and ancillary infrastructure (with and without mitigation)

Nature: Potential visual impact of on-site ancillary infrastructure on visual receptors in close proximity (<3km) of the San Solar Energy Facility

The on-site ancillary infrastructure proposed for the solar energy facility includes a substation, loop in loop out power line, internal access roads, gate house, warehouse, canteen, office and control centre.

No dedicated viewshed has been generated for the above infrastructure, as it is expected to be located within the proposed development site. Furthermore, the ancillary infrastructure is not expected to exceed the PV panels in scale and would therefore be less noticeable and ultimately absorbed within the potential visual exposure of the primary infrastructure (i.e. the PV panels).

The potential visual impact of the on-site ancillary infrastructure is expected to be **low** in

close proximity (i.e. within 3km) of the proposed facility.		
	No mitigation	Mitigation considered
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Improbable (2)	Very improbable (1)
Significance	Low (24)	Low (12)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
<p>Mitigation:</p> <p>Planning:</p> <ul style="list-style-type: none"> » Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site. » Retain and maintain natural vegetation in all areas outside of the development footprint. » Plan internal roads and ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. Consolidate infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible. <p>Construction:</p> <ul style="list-style-type: none"> » Rehabilitation of all construction areas. » Ensure that vegetation is not cleared unnecessarily to make way for the access road and ancillary buildings. <p>Operations:</p> <ul style="list-style-type: none"> » Maintain the general appearance of the facility as a whole. » Maintenance of roads to avoid erosion and suppress dust. <p>Decommissioning:</p> <ul style="list-style-type: none"> » Remove infrastructure and roads not required for the post-decommissioning use of the site. » Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. » Monitor rehabilitated areas post-decommissioning and implement remedial actions.. 		
<p>Cumulative impacts:</p> <p>The construction of the solar energy facility will increase the cumulative visual impact of industrial type infrastructure within the region.</p> <p>Existing infrastructure includes the Sishen Mine, located some 15km to the south east of the site, the railway line and the various distribution and transmission power lines.</p> <p>Potential/future infrastructure includes the proposed Kathu and Sishen solar energy facilities on the adjacent sites (west of the railway line) as well as the proposed Kalahari CSP facility.</p>		
<p>Residual impacts:</p> <ul style="list-style-type: none"> » None. The visual impact will be removed after decommissioning. 		

(c) Lighting Impacts at night – Operational Phase

Impact tables summarising the significance of lighting impacts at night (with and without mitigation)

Nature: Potential visual impact of lighting on visual receptors in close proximity of the San Solar Energy Facility

The area proposed for the placement of the solar energy facility is located within 16km of the towns of Dibeng and Kathu, the Sishen Mine and a number of isolated homesteads. Although these are not densely populated areas, the light trespass and glare from the security and after-hours operational lighting will have some significance.

A second visual impact is the potential lighting impact known as sky glow. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust, or smog. The sky glow intensifies with the increase in the amount of light sources. Each new light source, especially upwardly directed lighting, contributes to the increase in sky glow. The solar energy facility may contribute to the effect of sky glow in an otherwise dark environment.

To be noted in this regard is the existing light trespass from the Sishen Mine in the south, as well as the contribution of this mine to sky glow.

The anticipated impact of lighting is expected to be **moderate**, and may be mitigated to **low**.

	<i>No mitigation</i>	<i>Mitigation considered</i>
<i>Extent</i>	Regional (3)	Regional (3)
<i>Duration</i>	Long term (4)	Long term (4)
<i>Magnitude</i>	Low (4)	Low (4)
<i>Probability</i>	Probable (3)	Improbable (2)
<i>Significance</i>	Medium (32)	Low (22)
<i>Status</i>	Negative	Negative
<i>Reversibility</i>	Recoverable (3)	Recoverable (3)
<i>Irreplaceable loss of resources?</i>	No	No
<i>Can impacts be mitigated</i>	Yes	

Mitigation:

- » Decommissioning: removal of the solar energy structures and ancillary infrastructure after 30 years (not considered in above "after mitigation" assessments).
- » 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

Cumulative impacts:

The construction of the solar energy facility will increase the cumulative visual impact of industrial type infrastructure within the region.

Existing infrastructure includes the Sishen Mine, located some 15km to the south east of

the site, the railway line and the various distribution and transmission power lines.

Potential/future infrastructure includes the proposed Kathu and Sishen solar energy facilities on the adjacent sites (west of the railway line) as well as the proposed Kalahari CSP facility.

Residual impacts:

» None. The visual impact will be removed after decommissioning.

Implications for Project Implementation

- » The anticipated visual impacts identified are expected to be of moderate and low significance following the implementation of mitigation measures as recommended.
- » 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.

6.3.5 Assessment of Potential Social Impacts

Impacts associated with the construction phase of a project are usually of a short duration, temporary in nature, but could have long term effects on the surrounding environment. The operational life of a PV facility is between 20 - 25 years, after which the facility would possibly be upgraded to continue its lifespan if feasible, or decommissioned. The impacts usually associated with the operational phase are therefore perceived by affected parties to be more severe.

Impact tables summarising the significance of social impacts associated with the construction phase of the project (with and without mitigation)

Nature of Impact: Employment Opportunities during construction

During the construction phase of the San Solar Energy Facility will create approximately 294 employment opportunities, depending on the final design. Of this total ~ 68% (198) will be available to low-skilled workers (construction labourers, security staff etc.) and semi-skilled workers (drivers, equipment operators etc.) and 32% (93) to skilled personnel (engineers, land surveyors, project managers etc.). The work associated with the construction phase will be undertaken by contractors and will include the establishment of the San Solar Energy Facility and the associated components, including, access roads, services and power line.

The majority of low-skilled employment opportunities associated with the project are likely to benefit members from the local community. In this regard the majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community. The majority of the skilled and semi-skilled opportunities are likely to be associated with the contractors appointed to construct the proposed solar energy facility and associated infrastructure.

The skills and training that the contractors are likely to provide on-site training and skills

development opportunities. However, the majority of benefits are likely to accrue to personnel employed by the relevant contractors. In the absence of specific commitments from the developer to employ local contractors the potential for meaningful skills development and training for members from the local communities are likely to be limited.

	Without enhancement	With enhancement
Extent	Local – Regional (2) (Rated as 2 due to potential opportunities for local communities and businesses)	Local – Regional (3) (Rated as 3 due to potential opportunities for local communities and businesses)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Medium (36)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	N/A	
Can impacts be enhanced?	Yes	

Mitigation:

Employment

- » Where reasonable and practical, San Solar Energy should appoint local contractors and implement a 'locals first' policy, especially for semi- and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- » Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria;
- » Before the construction phase commences San Solar Energy should meet with representatives from the GLM to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase.
- » The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that San Solar Energy intends following for the construction phase of the project.
- » Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase.
- » The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

- » San Solar Energy should seek to develop a database of local companies, specifically BEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;
- » Where possible, San Solar Energy should assist local BEE companies to complete and

<p>submit the required tender forms and associated information.</p> <p>» The GLM, in conjunction with the local Chamber of Commerce and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.</p> <p>Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.</p>
<p>Cumulative impacts:</p> <p>» Opportunity to up-grade and improve skills levels in the area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.</p>
<p>Residual impacts:</p> <p>» Improved pool of skills and experience in the local area. However, due to relatively small number of local employment opportunities this benefit is likely to be limited.</p>

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

The presence of construction workers poses a potential risk to family structures and social networks in the area. In addition there are a number of potentially vulnerable farming activities, such as livestock farming.

the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of male construction workers, including:

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

Given the relatively small labour force (294) during the construction phase, of which approximately 200-220 can be sourced from the local area, the potential risk to local family structures and social networks is regarded as low.

The use of local residents to fill the low skilled job categories will also reduce the demand placed on local services (housing etc.) by construction workers. However, due to the potential mismatch of skills and low education levels, the potential employment opportunities for the members from these local communities may be low.

	Without enhancement	With enhancement
Extent	Local (3) (Rated as 3 due to potential severity of impact on local communities)	Local (2) (Rated as 1 due to potential severity of impact on local communities)

Duration	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)	Short term for community as a whole (2) Long term-permanent for individuals who may be affected by STDs etc. (5)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
Probability	Probable (3)	Probable (3)
Significance	Low for the community as a whole (27) Moderate-High for specific individuals who may be affected by STDs etc. (57)	Low for the community as a whole (24) Moderate-High for specific individuals who may be affected by STDs etc. (51)
Status (positive or negative)	Negative	Negative
Reversibility	No in case of HIV and AIDS	
Irreplaceable loss of resources?	Yes, if people contract HIV/AIDS. Human capital plays a critical role in communities that rely on farming for their livelihoods	
Can impacts be enhanced?	Yes, to some degree. However, the risk cannot be eliminated	
Mitigation:		
The potential risks associated with construction workers can be mitigated. The aspects that should be covered include:		
<ul style="list-style-type: none"> » Where possible, San Solar Energy should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks; » San Solar Energy should consider the establishment of a Monitoring Forum (MF) for the construction phase which should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, farmers, and the contractor. The role of the MF would be to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should also be briefed on the potential risks to the local community associated with construction workers; » San Solar Energy and the contractor should, in consultation with representatives from the MF, develop a Code of conduct for the construction phase. The code should identify what types of behaviour and activities by construction workers are not permitted. Construction workers that breach the code of good conduct should be dismissed. All dismissals must comply with the South African labour legislation; » San Solar Energy and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase; » The movement of construction workers on and off the site should be closely managed 		

<p>and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis;</p> <ul style="list-style-type: none"> » The contractor should make the necessary arrangements for allowing workers from outside the area to return home over weekends and or on a regular basis during the 6-12 month construction phase. This would reduce the risk posed by construction workers to local family structures and social networks; » It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay overnight on the site. This will make it possible to manage the potential impacts effectively.
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.
<p>Residual impacts:</p> <ul style="list-style-type: none"> » See cumulative impacts.

<p><i>Nature of Impact: Potential loss of livestock, poaching and damage to farm infrastructure associated with the presence of construction workers on site</i></p> <p>The presence of construction workers on the site increases the potential risk of stock theft and poaching. The movement of construction workers on and off the site also poses a potential threat to farm infrastructure, such as fences and gates, which may be damaged. Stock and game losses may also result from gates being left open and/or fences being damaged.</p>		
	Without enhancement	With enhancement
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2)
Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate (6) (Due to reliance on agriculture and livestock for maintaining livelihoods)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes, compensation paid for stock losses etc.	
Irreplaceable loss of resources?	No	
Can impacts be enhanced?	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> » San Solar Energy should enter into an agreement with the affected landowners whereby the company will compensate for damages to farm property and disruptions to farming 		

<p>activities. This includes losses associated with stock theft and damage to property etc.;</p> <ul style="list-style-type: none"> » San Solar Energy should investigate the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. Should such a MF be required it should be established prior to commencement of the construction phase. The Code of Conduct should be signed by San Solar Energy and the contractors before the contractors move onto site; » San Solar Energy should hold contractors liable for compensating farmers and communities in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between San Solar Energy, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below); » The Environmental Management Plan (EMP) must outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested; » Contractors appointed by San Solar Energy should ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. » Contractors appointed by San Solar Energy should ensure that construction workers who are found guilty of stealing livestock, poaching and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation; » The housing of construction workers on the site should be limited to security personnel
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » No, provided losses are compensated for
<p>Residual impacts:</p> <ul style="list-style-type: none"> » See cumulative impacts.

Nature of impact: Potential loss of livestock, crops and houses, damage to farm infrastructure and threat to human life associated with increased incidence of veld fires

The presence of construction workers and construction-related activities on the site poses an increased risk of veld fires that in turn pose a threat to the livestock, wildlife, and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. The landowners interviewed identified that veld fires were an issue of concern. In this regard all of the farms in the area are dependent on grazing and any loss of grazing due to a fire would therefore impact negatively on the livelihoods of the affected farmers. The potential risk of veld fires is likely to be higher during the dry, winter months.

	Without enhancement	With enhancement
Extent	Local (4) (Rated as 4 due to potential severity of impact on local farmers)	Local (2) (Rated as 2 due to potential severity of impact on local farmers)

Duration	Short Term (2)	Short Term (2)
Magnitude	Moderate-High due to reliance on livestock for maintaining livelihoods (8)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (42)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes, compensation paid for stock and crop losses etc.	
Irreplaceable loss of resources?	No	
Can impacts be enhanced?	Yes	
Mitigation:		
» Solar Reserve should liaise with the Lekwa-Teemane Local Municipality regarding the optimisation and focus of their intervention actions to ensure sustainable development over a period of time.		
Cumulative impacts:		
» Cumulative impacts for the Lekwa-Teemane Local Municipality could occur should other developers, together with Solar Reserve focus their intervention efforts and social responsibility programmes on the key IDP priority areas		
Residual impacts:		
» Improvement in quality of life of local individuals		

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

The movement of heavy construction vehicles during the construction phase has the potential to damage roads and create noise, dust, and safety impacts for other road users and local communities in the area. However, the findings of the SIA indicate that the current road use frequency is low. The social impacts associated with the movement of construction related traffic are therefore likely to be low.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short Term (2)	Short Term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (15)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
San Solar Energy should enter into an agreement with the affected landowners whereby the company will compensate for damages. This includes losses associated with damage to local internal farm roads that are affected by the site. In addition, the potential impacts associated with heavy vehicles and dust can be effectively mitigated. The aspects that should be covered include:		

<ul style="list-style-type: none"> » The contractor must ensure that damage caused to roads by the construction related activities, including heavy vehicles, is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor; » Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers; » All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits..
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » If damage to roads is not repaired then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage. .
<p>Residual impacts:</p> <ul style="list-style-type: none"> » See cumulative impacts

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

The activities associated with the construction phase have the potential to damage farmlands and result in a loss of land available for grazing. The significance of the impacts is to some extent mitigated by the fact that the farming activities on the site are confined to sheep farming as opposed to crops. The impact on farmland associated with the construction phase (an operational phase) can therefore be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase.

	Without mitigation	With mitigation
Extent	Local (3)	Local (1)
Duration	Long term-permanent if disturbed areas are not effectively rehabilitated (5)	Short term if damaged areas are rehabilitated (2)
Magnitude	Moderate, due to importance of farming in terms of local livelihoods (4)	Minor (2)
Probability	Definite (5)	Highly Probable (4)
Significance	High (60)	Low (20)
Status	Negative	Negative
Reversibility	Negative	
Irreplaceable loss of resources?	No, in case of footprint associated with solar thermal plant	
Can impacts be mitigated?	Yes, loss of farmland. However, disturbed areas can be rehabilitated	

Mitigation:

The potential impacts associated with damage to and loss of farmland can be effectively mitigated. The aspects that should be covered include:

- » The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be minimised;
- » An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;
- » All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase;
- » The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. The specifications for the rehabilitation programme should be drawn up the Environmental Consultants appointed to undertake the EIA (CSIR);
- » The implementation of the Rehabilitation Programme should be monitored by the ECO.

Cumulative impacts:

- » Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.

Residual impacts:

- » See cumulative impacts.

Impact tables summarising the significance of social impacts associated with the construction phase of the project (with and without mitigation)

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

Based on the information from other solar energy facility projects the proposed solar energy facility will create ~ 60 permanent employment opportunities during the 20 year operational phase. Of this total ~ 30 (50%) will be low skilled (security and maintenance), 10 (17%) semi-skilled and 20 (33%) skilled employees. Due to the low education and skills levels in the area the potential employment opportunities for members from the local Kathu and Dibeng community are likely to be limited to the low and semi-skilled positions. However, it will be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting local employment and skills development contained in the NCPGDS and the JTGDM IDP. .

Given the location of the proposed facility the majority of permanent staff is likely to reside in Kathu and Dibeng. In terms of accommodation options, a percentage of the permanent employees may purchase houses in the town, while others may decide to rent. Both options would represent a positive economic benefit for the region.

The Gamagara Local Economic Development (LED) Manager, Mr Herbert Motlonyane,

indicated that the proposed development would support the local economic development in the area and create employment.

	Without mitigation	With mitigation
Extent	Local and Regional (2)	Local and Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (30)	Medium (33)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » San Solar Energy should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area. 		
Residual impacts:		
<ul style="list-style-type: none"> » See cumulative impacts 		

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

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

Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20 year period. This revenue can be used to fund development initiatives in the area and support the local community.

The revenue from the proposed solar energy facility plant can be used to support a number of social and economic initiatives in the area, including:

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

<p>In addition, the establishment of a solar energy facility plant is not likely to have a significant impact on the current agricultural land uses that underpin the local economic activities in the area. The loss of this relatively small area will not impact on the current and future farming activities.</p>		
	Without mitigation	With mitigation
Extent	Local (2)	Local and Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Medium (30)	High (70)
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
<p>Mitigation: In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:</p> <ul style="list-style-type: none"> » San Solar Energy should meet the representatives of the Gamagara Development Trust and investigate how the proposed San Solar Energy Facility can contribute to the Development Trust; » Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community; » Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the community trust from the solar energy facility plant. 		
<p>Cumulative impacts:</p> <ul style="list-style-type: none"> » Promotion of social and economic development and improvement in the overall well-being of the community 		
<p>Residual impacts:</p> <ul style="list-style-type: none"> » See cumulative impacts. 		

Nature of impact: Promotion of clean, renewable energy

South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. As a result South Africa is one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The establishment of a clean, renewable energy facility will therefore reduce, albeit minimally, South Africa's reliance on coal-generated energy and the generation of carbon emissions into the atmosphere.

However, the overall contribution of the proposed San Solar Energy Facility to South Africa's total energy requirements will be small (75MW). In addition, the current application is not unique. In this regard, a significant number of solar energy facility developments are

currently proposed in other parts of South Africa. The potential contribution of the proposed San Solar Energy Facility should therefore be regarded as valuable, but should not be overestimated.

	Without Mitigation	With Mitigation (The provision of renewable energy infrastructure is in itself a mitigation measure)
Extent	Local, Regional and National (4)	Local, Regional and National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Low (4)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (40)	Medium (48)
Status (positive or negative)	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impacts be mitigated?	Yes	
Mitigation:		
» Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's employed during the operational phase of the project.		
Cumulative impacts:		
» Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.		
Residual impacts:		
» See cumulative impacts		

Nature of impact: Visual impact associated with the proposed solar facility and the potential impact on the areas rural sense of place

The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. Care therefore needs to be taken to ensure that the development of large renewable energy projects not impact on visual character and sense of place of the landscape. Based on the observations during the site visit, the visual impacts associated with the proposed San Solar Energy Facility are likely to be low.

The potential visual impacts will also to some extent be mitigated by the existing infrastructure in the site, including the railway line and the power lines to the west of the site.

	Without mitigation	With mitigation
Extent	Local (3)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)

Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes, solar facility can be removed.	
Irreplaceable loss of resources?	No	
Can impacts be enhanced or mitigated?	Yes	
Mitigation:		
» The recommendations contained in the VIA should be implemented.		
Cumulative impacts:		
» Potential impact on current rural sense of place		
Residual impacts:		
» None as the impact will be removed after decommissioning.		

Nature of impact: Potential impact of the solar thermal plant on local tourism

The NCPGDS identifies tourism as one of the key economic drivers in the province. Caution should therefore be taken to ensure that the development of renewable energy projects, such as the proposed San Solar Energy Facility, do not affect the tourism potential of the Province. However, based on the findings of the site visit, the proposed facility is not likely to impact on the tourism sector in the area or the Province. This is due to the sites location and the existence of existing infrastructure in the site, including the railway line and power lines. In addition, the visual quality of the area has been impacted by the over burden and processing dumps associated with the iron ore mines in the area. The significance of this issue is therefore rated as low negative. In some instances the plant may also attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

	Without mitigation	With mitigation
Extent	Local (2)	Local (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2)	Low (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24) (Applies to both – and +)	Low (27) (Applies to both – and +)
Status (positive or negative)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
In terms of mitigating the visual impacts, it is virtually impossible to hide the facility. The		

impact on the sense of place of the area cannot therefore be effectively mitigated. In terms of efforts to enhance the proposed benefits to tourism:

- » San Solar Energy should liaise with representatives from the GLM and local tourism representatives to raise awareness of the proposed facility;
- » San Solar Energy should investigate the option of establishing a renewable energy interpretation centre at the entrance to the site. The centre should include a viewing area where passing visitors can stop and view the site.

Cumulative impacts:

- » Potential negative and/or positive impact on tourism in the Gamagara Local Municipality Area.

Residual impacts:

- » See cumulative impacts

Nature of impact: Potential visual impact and impact on sense of place associated with power lines

The proposed facility includes the establishment of a 132 kV power line linking the on-site substation to the Eskom grid. The potential social impacts associated with the overhead power line are linked to the visual impact and associated impact on the sense of place and landscape character of the area. The findings of the SIA indicate that the significance of this impact is rated as low negative. This is due to the short length of the line required and the presence of existing power lines that traverse the site and the lines associated with the electrified railway line that runs along the western boundary of the site.

	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources?	No	
Can impacts be mitigated or enhanced?	Yes	

Mitigation:

- » The recommendations contained in the VIA should be implemented.
- » The measures listed above to address the potential impacts associated with the construction phase of the PV facility also apply to the construction of the power line.

Cumulative impacts:

- » Limited visual and impact on sense of place

Residual impacts:

- » None as the impact will be removed after decommissioning

Implications for Project Implementation

- » The anticipated visual impacts identified are expected to be of low significance following the implementation of mitigation measures as recommended.
- » None of the remaining visual impacts are considered to be fatal flaws for the proposed solar energy facility. The primary considerations in this regard include the very contained extent of potential visual impact and the relatively low occurrence of visual receptors within a 2km radius.
- » 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.

<i>Nature of impact: Visual impacts associated with the establishment of more than one solar thermal plant and the potential impact on the areas rural sense of place and character of the landscape.</i>		
	Without mitigation	With mitigation
Extent	Local and regional (2)	Local and regional (2)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Yes. Solar energy plant components and other infrastructure can be removed.	
Irreplaceable loss of resources?	No	
Can impacts be mitigated?	Yes	
Mitigation:		
» The establishment of a number of large solar facilities in the area does have the potential to have a negative cumulative impact on the area's sense of place and the landscape. The environmental authorities should consider the overall cumulative impact on the rural character and the areas sense of place before a final decision is taken with regard to the optimal number of such plants in an area.		
Cumulative impacts:		
» Impact on other activities whose existence is linked to linked to rural sense of place and character of the area, such as tourism, bird watching, and hunting.		
Residual impacts:		
» None as the impact will be removed after decommissioning		

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

The No-Development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a negative social cost. However, the overall contribution of the proposed San Solar Energy Facility to South Africa's total energy requirements will be small (75MW). In addition, the current application is not unique. The potential contribution of the proposed San Solar Energy Facility should therefore be regarded as valuable, but should not be over-estimated.

The No-Development option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust. This would represent a negative social impact. Also, as indicated above, the No-Development option would exacerbate the current energy supply challenges facing the area.

Nature of impact: The no-development option would result in the lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. The No-Development option would also result in the loss of the benefits to the local community and economy associated with the creation of employment opportunities and the establishment of a Community Trust.		
	Without mitigation	With mitigation
Extent	Local-Regional (2)	Local-Regional (4)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (6)	Medium (6)
Probability	Probable (3)	Highly Probable (4)
Significance	Medium (36)	Medium (56)
Status (positive or negative)	Negative	Positive
Reversibility	Yes	
Irreplaceable loss of resources?	Yes, impact of climate change on ecosystems	
Can impacts be mitigated?	Yes	
Mitigation:		
» The proposed facility should be developed and the mitigation and enhancement measures identified in the SIA and other specialist studies should be implemented. However, the impact of large solar facilities on the sense of place and landscape are issues need to be addressed in the location, design and layout of the proposed plant.		
Cumulative impacts:		
» Cumulative visual impact on the regional area should other PV facilities also be		

constructed.
Residual impacts:
» Distinct change in character and quality of the area

The "Do Nothing" alternative is not preferred as South Africa needs to diversify electricity generation sources, to which this project will contribute.

6.3. Summary of All Impacts

The following table provides a summary of the impact rating of the potential impacts identified and assessed through the EIA.

<i>Nature</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>
	<i>Without mitigation</i>	<i>With mitigation</i>
<u>Impacts on Ecology: Construction and operation of PV panels</u>		
Removal of vegetation, compaction of soils, creation of localised runoff zones, artificial shading of vegetation	High (-)	Medium (neutral)
<u>Impacts on Ecology Upgrading of external Access Road</u>		
Removal of vegetation, creation of runoff zone	Low (neutral)	Low (+)
<u>Impacts on Ecology Fencing area and associated clearance strip for fire-break</u>		
Removal of vegetation, compaction of soils	Medium (neutral)	Medium (neutral & +)
<u>Impacts on Ecology Construction of associated buildings and substation</u>		
Removal of vegetation, compaction of soils, creation of runoff zone, possible contamination	Medium (-)	Medium (-)
<u>Impacts on Ecology: Construction of power line</u>		
Removal of vegetation, compaction of soils	Low (neutral)	Low (+)
<u>Impacts on Geology and Soils and Agricultural Potential</u>		
Soil degradation (soil removal, mixing, compaction, etc) due to the construction of foundations for structures (PV panels, buildings, substations, power lines).	Low (-)	Low (-)
Soil degradation (soil removal, mixing, compaction, etc) due to the construction of access roads	Medium (-)	Medium (-)

<i>Nature</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>
	<i>Without mitigation</i>	<i>With mitigation</i>
Soil degradation due to pollution of soil by contaminants used on site during construction (e.g. fuel, oil, chemicals, cement).	Low (-)	Low (-)
Soil degradation due to increased soil erosion by wind and/or water on construction areas.	Low (-)	Low (-)
Degradation of waterways due to increased siltation downstream from site	Low (-)	Low (-)
Increased dust pollution from construction sites affecting surroundings..	Low (-)	Low (-)
Impact on existing land-use.	Low (-)	N/A
Reduction in agricultural potential.	Low (-)	N.A
Reduction in demand for non-renewable energy sources.	Medium (+)	N/A
<i>Potential Paleontological Impacts</i>		
Paleontological sites could be affected if bedrock was to be disturbed during the excavation activities associated with the construction of the pylon foundations.	Low (-)	Low (+)
<i>Potential Visual Impacts</i>		
Potential visual impact on users of roads in close proximity of the San solar energy facility	Moderate (-)	Moderate (-)
Potential visual impact on residents of homesteads in close proximity of the San solar energy facility.	Moderate (-)	Moderate (-)
Potential visual impact on sensitive visual receptors in the region(>3km) of the San solar energy facility	Moderate (-)	Low (-)
Potential visual impact of on-site ancillary infrastructure on visual receptors in close proximity (<3km) of the San solar energy facility	Low (-)	Low (-)
Potential visual impact of lighting on visual receptors in close proximity of the San solar energy facility	Moderate (-)	Low (-)

<i>Nature</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>	<i>Positive (+) ,Negative (-)or neutral Impact</i>
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Potential Social Impacts During Construction</i>		
Employment Opportunities	Medium (+)	Medium (+)
Presence of construction workers in the area	Low (-)	Low (-)
Increased risk of stock theft, poaching and damage to farm infrastructure	Medium (-)	Low (-)
Impact on the Increased risk of veld fires	Medium (-)	Low (-)
Impact of construction vehicles	Low (-)	Low (-)
Damage to and loss of farmland	High (-)	Low (-)
<i>Potential Social Impacts During Operation</i>		
employment and business creation opportunities	Medium (+)	Medium (+)
Benefits associated with the establishment of a community trust	Low (+)	Low (+)
Development of clean, renewable energy infrastructure	Medium (+)	Medium (+)
Visual impact and impact on sense of place	Low (-)	Low (-)
Impact on tourism	Low (-&+)	Low (+)
<i>Potential Social Impacts Assessment Power Line Options</i>		
Potential visual impact and impact on sense of place associated with power lines	Low (-)	Low (-)
Assessment of no-development option	Medium (-)	Medium (+)
<i>Assessment of Cumulative Impacts</i>		
Visual impacts associated with the establishment of more than one solar thermal plant and the potential impact on the areas rural sense of place and character of the landscape.	Low (-)	Low (-)

As can be seen from this table, there are no impacts of high significance expected to be associated with the construction and operation of the proposed facility, provided that the recommended mitigation measures are implemented. All identified impacts can therefore be mitigated to acceptable levels.

6.4. 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 area⁴.

Based on information available at the time of undertaking the EIA, the impact of solar facilities on the landscape is therefore likely to be a key issue in South Africa, specifically given South African's strong attachment to the land and the growing number of solar plant applications.

In the case of the proposed San Solar Energy Facility, two other solar energy facilities are proposed on the farm Wincanton 472, which borders onto the town of Dibeng. Renewable Energy Investments South Africa (Building Energy) (REISA – Building Energy) is proposing a Solar Energy Facility on Portion 4 of the farm Wincanton 472. This project is referred to as the Kathu Solar Energy Facility and has a capacity of 75 MW and will be established within a broader area of 6 km². Windfall 59 properties (Aveng & Acciona) is proposing a Solar Energy Facility on Portion 6 of the farm Wincanton 472. This project is referred to as the Sishen Solar Energy Facility and also has a capacity of 75 MW and will be established within a broader area of 7 km². The location of the proposed REISA (Building Energy) and Windfall 59 (Aveng & Acciona) facility's relative to the proposed San Solar Energy Facility.

Based on the findings of the site visit, the potential cumulative impacts are likely to be low. This is due to the fact that all three solar energy facilities are located on Wincanton Farm 472. The impacts are therefore concentrated on one site as opposed to being spread over a number of sites. The overall effect is therefore the establishment of a single, large solar energy facility as opposed to three separate facilities. This will result in a consolidation of the solar projects.

Social: The potential cumulative impacts on the area's sense of place is also mitigated by the existing infrastructure on the site and the mine related overburden and the mine dumps in the broader area. The visual integrity of the area has therefore already been altered. There would also be an increase in job opportunities and skills development due to these projects.

⁴ Definition as provided by DEA in the EIA Regulations.

Visual: The three projects will be consolidated onto one area, and not scattered in different parts of the Kathu. Those impacted by the development would be those surrounding homesteads.

Ecology: The cumulative impact on ecology regarding the loss of vegetation and in particular the protected Camel Thorn trees (present on San Solar) would be concentrated on that specific area. The area that consist of a grove of these protected trees are located to the south east of the San Solar Facility. The fragmentation of vegetation will be concentrated into one area of Kathu, as opposed to impacting on different areas of vegetation.

However, the relevant environmental authorities should be aware of the potential cumulative impacts when evaluating other applications in the area.

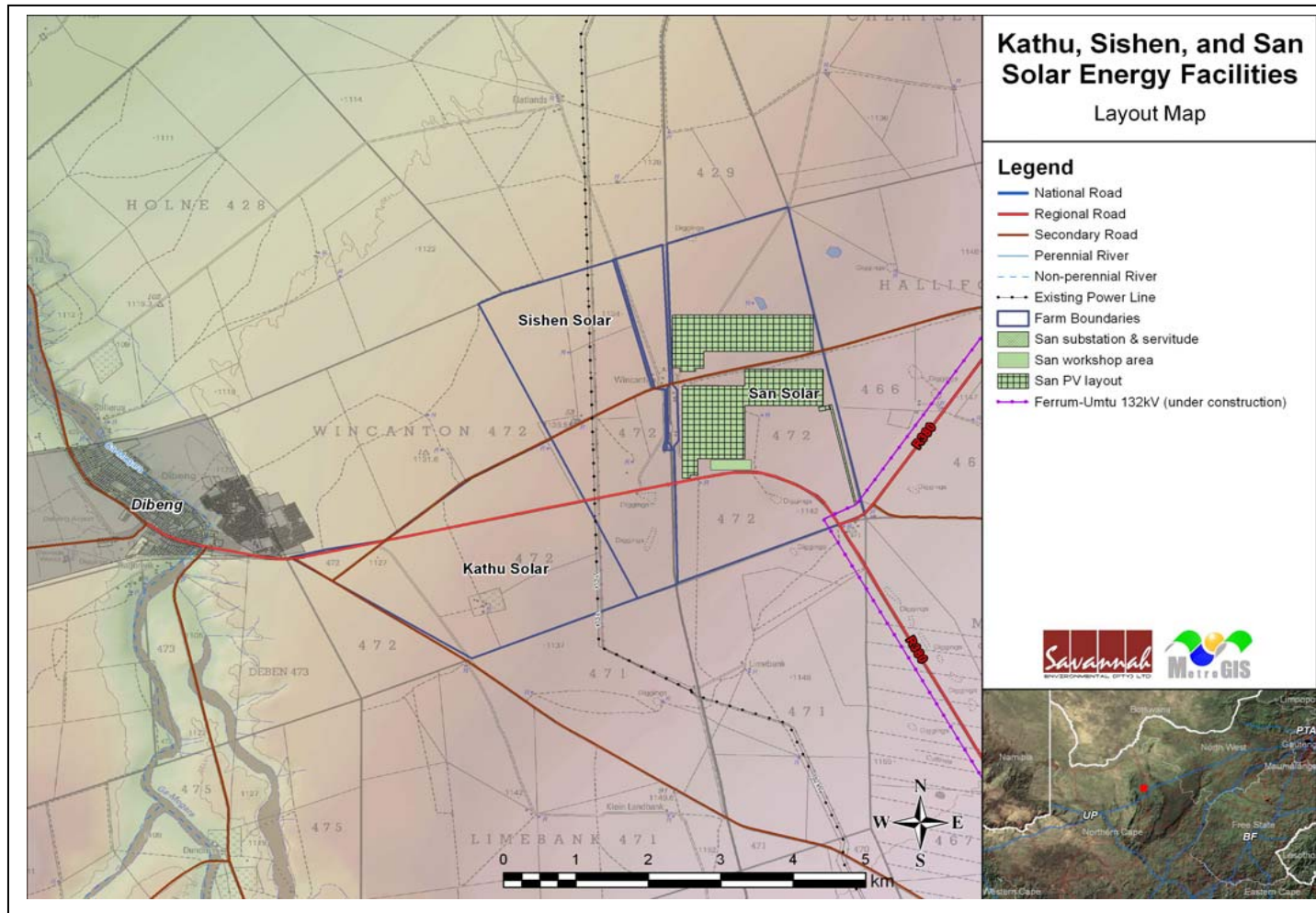


Figure 6.5: The location of the proposed REISA (Building Energy) and Windfall 59 Properties (Aveng & Acciona) solar energy facilities relative to the proposed San Solar Energy Facility

6.5. Assessment of the Do Nothing Alternative

The 'do-nothing' alternative is the option of not constructing the proposed San Solar Energy Facility. Should this alternative be selected, there would be no impacts on the site due to the construction and operation activities of a solar energy facility. However, there will be impacts at a local and a broader scale. .

From a local perspective, the identified site, which is used extensively for livestock and –game farming... However, at a broader scale, the benefits of additional capacity to the electricity grid and those associated with the introduction of renewable energy would not be realised. Although the facility is only proposed to contribute 75 MW to the grid capacity, this would assist in meeting the growing electricity demand throughout the country and would also assist in meeting the government's goal for renewable energy.

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

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

- » **Pollution reduction:** The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions.
- » **Climate friendly development:** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for approximately 1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions.
- » **Support for international agreements:** The effective deployment of renewable energy provides a tangible means for South Africa to demonstrate its commitment to its international agreements under the Kyoto Protocol, and for cementing its status as a leading player within the international community.
- » **Employment creation:** The sale, development, installation, maintenance and management of renewable energy facilities have significant potential for job creation in South Africa.
- » **Acceptability to society:** Renewable energy offers a number of tangible benefits to society including reduced pollution concerns, improved human and ecosystem health and climate friendly development.
- » **Support to a new industry sector:** The development of renewable energy offers the opportunity to establish a new industry within the South African economy.

The 'do nothing' alternative will not assist the South African government in addressing climate change, in reaching the set targets for renewable energy, nor will it assist in supplying the increasing electricity demand within the country. In addition the Northern Cape power supply will be deprived of an opportunity to benefit from the additional generated power being evacuated directly into the Province's grids. The 'do nothing' alternative is, therefore, not a preferred alternative.

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 7

The San Solar Energy Facility is proposed to be developed as a commercial solar energy facility located on the remaining extent of the farm Wincanton 472, which falls within the Gamagara Local Municipality of the Northern Cape Province (refer to Figure 7.1) The purpose of the proposed facility is to add new capacity for generation of power from renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand), and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

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

As such San Solar Energy Facility (Pty) Ltd, as an IPP, is investigating the establishment of a 75 MW (94 installed capacity) photovoltaic solar energy facility and associated infrastructure for the purpose of commercial electricity generation. The proposed facility will require approximately 500 ha and will be comprised of the following primary elements (refer to Chapter 2 for more details):

- » An array of solar panels with a generation capacity of up to 75 MW (94 MW installed capacity).
- » An on-site generator transformer and a single substation to facilitate the connection between the solar energy facility and the Eskom electricity grid.
- » A 132kV overhead power line looping in and out of the Umtu-Ferrum power line (currently under construction).
- » Internal access roads.
- » Gate house and security.
- » Warehouse.
- » Canteen and change rooms.
- » Office and Control centre.

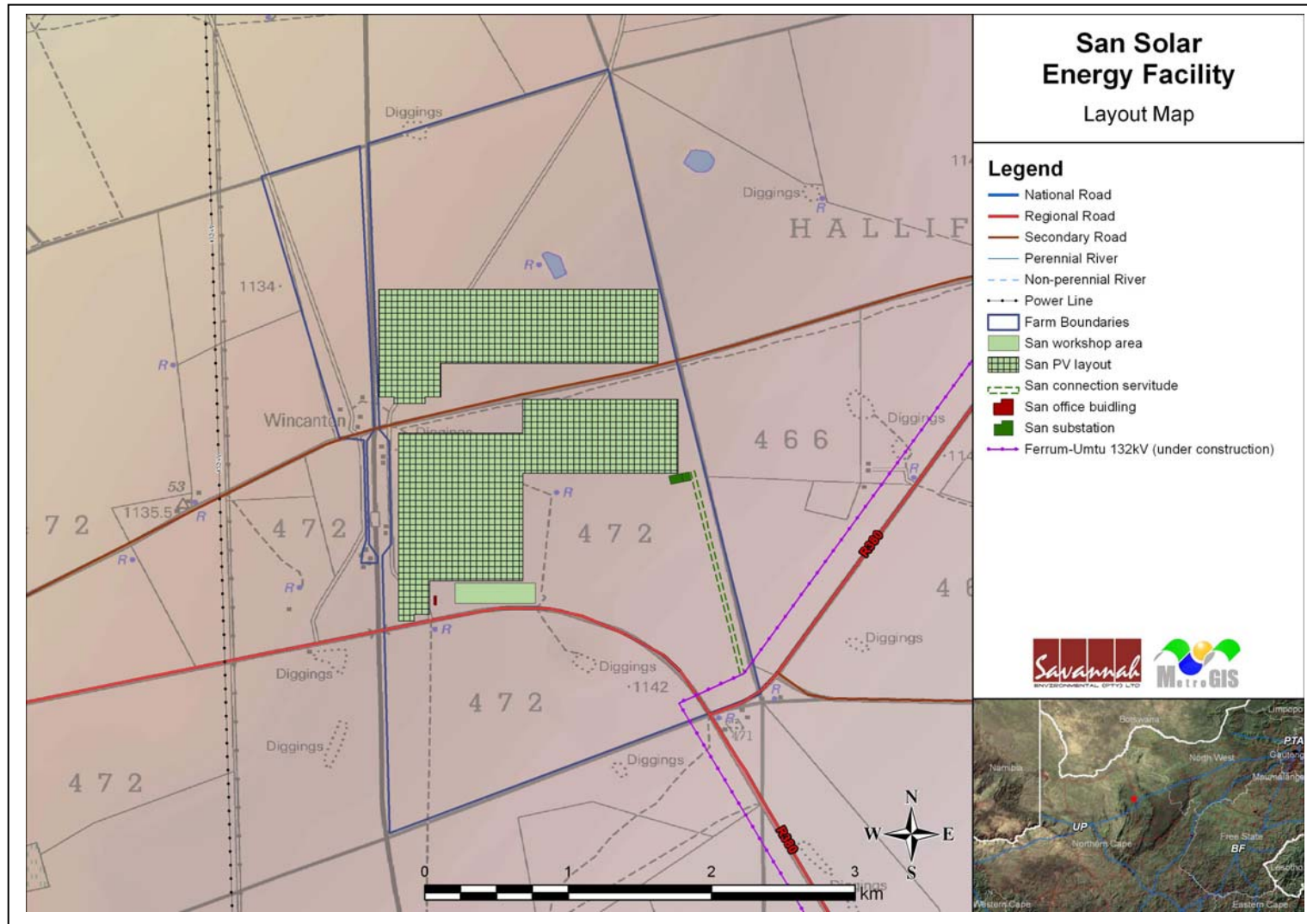


Figure 7.1: Locality map illustrating the location of the assessed development site for the proposed San Solar Energy Facility and preliminary layout of the proposed facility

An EIA process, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing, and reporting environmental impacts associated with an activity. The EIA process forms part of the feasibility phase of a project and informs the final design of a development. In terms of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998), San Solar Energy Facility (Pty) Ltd requires authorisation from the National Department of Environmental Affairs (DEA) (in consultation with the Northern Cape – Department of Environmental and Nature Conservation (DENC) for the establishment of the proposed facility. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR543, GNR544, GNR545; and GNR546, a Scoping and an EIA Phase have been undertaken for the proposed project. As part of this EIA process comprehensive, independent environmental studies have been undertaken in accordance with the EIA Regulations. The following key phases have been 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 stakeholder letters. Details of registered 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 project development site), as well as the extent of studies required within the EIA Phase were identified.
- » *EIA Phase* – potentially significant biophysical and social impacts⁵ and identified feasible alternatives put forward as parts of the project have been comprehensively assessed through specialist investigations. Appropriate mitigation measures have been recommended as part of a draft Environmental Management Programme (EMP) (refer to Appendix J).

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

7.1. Evaluation of San Solar Energy Facility

The preceding chapters of this report together with the specialist studies contained within Appendices E -J provide a detailed assessment of the potential impacts that may result from the proposed project. This chapter concludes the EIA Report for San Solar Energy Facility by providing a summary of the conclusions of the

⁵ Direct, indirect, cumulative that may be either positive or negative.

assessment of the proposed site for the development of the PV solar energy facility. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

From the assessment of potential impacts undertaken within this EIA, it is concluded that there are no impacts fatal flaws were identified to be associated with the site, and no absolute 'no-go' areas were identified for the larger site, although areas of high ecological sensitivity were identified in terms of the small saline pans. These areas should be avoided as far as possible, and where not possible to avoid, impacts on such sites should be minimised to reduce impacts to acceptable levels. In summary, the most significant environmental impacts associated with the San Solar Energy Facility, as identified through the EIA, include:

- » Local site-specific biophysical (flora, fauna and soils) impacts as a result of physical disturbance/modification to the site with the establishment of the facility.
- » Visual impacts.
- » Impacts on the social environment.

7.1.1. Local Site-specific Impacts

The construction of the San Solar Energy Facility will lead to permanent disturbance of an area of < 500ha in extent. Permanently affected areas include the area for the PV panels and associated infrastructure, as well as the internal power line route. From the specialist investigations undertaken for the proposed solar energy facility development site, it was determined that the majority of the site is in a natural state, but degraded. Areas of sensitivity within the proposed development site were identified through the EIA process. These relate to the local ecology (sensitive and protected vegetation, habitat for fauna, and a pan that occurs on the site (refer to the sensitivity map – Figure 7.2)).

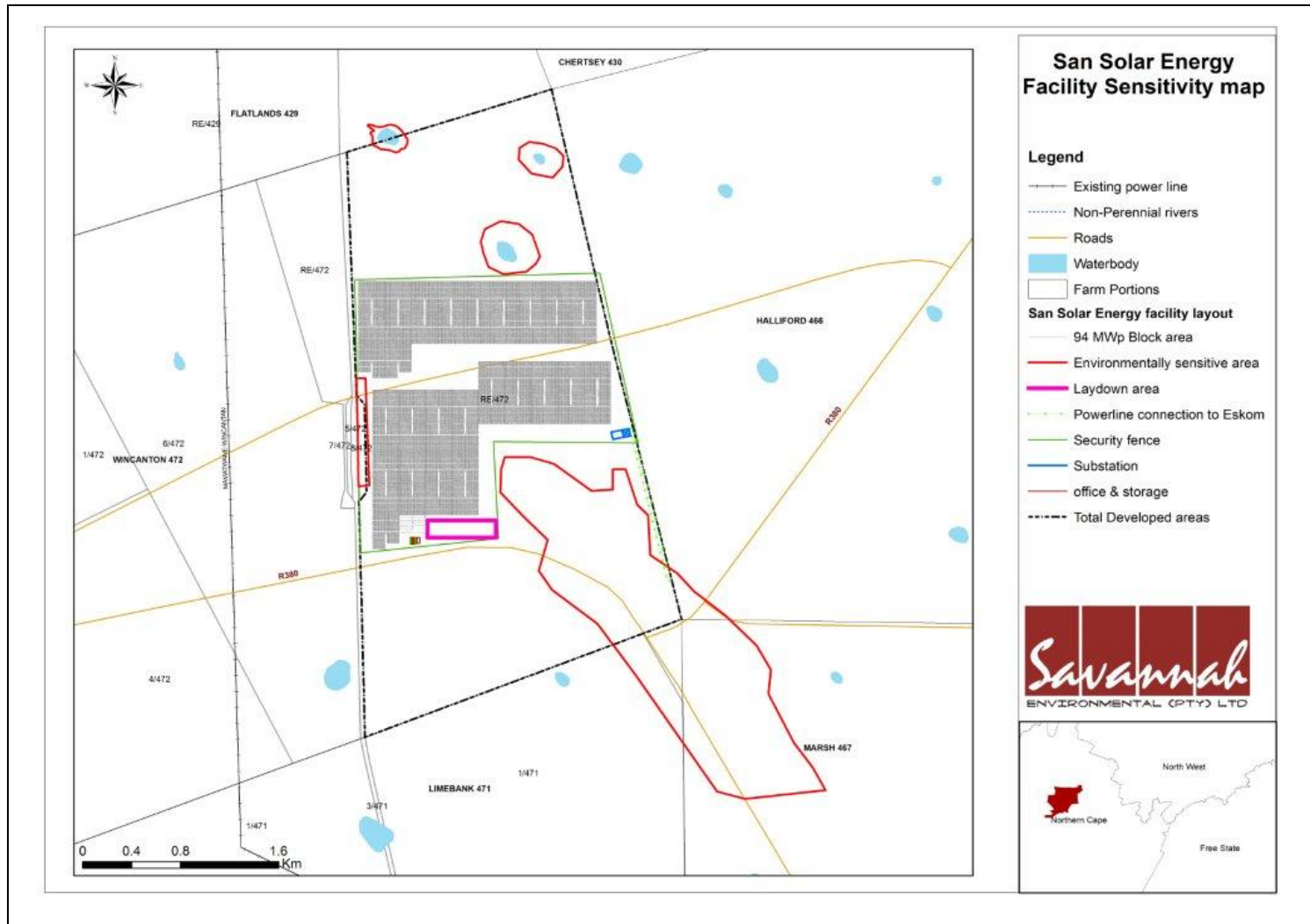


Figure 7.2: Sensitivity map for the San Solar Energy Facility

In order to minimise potential impacts on these sensitive areas within the site during construction, no development should take place within these areas as far as possible. Where this is unavoidable, the relevant permits (including a water use license for impacting on the pan and biodiversity permits for impacts on threatened and/or protected plant and animal species) must be obtained prior to undertaking construction.

7.1.2. Visual Impacts

It has been concluded that the visual impacts associated with the proposed facility will be largely contained within the broader region itself. None of the potential visual impacts identified are considered to be fatal flaws for the proposed solar energy facility.

The primary considerations in this regard include the very contained extent of potential visual impact on users of the arterial road (i.e. the R380) and the secondary roads in close proximity (i.e. within 3km) of the proposed solar energy facility. Visual impacts can be further mitigated through the retention of a buffer of 30 – 50m of natural vegetation along the boundary of the development site.

Two solar energy facilities are proposed next to the proposed San Solar Energy Facility (Refer to Figure 7.3). Both of these facilities have been awarded preferred bidder status by the DoE and will therefore be developed in the near future. Based on the findings of the specialist studies undertaken, the potential cumulative visual impacts are likely to be low. This is due to the fact that all three solar energy facilities are located on Wincanton Farm 472. The impacts are therefore concentrated on one site as opposed to being spread over a number of sites. The overall effect is therefore the establishment of a single, large solar energy facility in an area as opposed to three separate facilities spread across the region. The potential cumulative impact on the area's sense of place is also mitigated by the existing infrastructure on the site and the mine related overburden and the mine dumps in the broader area. The visual integrity of the area has therefore already been altered.

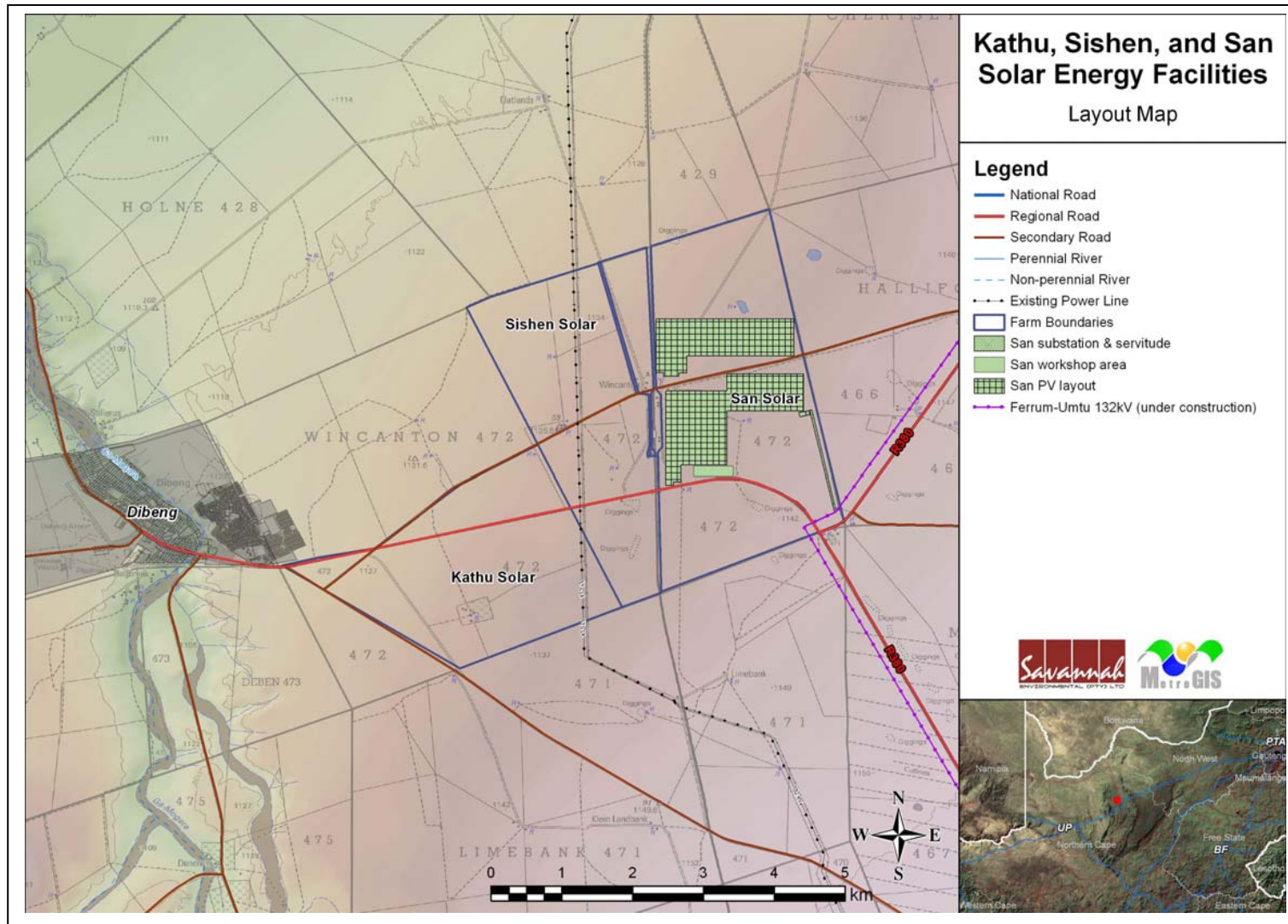


Figure 7.3: Locality map showing the adjacent Solar Energy Facilities proposed adjacent to San Solar Energy Facility

7.1.3. Impacts on the Social Environment

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. Construction crew camps may be established on the site, and if required construction workers may also be housed in the nearest towns or other available/existing accommodation. Construction activities on the site will be largely restricted to daylight hours, and the construction phase is anticipated to extend for a minimum period of 8-months.

Negative impacts during construction relate mainly to impacts due to the presence of construction workers and visual impact imposed by the facility on the local environment. The findings of the SIA undertaken for the proposed project indicate that the development will create employment and business opportunities for locals during both the construction and operational phase of the project. This will be a positive impact due to the high unemployment levels in the area. The positive impact due to employment creation will be lower during operation as there will be a limited number of staff required compared to the construction phase. The concerns raised by neighbouring landowners, have been included in this EIA report and with implementation of an EMP, these social risks from the PV plant can be managed to an acceptable level.

7.2. Overall Conclusion (Impact Statement)

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

The technical viability of establishing a solar energy facility with a generating capacity of 75 MW (94 installed capacity) on a site located on the remaining extent of the farm Wincanton 472 has been established San Solar Energy Facility (Pty) Ltd. The positive implications of establishing a solar energy facility on the identified site within the Northern Cape include the following:

- » The potential to harness and utilise solar energy resources within the Northern Cape.
- » The consolidation of solar facility infrastructure within an area (specifically considering the proximity to the Kathu and Sishen solar facilities to be developed).
- » The project would assist the South African government in reaching their set targets for renewable energy.
- » The project would assist the South African government in the implementation of its green growth strategy and job creation targets.
- » The National electricity grid in the Northern Cape would benefit from the additional generated power.
- » Promotion of clean, renewable energy in South Africa
- » Creation of local employment, business opportunities and skills development for the area.

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

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**.

7.3. 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 developmental impacts of the San Solar Energy Facility project can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

- » As far as possible, any component of the facility which could potentially affect sensitive areas (i.e. on site pans) should be shifted in order to avoid these areas of high sensitivity (i.e. best practice is impact avoidance). Where this is not possible, alternative mitigation measures as detailed in this report must be implemented and relevant permits must be obtained.
- » Following the final design of the facility, a revised layout must be submitted to DEA for review and approval prior to commencing with construction.
- » An independent Environmental Control Officer (ECO) should be appointed to monitor compliance with the specifications of the EMP for the duration of the construction period.
- » The draft Environmental Management Programme (EMP) as contained within Appendix J 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.
- » Alien invasive plants should be controlled on site throughout the construction and operation of the facility.
- » All relevant practical and reasonable mitigation measures detailed within this report and the specialist reports contained within Appendices E to I must be implemented.
- » During construction, unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.
- » Disturbed areas should be rehabilitated as quickly as possible once construction is completed in an area, and an on-going monitoring programme should be established to detect, quantify, and manage any alien species.

- » A comprehensive storm water management plan should be compiled and implemented for the developmental footprint prior to construction.
- » Applications for all other relevant and required permits required to be obtained by San Solar Energy Facility (Pty) Ltd must be submitted to the relevant regulating authorities.

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