ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
DRAFT SCOPING REPORT

PROPOSED TUTUKA PV SOLAR ENERGY FACILITY NEAR STANDERTON, MPUMALANGA PROVINCE

DEA REF NO.: 14/12/16/3/3/2/754

DRAFT SCOPING REPORT

FOR PUBLIC REVIEW

Prepared for:

Eskom Holdings SOC Limited
Megawatt Park,
Maxwell Drive,
Sandton,
Johannesburg

Prepared by:

Savannah Environmental Pty Ltd

UNIT 10, BLOCK 2
5 WOODLANDS DRIVE OFFICE PARK,
CORNER WOODLANDS DRIVE & WESTERN
SERVICE ROAD, WOODMEAD, GAUTENG
PO BOX 148, SUNNINGHIL, 2157
TEL: +27 (0)11656 3237
FAX: +27 (0)86 684 0547
E-MAIL: INFO@SAVANNAHSA.COM
WWW.SAVANNAHSA.COM

Savannah
ENVIRONMENTAL (PTY) LTD

PROJECT DETAILS

DEA Reference No.	:	14/12/16/3/3/2/754
Title	:	Environmental Impact Assessment Process Draft Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province
Authors	:	Savannah Environmental (Pty) Ltd Sheila Muniongo Jo-Anne Thomas
Sub-consultants	:	Feathers Environmental Services Limosella Consulting ARC-Institute for Soil, Climate and Water Heritage Contracts and Archaeological Consulting CC (HCAC) BM Geological Services Afzelia Environmental Consultants and Environmental Planning and Design
Client	:	Eskom Holding SOC (state owned company) Ltd
Report Status	:	Draft Scoping Report for Public Review
Review Period	:	17 March 20152015 – 20 April 2014

When used as a reference this report should be cited as: Savannah Environmental (2015) Draft Scoping Report: Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province.

PURPOSE OF THE SCOPING REPORT

Eskom Holding SOC (state owned company) Ltd is proposing to establish a 65.9MW photovoltaic solar energy facility and associated infrastructure on a site within the Tutuka coal fired power station boundary, approximately 28 km north-east of Standerton in Mpumalanga Province and appointed Savannah Environmental, as independent environmental consultants, to undertake the requisite Environmental Impact Assessment (EIA) Process. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

Scoping is an important part of the EIA process, as it helps to ensure that the impact assessment is appropriately focussed. The main objectives of the Scoping process are:

» To engage with stakeholders at an early stage of the development so that they may contribute their views with regards to the proposed project;
» To identify potential issues and impacts associated with the proposed development;
» To define the scope of the Environmental Impact Assessment (EIA);
» To define the methodology that is required for the EIA; and
» To describe the plan of study for the EIA.

In terms of NEMA, the Scoping Report is submitted to the competent authority (i.e. the National Department of Environmental Affairs (DEA)) as part of the decision-making process with regard to the proposed solar energy project. The Scoping Report is also intended to provide sufficient background information to other Organs of State, non-statutory bodies, the general public, organisations and local communities in order to obtain their commentary and input on the proposed development. The Scoping Phase of the EIA process identifies and describes potential issues associated with the proposed project, and defines the extent of the studies required within the EIA Phase of the process. The EIA Phase will assess those identified potential environmental impacts and benefits associated with all phases of the project including design, construction, operation and decommissioning, and will recommend appropriate mitigation measures for potentially significant environmental impacts.

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

» **Chapter 1** provides background to the proposed solar energy facility and the environmental impact assessment process.
» **Chapter 2** describes the components of the proposed project.

- **Chapter 3** outlines the process which was followed during the Scoping Phase of the EIA process.
- **Chapter 4** describes the existing biophysical and socio-economic environment affected by the proposed project.
- **Chapter 5** provides a desktop assessment of the potential environmental and social impacts associated with the development of the proposed project.
- **Chapter 6** presents the conclusions of the scoping evaluation.
- **Chapter 7** describes the Plan of Study for EIA.
- **Chapter 8** provides references used in the compilation of this Scoping Report.

DEA & LEGAL REQUIREMENTS

As outlined in the acceptance of the application dated November 2015, Savannah Environmental has compiled a table (refer to Table 1 below) which outline the requirements and where in the draft scoping report the requirements have been addressed for ease of reference.

Table 1: Information requested by dea

No.	Information	Provided
1	Please be advised that in terms of the EIA Regulations and NEMA the investigation of alternatives is mandatory. Alternatives must therefore be identified, investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option).	Section 2.3
2	A detailed and complete EMPr must be submitted with the EIR. This EMPr must not provide recommendations but must indicate actual remediation activities which will be binding on the applicant. Without this EMPr the documents will be regarded as not meeting the requirements and will be returned to the applicant for correction.	An EMPr will be drafted and will form part of the Final EIA report
3	The applicant/EAP is required to inform this Department in writing upon submission of any draft report, of the contact details of the relevant State Departments (that administer laws relating to a matter affecting the environment) to whom copies of the draft report were submitted for comment. Upon receipt of this confirmation, this Department will in accordance with Section 240(2) & (3) of the National Environmental Management Act, 1998 (Act 107 of 1998) inform the relevant State Departments of the commencement date of the 40 day commenting period, or 60 days in the case of the Department of Water Affairs for waste management activities which also require a licence in terms of the National Water Act, 1998 (Act 36 of 1998).	In terms of the NEMA Amendments Law Act, Section 24O of NEMA has been amended such that Organs of State must comment within 30days of receipts of the request. Also Organs of States should now submit their comments to the EAP and no longer directly to DEA (except for final reports)

Table 2: Legal requirements in terms of the EIA regulations

NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS	CROSS REFERENCE IN THIS SCOPING REPORT
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP to carry out scoping procedures	Chapter 1
(b) a description of the proposed activity	Chapter 2
(c) a description of any feasible and reasonable alternatives that have been identified	Chapter 2
(d) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is— (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken	Chapter 2
(e) a description of the environment that may be affected by the activity and the manner in which activity may be affected by the environment	Chapter 4
(f) an identification of all legislation and guidelines that have been considered in the preparation of the scoping report	Chapter 3
(g) a description of environmental issues and potential impacts, including cumulative impacts, that have been identified	Chapter 5
(h) details of the public participation process conducted in terms of regulation 27(a), including—	
(i) the steps that were taken to notify potentially interested and affected parties of the application	Chapter 3
(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given	Appendix C
(iii) a list of all persons or organisations that were identified and registered in terms of regulation 55 as interested and affected parties in relation to the application	Appendix C
(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues	Appendix C
(i) a description of the need and desirability of the proposed activity	Chapter 2

NEMA REGULATIONS 543, SECTION 28 REQUIREMENTS FOR THE CONTENT OF SCOPING REPORTS	CROSS REFERENCE IN THIS SCOPING REPORT
(j) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	Chapter 2
(k) copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties	Appendix C
(l) copies of the minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants	Appendix C
(m) any responses by the EAP to those representations and comments and views;	Appendix C
(n) a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include—	Chapter 7
(i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken	
(ii) an indication of the stages at which the competent authority will be consulted	
(iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and	
(iv) particulars of the public participation process that will be conducted during the environmental impact assessment process	
(o) any specific information required by the competent authority	Refer to Page i for information requested by DEA
(p) any other matters required in terms of sections 24(4)(a) and (b) of the Act.	Refer to Page i for information requested by DEA
(2) In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application.	Chapter 3
(3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation (1)(c), exist.	Chapter 2

INVITATION TO COMMENT ON THE DRAFT SCOPING REPORT

This **Draft Scoping Report** has been made available for public review at the following places, which lie in the vicinity of the proposed project area from **17 March 2015 – 20 April 2015**

» Thuthukani Public Library
» Standerton Public Library

The report is also available for download on:

» www.savannahsa.com

Please submit your comments to
Gabriele of **Savannah Environmental** PO Box 148, Sunninghill, 2157 Tel: 011 656 3237 Fax: 086 684 0547 Email: gabriele@savannahsa.com
The due date for comments on the Draft Scoping Report is **20 April 2015**

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

EXECUTIVE SUMMARY

Background

Eskom Holding SOC (state owned company) Ltd is proposing to establish a 65.9MW photovoltaic solar energy facility and associated infrastructure on a site within the Tutuka coal fired power station boundary, approximately 28 km north-east of Standerton in Mpumalanga Province.

Based on a pre-feasibility analysis and site identification process undertaken by Eskom Holding, a favourable area has been identified for consideration and evaluation through an environmental impact assessment process. The study area is situated in the jurisdiction of Gert Sibande District Municipality and Lekwa Local Municipality within the Mpumalanga Province

The **Tutuka PV Solar Energy Facility** is proposed to accommodate several arrays of photovoltaic (PV) panels and associated infrastructure. From a local perspective, the site is preferred due to suitable topography, grid connection access, and by virtue of the extent of the site.

An EIA process and public participation process is being undertaken for the proposed project. The nature and extent of this facility, as well as potential environmental impacts associated with the construction, operation and decommissioning phases are explored in more detail in this final Scoping Report.

Project Location

The project is portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS located approximately 28km north-east of Standerton in Mpumalanga Province within the Tutuka Power Station.

Project Components

The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a net generating capacity of up to 65.9MW. The broader site is proposed to accommodate the following infrastructure:

- Solar panels (fixed/tracking technology) with an export capacity of up to 65.9MW.
- Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
- Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- An on-site substation or switching station.
- A power line to facilitate the connection of the solar energy

facility from the on-site substation to Tutuka power station or nearest grid connection within the Tutuka power station.
» Internal access roads.
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

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

Evaluation of the Proposed Project

The main issues identified through this scoping study associated with the proposed solar energy facility are summarised in Table 3 below.

As is evident from the table above, the majority of potential impacts identified to be associated with the construction of the Tutuka Solar Energy project are anticipated to be localised and restricted to the proposed site itself (apart from social impacts – job creation which could have more of a regional positive impact), while operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa). However, areas of potential environmental sensitivity were identified through the scoping phase. These include depressions, seepage areas and wetlands such as dams and vleis, as well as possibly intact natural vegetation. These are shown in Figure 1.

The potentially sensitive areas/environmental features/issues that have been identified for further study include:

Ecologically sensitive areas on the site - The Mpumalanga Biodiversity Conservation Plan classifies the western half of the study area as of Least Concern, whilst the roughly the eastern half of the study area is considered Important and Necessary for meeting biodiversity targets. Although most of the study area appears to have been previously disturbed, the actual state of the ecosystem will have to be studied in detail during the peak growing season, before a definite assessment statement can be made as to the ecological impact of the proposed development. .

Table 3: Summary of the potential impacts associated the Tutuka PV Solar Energy Facility development.

Construction / Decommissioning Impacts	Extent
Habitat Loss	L
Disturbance and Displacement	L
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for threatened and /or protected vertebrates	L
Impacts on wetlands	L
Establishment and spread of declared weeds and alien invader plants.	L
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for threatened and /or protected vertebrates	L
Impacts on wetlands	L
Establishment and spread of declared weeds and alien invader plants.	L
Potential impacts on heritage resources	L
Potential movement, damage, or destruction of fossil material	L
Loss of agricultural land use	L
Soil erosion	L
Degradation of vegetation	L
Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard;	L-R
It is anticipated that the more skilled positions could be filled by individuals from South Africa;	L-R
An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed	L
Visual impact of construction traffic, deliveries, laydown areas, accommodation, offices.	L
Impact on surface water resources (riparian systems)	L

Operational Impacts	Extent
Mortality as a direct collisions with solar panels	L
Collisions with power line infrastructure	L
Disturbance and Displacement	L
Disturbance or loss of indigenous natural vegetation due to shading	L
Altered runoff patterns due to rainfall interception by PV panels and compacted areas	L
Loss of agricultural land use	L
Soil erosion	L
Contribution of clean energy	N
Employment opportunities	L-R
General landscape degradation or changes to landscape character	L
Change to the views of visual receptors.	L
Impact on surface water resources (riparian systems)	L

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

Avifauna - Given the presence of existing habitat degradation and disturbance associated with the mining and energy generation activities in the study area, it is anticipated that the proposed Tutuka Solar Photovoltaic Facility can be constructed at either of the two alternative PV sites with acceptable levels of impact on the resident avifauna. Potential impacts that were identified relating to the PV plant itself are: bird collisions with PV panels; loss of habitat; disturbance; and the nesting of birds on plant infrastructure, of which habitat destruction is likely to be the most significant. Potential impacts of associated infrastructure include the following: collision of large terrestrial birds with overhead power lines; electrocution of birds on pylons; nesting of birds on pylons; habitat destruction and disturbance. Certain levels of habitat destruction and disturbance may also result from the construction of internal access roads, additional on-site substations and operations building.

Heritage - This scoping study revealed that very few known heritage sites occur in the larger region but this can be attributed to a lack of research in the area. Every site is relevant to the Heritage Landscape, but it is anticipated that no site in the study area could have conservation value. The following conclusions are applicable to the following sites:

» Archaeological sites: If any sites occur in the study area they could be mitigated either in the form of conservation of the sites with in the development or by a Phase 2 study where the sites will be recorded and sampled before the client can apply for a destruction permit for these sites prior to development.
» Historical finds and Cultural landscape: No structures occur in the study area however this assumption will have to be verified in the field.
» Burials and cemeteries: Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved with in a development. These sites can how ever be relocated if conservation is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave sites must be confirmed during the field survey and the public consultation process.

Soils & agricultural potential - The major impact on the natural resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. With the possibility of moderate potential agricultural soils in the vicinity, this impact would in all probability have a degree of significance, although local in extent.

Social impacts - The most important potential social benefits associated with the construction and operations of the project refer to the job opportunities and possible socio-economic spin-offs created. New economic activities such as this project having the potential to assist

with the developmental challenges that much of province is faced with, providing employment and skills development to local community and contributing to the social, economic and institutional development of the local area. The benefit of employment opportunities and disposable income in the local project area has the opportunity to improve levels of health, education and service delivery with the exposure to such opportunities. Additional employment and associated indirect economic benefits will maintain and improve the quality of life of these communities. Continued investment in the project area will also support development. The main negative impacts are associated with the influx of in-migrants and intrusion impacts associated with the construction phase and the visual impact of the facility and associated infrastructure while in operation, with possible subsequent negative social consequences and/or impacts.

Visual / Social Receptors - The brief assessment undertaken for the scoping stage indicates that because the project is proposed against the backdrop of the Tutuka Power Station which includes associated infrastructure such as internal buildings, HV overhead power lines, coal stockpiles, a PFA tip and above ground conveyors, visual impacts of the proposed solar array and associated infrastructure are generally unlikely to be significant.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance although rural areas are clearly defined particularly from a distance and it is assumed that the majority of people would prefer rural views over views over heavy industry. Proposed development is likely to be viewed against the backdrop of existing industrial elements and so there is unlikely to be any significant further loss of the rural landscape character in the area.

In terms of visual intrusion or obstruction impacting on visual receptors, the initial investigation indicates that generally these impacts are not likely to be significant. However, there are a number of homesteads in close proximity to the proposed development and impacts on these needs to be investigated in detail in the field.

Whilst visual impacts are indicated as likely to be low, due to the nature of the proposed development and the fact that there is potential to impact on a reasonably cohesive rural landscape, a detailed assessment is recommended

This preliminary / desktop sensitivity analysis of the site should be considered by Eskom in understanding which area of the site would be least impacted by the development of the Tutuka Solar Energy Facility in order to inform the preliminary infrastructure layouts for consideration within the EIA phase. Through the EIA phase more detailed studies will be conducted, and further sensitive areas will be marked, more

accurately and in more detail than in this Draft Scoping Report.

Evaluation of the Potential Issues with Associated Infrastructure - Invertors, and Internal Access Roads

In order to connect the Tutuka PV Solar Energy Facility to the power grid, the Eskom intends on building on-site substation and power line for which will connect into the existing substation located on the site.

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

At this stage, there are no fatal flaws associated with the associated infrastructure of the Tutuka PV Solar Energy Facility site on portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS. Further investigation is required to confirm this. It is recommended that the proposed site can be considered in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

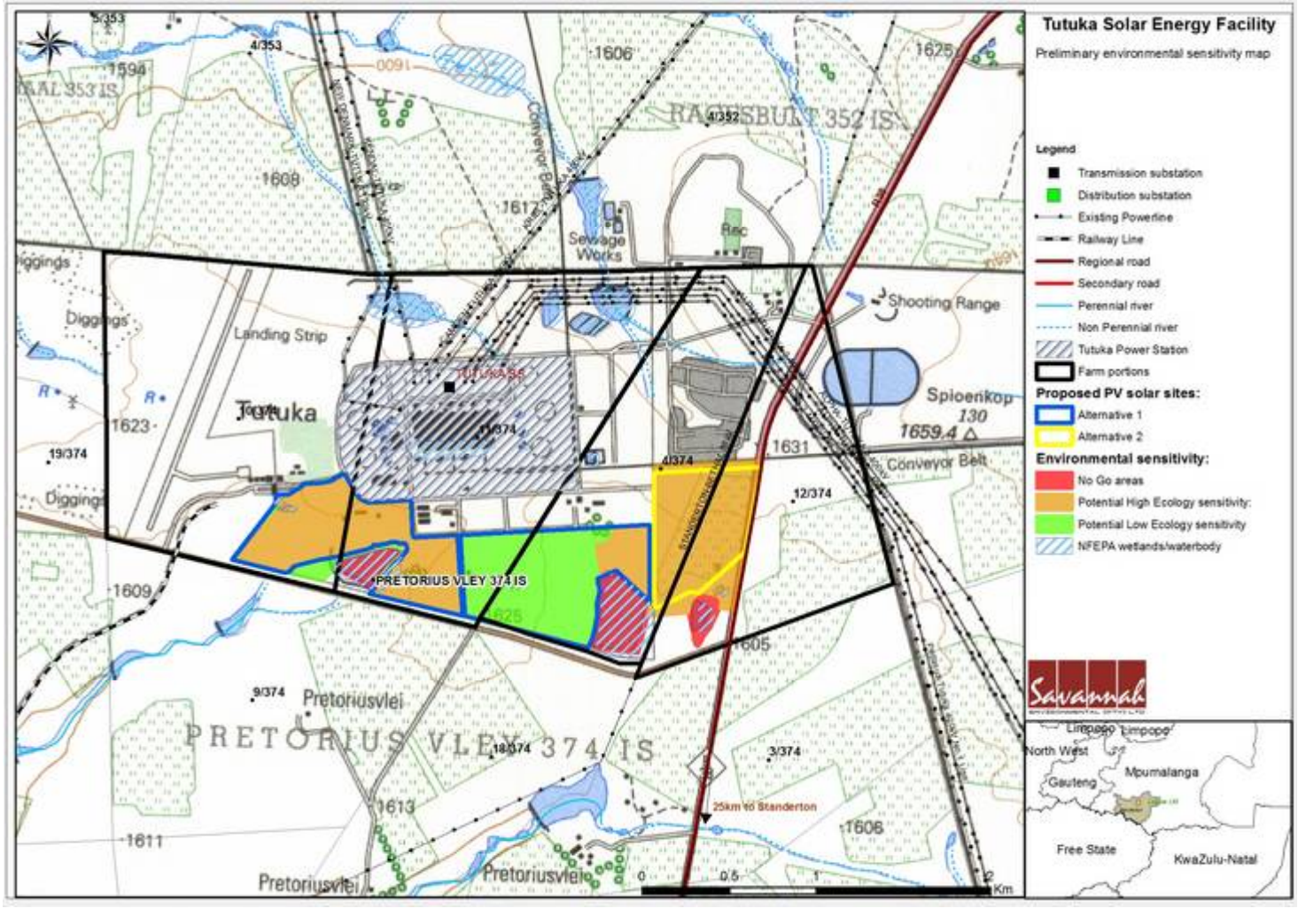

Figure 1: Desktop environmental sensitivity map of the proposed Tutuka Solar Energy Facility development site

TABLE OF CONTENTS

PAGE

APPENDIX LIST

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.

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

Calcrete: A soft sandy calcium carbonate rock related to limestone which often forms in arid areas.

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

Demand-side Management Programme (DSM): A joint initiative between the DME, the National Electricity Regulator (NER) and Eskom which aims to provide lower cost alternatives to generation system expansion by focusing on the usage of electricity. Consumers are incentivised to use electricity more efficiently and at times of the day outside of Eskom's peak periods.

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

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'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.

Early Stone Age: A very early period of human development dating between 300 000 and 2.6 million years ago.

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 on-going 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.

Late Stone Age (LSA): In South Africa this time period represents fully modern people who were the ancestors of southern African KhoeKhoen and San groups (40 000 – 300 years ago).

Middle Stone Age (MSA): An early period in human history characterised by the development of early human forms into modern humans capable of abstract though process and cognition 300 000 – 40 000 years ago.

Midden: A pile of debris or dump (shellfish, stone artefacts and bone fragments) left by people after they have occupied a place.

Miocene: A geological time period (of 23 million - 5 million years ago).

National Integrated Resource Plan (NIRP): Commissioned by NERSA in response to the National Energy Policy's objective relating to affordable energy services, in order to provide a long-term, cost-effective resource plan for meeting electricity

demand, which is consistent with reliable electricity supply and environmental, social and economic policies.

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

Palaeontological: Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

Pleistocene: A geological time period (of 3 million – 20 000 years ago).

Pliocene: A geological time period (of 5 million – 3 million years ago).

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).

Self-consumption: The possibility for any kind of electricity consumer to connect a photovoltaic system, with a capacity corresponding to his/her consumption, to his/her own system or to the grid, for his/her own or for on-site consumption, while receiving value for the non-consumed electricity which is fed into to the grid.

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

Sustainable Utilisation (*sensu* Convention on Wetlands): Defined in Handbook 1 as the "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (refer http://www.ramsar.org/).

Structure (historic): Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith. Protected structures are those which are over 60 years old.

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBOs	Community Based Organisations
CDM	Clean Development Mechanism
CO_2	Carbon dioxide
DEA	National Department of Environmental Affairs
DMR	Department of Mineral Resources
DOT	Department of Transport
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEP	Integrated Energy Planning
km^2	Square kilometres
kV	Kilovolt
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
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
SIA	Social Impact Assessment
ZVI	Zone of visual influence

INTRODUCTION CHAPTER 1

Eskom Holding SOC (state owned company) Ltd is proposing to establish a 65.9MW photovoltaic solar energy facility and associated infrastructure on a site within the Tutuka coal fired power station boundary, approximately 28 km north-east of Standerton in Mpumalanga Province (Refer to Figure 1.1). This project is to be known as the Tutuka Photovoltaic (PV) Solar Energy Facility. Based on a pre-feasibility analysis and site identification process undertaken by Eskom Holdings SOC Ltd (hereafter to be referred to as Eskom), a favourable area has been identified for consideration and evaluation through an Environmental Impact Assessment (EIA).

The solar energy facility is proposed to accommodate several arrays of tracking or static **photovoltaic (PV) panels** and associated infrastructure over the proposed site. From a regional perspective, the greater area is considered favourable for the development of commercial solar electricity generating facility by virtue of the **climatic conditions** (primarily as the economic viability of a solar energy facility is directly dependent on the annual solar irradiation values for a particular area), relief and aspect, the extent of the site, and the availability of a direct **grid connection** (i.e. point of connection to the National grid). In addition, the project will contribute towards Eskom's target for the reduction of its self-consumption at its sites by introducing a PV Programme at various Eskom-owned properties across the country.

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

1.1. Background to the project

The Tutuka Solar Energy Facility is proposed on portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS, in the jurisdiction of Gert Sibande District Municipality and Lekwa Local Municipality within the Mpumalanga Province. A study area of approximately 99ha just south of the Tutuka Power Station (alternative site 1), with an additional 36ha south-east of the power station (alternative site 2) is being investigated (Refer to Figure 1.1). It is anticipated that the PV panels and the associated infrastructure can be appropriately placed within the boundaries of the site to avoid any identified environmental sensitivities or constraints identified through the EIA process.

The proposed sites were confirmed by Eskom as being potentially suitable for solar energy generation through an internal site selection and feasibility study (refer to Chapter 2). The proposed development area is traversed by a number

of power lines connecting into the Tutuka Power Station. Access to the site is provided from the R38 that runs east to the boundary of the proposed site and that connects the town of Standerton and Bethal.

The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a net generating capacity of up to 65.9MW. The broader site is proposed to accommodate the following infrastructure:

» Solar panels (fixed/tracking technology) with an export capacity of up to 65.9MW.
» Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
» Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
» An on-site substation or switching station.
» A power line to facilitate the connection of the solar energy facility from the on-site substation to Tutuka power station or nearest grid connection within the Tutuka power station.
» Internal access roads.
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

The overarching objective for the Tutuka 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. Furthermore, the project will contribute towards Eskom's target to reduce self-consumption at their various owned or utilised sites by installing 150MWp at their various power stations, offices and substations. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme. In order to assess the environmental feasibility of the proposed project, local level environmental and planning issues will be assessed through the EIA through site-specific studies in order to delineate areas of sensitivity within the broader site. This will serve to inform the design of the facility.

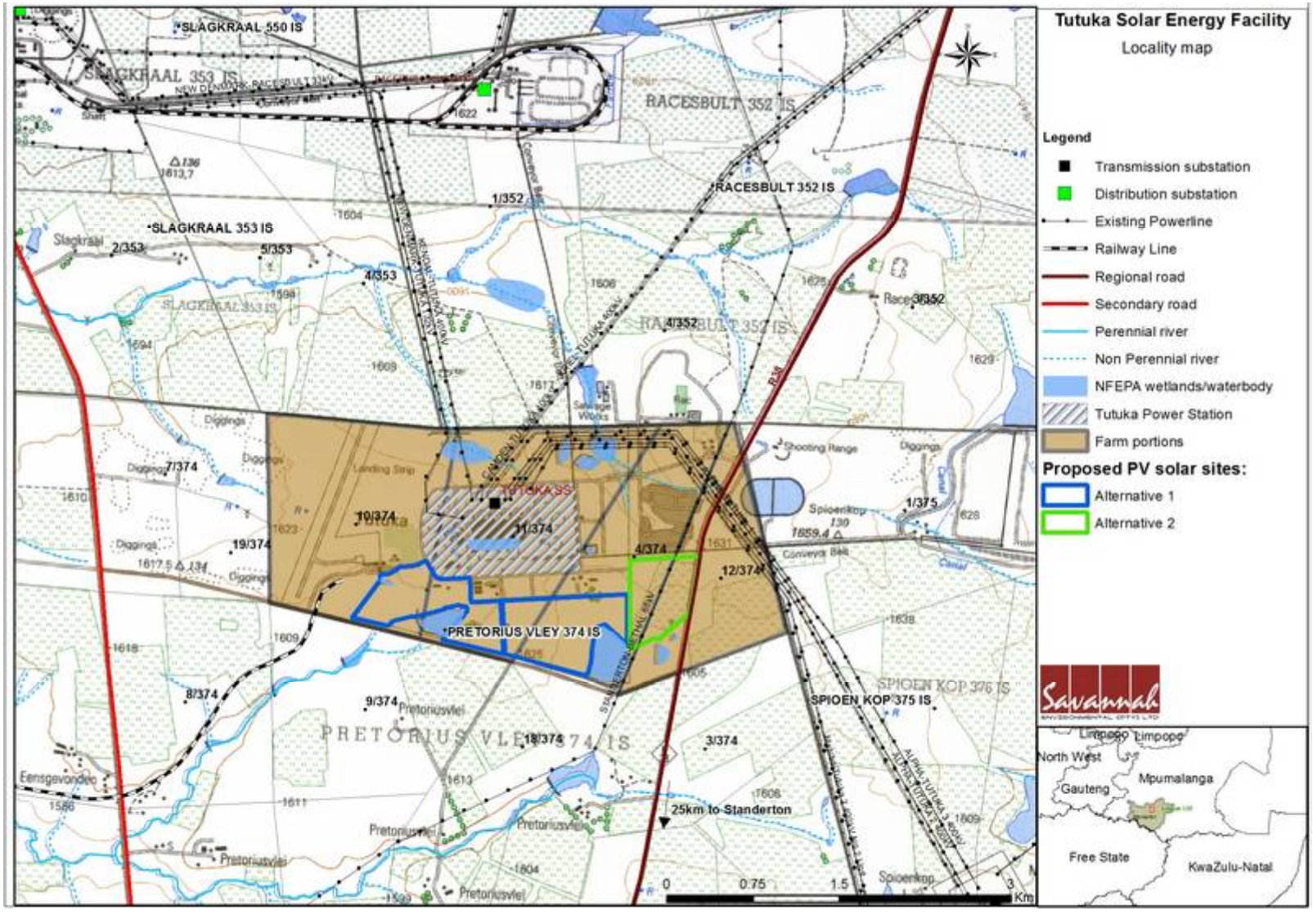

Figure 1.1: Locality map for the proposed site for the Tutuka Solar Energy Facility, indicating the proximity to grid connection infrastructure

1.2. Requirement for an Environmental Impact Assessment Process

The Tutuka PV 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 the projects.

NEMA is the national legislation that provides for the authorisation of 'listed activities'. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project, the National Department of Environmental Affairs (DEA) is the competent authority and the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET) will act as a commenting authority. The application has been registered with the Department of Environmental Affairs under the DEA reference number **14/12/16/3/3/2/754**[1]. It must be noted that a precautionary approach has been taken in determining the list of relevant Listed Activities such that all possible activities relevant to the project have been included in the application. This application may be refined during the course of the EIA process and listed activities may be removed or added as applicable depending on the findings of the EIA process.

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

An EIA is also an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issues reported on in the Scoping and EIA Reports as well as dialogue with interested and affected parties (I&APs).

[1] This EIA application was accepted by the DEA under the EIA Regulations of GNR543; GNR544; GNR545; and GNR546 as amended in December 2010 (Appendix B).

1.3 Details of the Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA Phases

Savannah Environmental was contracted by Eskom as an independent Environmental Assessment Practitioner (EAP) to undertake both Scoping and EIA processes for the proposed project. Neither Savannah Environmental nor any of the specialist sub-consultants on this project are subsidiaries of, or are affiliated to Eskom. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing holistic environmental management services, including environmental impact assessments and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team have considerable experience in environmental impact assessments and environmental management, and have been actively involved in undertaking environmental studies, for a wide variety of projects throughout South Africa, including those associated with electricity generation, including renewable energy projects.

» *Sheila Muniongo* - the principle author of this report holds an Honours Bachelor degree in Environmental Management and 4 years' experience in the environmental field. Her key focus is on environmental impact assessments, public participation, environmental management programmes, and mapping through ArcGIS for variety of environmental projects. She is currently involved in several EIAs for renewable energy projects EIAs across the country.
» *Jo-Anne Thomas* - the principle Environmental Assessment Practitioner (EAP) for this project, is a registered Professional Natural Scientist and holds a Master of Science degree. She has 16 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 and power line projects across the country.

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

» Avifauna – Megan Diamond (Feathers Environmental Services)
» Ecology – Marianne Strohbach (Savannah Environmental)
» Wetlands – Robert Taylor (Limosella Consulting)
» Soils and Agricultural Potential – Garry Paterson (ARC-Institute for Soil, Climate and Water)
» Heritage – Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC (HCAC))
» Paleontological Assessment – Barry Millstead (BM Geological Services)
» Visual – John Marshall (Afzelia Environmental Consultants and Environmental Planning and Design)
» Social – Candice Hunter (Savannah Environmental) and Anton Pelser (external reviewer)

The public participation process will be undertaken by Gabriele Wood of Savannah Environmental.

Refer to Appendix A for the curricula vitae for the environmental assessment practitioners from Savannah Environmental and the specialist consultants.

SCOPE OF THE PROPOSED PROJECT CHAPTER 2

This chapter provides a description of the Tutuka PV project near Standerton, Mpumalanga Province. The project scope includes the planning and design, construction, operation and decommissioning phases during which potential impacts will vary in terms of their nature and significance. This chapter also describes the feasible alternatives identified for investigation within the EIA process.

2.1 Description of the Associated Infrastructure

The proposed Tutuka Solar Energy Project will require various support infrastructures, located within the perimeter of the facility. The facility is proposed to include several arrays of photovoltaic (PV) solar panels with a generating capacity of up to 65.9MW (depending on the alternative site selected) and includes the following associated infrastructure:

» Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, or ground screws to support the PV panels.
» Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
» An on-site substation or switching station.
» A power line to facilitate the connection of the solar energy facility from the onsite substation to a substation/power line located within the Tutuka power station. The length of transmission line connecting to the Tutuka power station is estimated around between 500 – 1000 m. The connection point will be either at HV yard within power station or at station board. However, the project is going to apply for grid connection through grid access unit, which identifies the alternative grid connection point. The project in later phase will know the exact connection point for alternative options, which will be notified upon the finalization.
» Internal access roads.
» Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity.

A summary of the details and dimensions of the infrastructure is shown in Table 2.1.

Table 2.1: Dimensions of typical structures required for the PV Facility

Component	Description/ Dimensions
Location of the site	Portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS
Municipal Jurisdiction	The property is located within jurisdiction of Gert Sibande District Municipality and Lekwa Local Municipality
Electricity Generating	65.9MW

Component	Description/ Dimensions
capacity	
Extent of the proposed development footprint	Alternative site 1 - approximately 99ha, located south of the power station Alternative site 2 - approximately 36ha, located south-east of the power station
Centre Point proposed site	Alternative site 1: Longitude: 29° 21' 11.60"E Latitude: 26° 47' 02.18"S Alternative site 2: Longitude: 26°46'51.81"S Latitude: 29°21'58.87"E
Extent of broader site	Alternative site 1- approximately 99ha, located south of the power station Alternative site 2 - approximately 36ha, located south-east of the power station
Site access	Access to the site is provided from the R38 that runs east of the boundary of the proposed site and that connects the town of Standerton and Bethal. Internal access roads of up to 5m wide will also be required.
Proposed technology and Height of installed panels from ground level	Static PV - Fixed mounted PV up to 3.5 m above ground Tracking – single/double axis up to 6 m
Number of Panels	Alternative site 1: » 263360 (considering 250 Wp capacity per Polycrystalline PV module) » 627,620 PV modules (considering 105 Wp capacity per thin film PV module) Alternative site 2: » 96,000 (considering 250 Wp capacity per Polycrystalline PV module) » 228,570 PV modules (considering 105 Wp capacity per thin film PV module)
Panel Dimensions	1.638 × 0.982 × 0.04 m (considering standard crystalline silicon modules 250 Wp capacity per module) 1.200 × 0.600 × 0.0068 m (considering standard thin film PV module 105 Wp capacity)
Panel direction	North facing
Number of inverters	Dependant on inverter to be used. This will be confirmed before construction. Typically it would be: » Alternative site 1: Approximately 130 inverters and height of each inverter up to 2.6 m (Assumption: 500 kW inverter per capacity) » Alternative site 2: Approximately 72 inverters and height of each inverter up to 2.6 m (Assumption: 500 kW inverter per capacity)
Main transformer / on-site substation capacity	» Step-up up to 6.6/11 kV (for connection at station board) » Step-up up to 88/132 kV (for connection at HV yard)

Component	Description/ Dimensions
and size	on site substation size approximately 50m x 50m Alternative site– same as above
Associated buildings (size)	±150 m^2
New overhead power line	Servitude width: depending upon the overhead voltage level (between 9 m to 15.5 m : measured from the centre line of the power line) Length: approximately 200 - 400 m Height of towers: maximum height of 13 m
Services required	» Sewage and Refuse material disposal - all sewage and refuse material generated during the establishment of the proposed site will be collected by a contractor to be disposed of at a licensed waste disposal site. » Water and electricity – water will be obtained from the power station. Electricity will be generated from generators for any electrical work on site or electricity will be obtained from an Eskom auxiliary supply, depending on the feasibility during construction.

2.2 Photovoltaic (PV) Solar Energy Facility and the Generation of Electricity

Solar energy facilities, such as those using PV technology use the energy from the sun to generate electricity through a process known as the Photoelectric Effect (Figure 2.1). A PV cell or solar cell is the semiconductor device that converts sunlight into electricity. These cells are interconnected to form panels which, in turn, are combined with associated structural and electrical equipment to create what are called arrays – the actual solar generation systems which connect to the energy grid. As sunlight hits the solar panel, photons can be reflected, absorbed, or pass through the panel. When photons are absorbed, they have the energy to knock electrons loose, which flow in one direction within the panel and exit through connecting wires as solar electricity.

There are several types of semiconductor technologies currently in use for PV solar panels. Two however, have become the most widely adopted: crystalline silicon and thin film.

[2]**Polycrystalline Silicon Solar Cells**

The first solar panels based on polycrystalline silicon, which also is known as polysilicon (p-Si) and multi-crystalline silicon (mc-Si), were introduced to the market in 1981. Unlike monocrystalline-based solar panels, polycrystalline solar panels do not require the Czochralski process. Raw silicon is melted and poured into a square mold, which is cooled and cut into perfectly square wafers.

Advantages

» The process used to make polycrystalline silicon is simpler and cost less. The amount of waste silicon is less compared to monocrystalline.
» Polycrystalline solar panels tend to have slightly lower heat tolerance than monocrystalline solar panels. This technically means that they perform slightly worse than monocrystalline solar panels in high temperatures. Heat can affect the performance of solar panels and shorten their lifespans. However, this effect is minor, and most homeowners do not need to take it into account.

Disadvantages

» The efficiency of polycrystalline-based solar panels is typically 13-16%. Because of lower silicon purity, polycrystalline solar panels are not quite as efficient as monocrystalline solar panels.
» Lower space-efficiency. You generally need to cover a larger surface to output the same electrical power as you would with a solar panel made of monocrystalline silicon. However, this does not mean every monocrystalline solar panel perform better than those based on polycrystalline silicon.

[2] http://energyinformative.org/best-solar-panel-monocrystalline-polycrystalline-thin-film/

» Monocrystalline and thin-film solar panels tend to be more aesthetically pleasing since they have a more uniform look compared to the speckled blue color of polycrystalline silicon.

Thin-Film Solar Cells (TFSC)

Depositing one or several thin layers of photovoltaic material onto a substrate is the basic gist of how thin-film solar cells are manufactured. They are also known as thin-film photovoltaic cells (TFPV). Depending on the technology, thin-film module prototypes have reached efficiencies between 7–13% and production modules operate at about 9%. Future module efficiencies are expected to climb close to the about 10–16%. The market for thin-film PV grew at a 60% annual rate from 2002 to 2007. In 2011, close to 5% of U.S. photovoltaic module shipments to the residential sector were based on thin-film.

Advantages

» Mass-production is simple. This makes them and potentially cheaper to manufacture than crystalline-based solar cells.
» Their homogenous appearance makes them look more appealing.
» Can be made flexible, which opens up many new potential applications.
» High temperatures and shading have less impact on solar panel performance.
» In situations where space is not an issue, thin-film solar panels can make sense.

Disadvantages

» Thin-film solar panels are in general not very useful for in most residential situations. They are cheap, but they also require a lot of space. SunPower`s monocrystalline solar panels produce up to four times the amount of electricity as thin-film solar panels for the same amount of space.[3]
» Low space-efficiency also means that the costs of PV-equipment (e.g. support structures and cables) will increase.
» Thin-film solar panels tend to degrade faster than mono- and polycrystalline solar panels, which is why they typically come with a shorter warranty.

This project proposes using either of the above PV technology

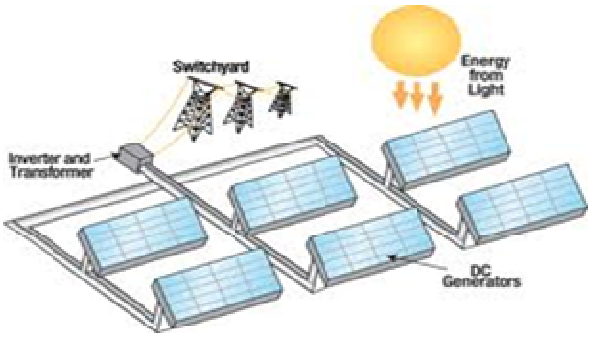

Figure 2.1: Schematic diagram of a PV plant (Sourced from: http://www.solar-green-wind.com/archives/tag/solar-cells)

A solar energy facility typically comprises the following components:

The **Photovoltaic Panels**

Solar photovoltaic (PV) panels consist primarily of glass and various semiconductor materials and in a typical solar PV project, will be arranged in rows to form solar arrays, as shown in Figure 2.2 and Figure 2.3. The PV panels are designed to operate continuously for more than 25 years with minimal maintenance required.

Figure 2.2: Picture of a PV Panel Modules (75 MW plant in Kalkbutt South-Africa Source: SMA)

Figure 2.3: Picture of the installation of a typical PV array (75 MW plant in Kalkbutt South-Africa Source: PennEnergy)

The **Inverter**

The PV cells produce electricity in direct current (DC). Therefore an inverter (refer to Figure 2.4) must be used to invert it to alternating current (AC) for transmission in the national grid. The inverters convert the DC electric input into AC electric output, and then a transformer steps up the current to 33kV for on-site transmission of the power. The inverter and transformer are housed within the power conversion station (PCS) (refer to Figure 2.5). The PV combining switchgear (PVCS), which are dispersed among the arrays, collects the power from the arrays for transmission to the project's substation.

Figure 2.4: Image of a typical inverter

Figure 2.5: Image of a typical power conversion station

The **Support Structure**

The photovoltaic (PV) modules will be mounted to steel support structures. These can either be mounted at a fixed tilt angle, optimised to receive the maximum amount of solar radiation and dependent on the latitude of the proposed facility, or on a tracking mechanism where at a maximum tilt angle of -45 to 45 degrees. The lowest part of the panel can be 30-50cm from the ground (refer to Figure 2.6).

Figure 2.6: The support structures elevate the PV panels and allow for single axis tracking of the sun for increased efficiency (Source:SAPVIA)

2.3 Description of alternatives

In accordance with the requirements of the EIA Regulations[3], project alternatives have been considered within the Scoping process. These are detailed below.

2.3.1 Site Alternatives

Two technically and economically feasible alternative sites were identified by Eskom for investigation in the EIA process for the establishment of the proposed Tutuka PV project. This is based on an investigation/screening process that was undertaken by Eskom to assess the potential for installing PV facilities at Eskom power stations in Gauteng, Free-State, Mpumalanga and KwaZulu-Natal regions. This study provided an indication of the potential capacity, land availability, environmental constraints and electrical connection options for each of the power stations including Arnot, Duvha, Kendal, Kriel, Lethabo, Majuba, Matimba, Tutuka, Camden, Komati and Ingula. The sites within the Arnot, Duvha, Lethabo, Majuba and Tutuka power stations were selected as the first sites for consideration within EIA processes.

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

The following factors have been considered in determining a preferred site for PV solar development including:

» Land availability and environmental constraints i.e. sensitive ecological features such as protected plants and wetlands.
» Technical feasibility – taking into account all electrical considerations including point of connection and electrical infrastructure available

At screening it was concluded by Eskom that the Tutuka power station has land available for a large PV facility. The land is flat with little vegetation but with some wild dominant animals present at the proposed alternatives. This could have some environmental impact but may also serve beneficial in keeping the animals in the area so as to control the growth of the grassland. There was support offered from the power station personnel in accepting to install PV at the power station as well as providing the required information. Although there are only two sites identified there is great potential at the power station and the personnel are very keen to see the PV project being developed.

Based on the above considerations, Eskom considers the proposed site as a highly preferred site for the development of a PV Solar Energy Facility

2.3.2 Layout and Design Alternatives

The Scoping Phase aims to identify potential environmentally sensitive areas on the site which should be avoided by the proposed development as far as possible. These areas will need to be considered in greater detail during the EIA Phase through site-specific specialist studies. The information from these studies will be used to inform layout alternatives for the proposed development site and inform recommendations regarding a preferred alternative. Specific design alternatives will include *inter alia* the layout and mounting of the PV panels, and alternative routes for the power line corridors and access roads. The aim of this planning process is to avoid environmentally sensitive areas as far as possible and inform the final design of the facility.

2.3.3 Technology Alternatives

Few technology options are available for PV facilities, and the use of those that are considered are usually differentiated by weather and temperature conditions that prevail on the site, so that optimality is obtained by the final site selection. Solar energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability. Solar PV was determined as the most suitable option for the proposed site as large volumes of water are not required for power generation purposes compared to concentrated solar power technology (CSP). PV is also preferred when compared to CSP technology because of the lower visual profile. Two solar energy technology alternatives are being considered for the proposed project and include:

» Fixed Mounted PV systems (static/fixed-tilt panels)
» Tracking PV systems (with solar panels that rotate around a defined axis to follow the sun's movement)

The primary differences between technologies available which affect the potential for environmental impacts relate to the extent of the facility, or land-take (disturbance or loss of habitat), as well as the height of the facility (visual impacts). The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance. The impacts associated with the operation and decommissioning of the facility will be the same irrespective of the technology chosen. The technology to be used will be confirmed and assessed during the EIA Phase.

Fixed Mounted PV System

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

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

Tracking PV System

Tracking PV Systems (single axis or dual axis trackers) are fixed to mountings which track the sun's movement. There are various tracking systems. A 'single axis tracker' will track the sun from east to west, while a dual axis tracker will in addition be equipped to account for the seasonal waning of the sun. These systems utilise moving parts and more complex technology, which may include solar irradiation sensors to optimise the exposure of PV panels to sunlight. Tracking PV panels follow the suns rotational path all day, every day of the year giving it the best solar panel orientation and thereby enabling it to generate the maximum possible output power.

2.3.4 The 'Do-Nothing' Alternative

The 'do-nothing' alternative is the option of not constructing the proposed Tutuka PV 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. This alternative will be assessed within the EIA Phase of the process.

2.4 Need and desirability of the proposed project

Internationally there is an increase in the deployment of renewable energy technologies for the generation of electricity due to concerns such as climate change and exploitation of non-renewable resources. Through the Integrated Resource Plan (IRP), the South African Government has set a target for renewable energy of 17 GWh renewable energy contributions to final energy consumption by 2030, to be produced mainly from biomass, wind, solar and small-scale hydro. Eskom has already successfully installed PV systems at offices and parking lots within Eskom-owned property to promote renewable energy awareness and to diversify their own energy mix. Furthermore, Eskom is looking at further reducing its self-consumption at its sites by introducing the PV Programme which aims to install up to 150 MWp at its various power stations, which includes the proposed Tutuka Photovoltaic Solar Energy Facility. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme.

The approved strategy for PV programme is to install 150 MWp of PV at various power stations; however, the program is exploring the possibility of maximizing the usage of available land at each power station. The capacity of 66 MW presented in this report represents the maximum estimated PV capacity at Tutuka.

As can be seen in the above paragraph, 66 MW for Tutuka is way above the capacity allocated for self-consumption (8 – 12 MW) at Tutuka. The Program is also exploring to construct maximum available capacity if Eskom would be allowed to develop a project and connect into the national grid. Currently, Eskom is not allowed to feed into the national grid.

2.4.1 The Need for the Project at a National Scale

The need for harnessing renewable energy resources (such as wind energy for electricity generation) is linked to increasing pressure on countries to increase their share of renewable energy generation due to concerns such as exploitation of non-renewable resources and the rising cost of fossil fuels. In order to meet the long-term goal of a sustainable renewable energy industry, a target of 17.8 GW of renewables by 2030 has been set by the Department of Energy (DoE) within the Integrated Resource Plan (IRP)

2010. This 17,8GW of power from renewable energy amounts to ~42% of all new power generation being derived from renewable energy forms by 2030.

Renewable energy technologies are among the supply-side options being considered by Eskom. The organisation has developed a renewable energy strategy which outlines a number of focus areas, including research and development of various technologies. Renewable energy sources which are being evaluated are wind, solar, wave, tidal, ocean current, biomass and hydro. Through the South African Bulk Renewable Energy Generation (SABRE-Gen) programme, a vehicle was established to enable the evaluation of multi-MW, grid connected generation. The initiatives all follow the same functional structure, namely:

a) the identification of feasible options
b) an assessment of the financial and economic viability as well as resource potential in the country
c) the implementation of demonstration projects to conduct operational research
d) the provision of strategies for the uptake and sustainable deployment of the technologies where feasible.

2.4.2 The Need for the Project at a Provincial and Local Scale

According to the DEA Draft Guideline on Need and Desirability in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (October 2012) the need and desirability of a development must be measured against the contents of the Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) for an area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF.

Mpumalanga Provincial Growth and Development Strategy (PGDS) (2004-2014)

The PGDS: 2004-2014 is the fundamental policy framework for the Mpumalanga Provincial Government. As a policy framework it sets the tone and pace for growth and development in the province. The PGDS addresses the key and most fundamental issues of development spanning the social, economic and the political environment and was developed for the purpose of aligning the policies and strategies of all spheres of Government. The province has identified six priority areas of intervention. These priority areas have been identified primarily based on the social, economic and developmental needs of the province, namely;

» Economic Development:
  - Enhance provincial economic development to improve the quality of life for all
  - Prioritise the advancement of the second economy to address poverty and unemployment

» Development Infrastructure:

- The development of multi-faceted infrastructure to address basic needs and improve the quality of life

» Social Development:
- Attain high levels of social development that will ensure a well-educated citizenry that is healthy, safe and has access to sufficient recreational facilities

» Sustainable Environmental Development:
- To ensure sustainable development and environmental management

» Good Governance:
- Enhance and develop the institutional capacity of the public sector to ensure effective and efficient service delivery
- Promote and enhance cooperative governance for integrated service delivery
- Promote a culture of accountability and transparency in the public sector
- Improved integrated service deliver through innovative and proactive practices
- Strengthening of social partnership and community participation in development and service delivery

» Human Resource Development:
- Invest in peoples skills to promote service delivery, economic growth and development
- To position higher education institutions to meet the skills demand of the province
- Improve access to and ensure quality education

The Mpumalanga PGDS emphasises the provinces priorities, some of which are aligned with the proposed development such as the need for economic development, addressing poverty, unemployment and human resource development, as well as infrastructure development and service delivery. The proposed development will contribute towards these priorities.

Mpumalanga Economic Growth and Development Path (MEGDP) (2011)

The primary objective of the Mpumalanga Economic Growth and Development Path (MEGDP) is to foster economic growth that creates jobs, reduce poverty and inequality in the Province. The main economic sectors have been identified as key to spur economic growth and employment creation and are as follows:

a. Agriculture and forestry
b. Mining and energy
c. Manufacturing and beneficiation
d. Tourism and cultural industries

As far as new economies within the province are concerned, focus is placed on the green economy and Information, Communication and Technology.

The Green Economy: The use of coal for energy production results in both the primary environmental impacts associated with the mining and removal of coal for use in coal fired power stations in the province, as well as the secondary impacts resulting from the burning of this coal for energy production. Coal intensive activities contribute to large-scale water and air pollution, including significant carbon dioxide emissions, which contribute to global warming. While energy is crucial for the socio-economic developmental objectives of the province, it is obvious that there has not been enough focus on renewable energy development as a key aspect of this developmental agenda. In order to adequately address the information gaps and to allow the province to meet its integrated energy needs for sustainable socio-economic development, there is a need for research to be conducted on a number of key areas with a view of developing an Integrated Renewable Energy Plan for the Province. This will include research work in areas such solar energy; biomass (bagasse; wood-waste (saw-dust, wood off-cuts, etc.) and putrescible waste (including municipal solid waste, abattoir waste) and Hydro-power. The work on Bio-fuels in the Province has already set the scene for extensive research for other sources of renewable energy.

As is evident from the above, the proposed development falls directly in line with the Mpumalanga provincial growth path with regards to employment creation in the renewable energy industry (which support the province green economy vision), the benefits it will bring to the local community as well as contributing towards diversifying the local economy towards a greener economy.

Gert Sibande District Municipality Spatial Development Framework (2009)

The Gert Sibande District Municipality SDF firstly seeks to encourage rural – urban migration by providing subsidised services in key selected areas / nodes / economic clusters. Secondly, the SDF seeks to strengthen and supplement the functional economic strips / corridors characterising the District's space-economy, as well as developing industry specific economic clusters / activity areas. The following are the development principles to be achieved as part of the Spatial Development Framework for the Gert Sibande District Municipality (GSDM):

1. To actively protect, enhance and manage the natural environmental resources of the District, in order to ensure a sustainable equilibrium between biodiversity conservation, mining, manufacturing and industrial activities, agriculture, forestry, and tourism related activities within the District.
2. To optimally capitalize on the strategic location of the District and its five key economic strips / corridors, and to functionally link all towns and settlements to one another through establishing and maintaining a strategic road and rail network comprising internal and external linkages.
3. To utilise the existing natural environmental, cultural-historic and man-made activity areas within the District as Tourism Anchors and Nodes; and to develop and promote

the eastern parts of the District (around route R33) as a Primary Tourism Corridor linking the Lowveld Tourism Precinct to the north (in Ehlanzeni), to the St Lucia Tourism Precinct located to the south of the District.

4. To promote forestry within and along the identified Primary Tourism Corridor.
5. To promote intensive and extensive commercial farming activities throughout the District, and to facilitate and concentrate subsistence farming activities within certain rural communities.
6. To unlock the development potential of existing towns through developing industry specific Special Economic Zones / Economic Clusters throughout the District, in line with the MPISF and the provincial LED Strategy and in accordance with the following sectors:
    a. Agricultural Cluster
    b. Forestry Cluster
    c. Industrial Cluster
7. To facilitate and accommodate mining in the District in a sustainable manner in order to support local electricity generation and industrial development.
8. To establish a functional hierarchy of towns and settlements in the District, and to ensure equitable access to social infrastructure and the promotion of local economic development by way of Thusong Centres (Multi-Purpose Community Centres (MPCCs)).
9. To ensure that all communities have access to at least the minimum levels of service as enshrined in the Constitution.
10. To consolidate the urban structure of the District around the highest order centres by way of infill development and densification in Strategic Development Areas (SDAs).

Development Principles 1 to 9 highlighted the proposed future spatial structure of the District Municipality, as well as the major activity nodes/centres to be promoted as such. The proposed development is located in an industrial area within the boundary of the Tutuka Power Station. The proposed development will not compromise agricultural land or tourism potential within this area and therefore the project falls in line with the SDF.

Gert Sibande District Municipality Integrated Development Plan (2015/2016)

The vision of the District Municipality is as follows - Striving to Excel in Good Governance and Quality Infrastructure. The developmental objectives and strategies are presented by Key Performance Area (KPA) as listed below. Key Performance Areas include:

» KPA 1: Municipal Transformation and institutional Organizational Development
» KPA 2: Basic Service Delivery and Infrastructure Development
» KPA 3: Local Economic Development
» KPA 4: Municipal Financial Viability and Management
» KPA 5: Intergovernmental Relations, Good Governance and Public Participation
» KPA 6: Spatial Rationale and Municipal Planning Alignment

The GSDM and its constituent local municipalities face a number of backlog and developmental challenges. Over and above the infrastructural backlog, the District is faced with a high unemployment and poverty rate.

Local economic development is seen as one of the most important ways of decreasing poverty. The proposed development will stimulate local economic growth through job creation, diversifying the local industry and skills development which is in line with the IDP KPA 3.

Lekwa Local Municipality Integrated Development Plan (IDP) (2013-2014)

In terms of the IDP, key priorities of the current council include:

» *Municipal Transformation and Organizational Development*
» *Infrastructure Development and Service Delivery*
» *Local Economic Development (LED)*
» *Municipal Financial Viability and Management*
» *Good Governance and Public Participation*

Taking cognisance of the developmental challenges that the local municipality is faced with, coupled with the availability of funding allocated to support these initiatives and ultimately realise the aforementioned Vision and Mission, the municipality has set for itself the following Developmental Objectives and Strategies to be pursued in the short- to medium term. The Developmental objectives and strategies are presented by Key Performance Area as listed below, and in the format of Strategic Scorecards:

KPA 1: Build local economies to create more employment, decent work and sustainable livelihoods
KPA 2: Improve service and broaden access to them
KPA 3: Ensure more effective, accountable and clean local government that works
KPA 4: Municipal Financial Viability and Management
KPA 5: Build more united, non-racial, integrated and safer communities

The proposed solar energy facility development will advance the objectives of KPA 1 and KPA 2 in terms of local economic development through job creations and skills development, and will contribute towards the key priorities of the LLM IDP.

Strategic Integrated Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) are integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new

jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration.

SIP 8 of the energy SIPs supports the development of the Solar Energy Facility which is as follows:

» *SIP 8: Green energy in support of the South African economy:* Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.

In fulfilment of SIP 8 (green energy) and to meet the targets set in the Integrated Resource Plan (IRP 2010), the proposed Tutuka Solar Energy Facility could potentially contribute towards SIP 8 by addition of clean energy to the grid (should the project be constructed) and the project will create significant socio-economic benefits at a local, regional and national scale.

Financial Viability and Community Needs

In terms of the energy yield predicted from the facility, Eskom considers the Eskom Tutuka project to be financially viable. The "need and desirability" of the local community as reflected in the IDP and SDF for the area is also considered in the EIA. In the South African context, developmental needs (community needs) are often determined through the above planning measures (IDP and SDF). Although the renewable energy sector is not explicitly identified as a sector or initiative in all current municipal policy and planning documents as outlined above, it could contribute positively to the needs of the local community, including development, social services, education and employment opportunities in this area, as identified in these planning documents. The Tutuka solar energy facility will create employment and business opportunities during the construction and operational phases, as well as the opportunity for skills development for the local community. In addition, indirect benefits and spend in the local area will benefit the local community.

In addition, the development of the project would benefit the local/regional/ national community by developing a renewable energy project which would reduce the country's dependence on fossil-fuel generated electricity.

The Desirability for the Tutuka Solar Energy Facility Project

The use of solar irradiation for electricity generation is essentially a non-consumptive use of a natural resource. A solar energy facility also qualifies as a Clean Development

Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies) as it meets all international requirements in this regard. The proposed sites located on portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS were selected for the development of a solar energy facility based on its suitable proximity in relation to the existing and available electricity grid, and minimum technical constraints from a construction, technical perspective and environmental suitability.

Additionally, Eskom has successfully installed PV at offices and parking lots to promote renewable energy awareness and to diversify their own energy mix. Eskom is looking at further reducing their self-consumption at their various owned or utilised sites by introducing Eskom's Ilanga PV Project Portfolio which aims to install 150MWp at their various power stations, offices and substations. The solar PV facilities will promote the reduction of Eskom's carbon footprint and support the demand side management energy efficiency programme.

2.5 Proposed Activities during the Project Development Stages

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

2.5.1 Design and Pre-Construction Phase

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.

2.5.2 Construction Phase

The construction the proposed project is expected to extend over a period of approximately 15-18 months and create at least 250-300 employment opportunities at peak. The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to local residents in the area. The majority of the beneficiaries are likely to be historically disadvantaged (HD) members of the community, representing a significant positive social benefit in an area with limited

employment opportunities. The construction phase will entail a series of activities including:

Undertake Site Preparation

Site preparation involves construction of new access roads and improvement of existing on-site construction access roads with compacted native soil, installation of drainage crossings, setup of construction staging areas, storm water management work, preparation of land areas for array installation, and other activities needed before installation of the solar arrays can begin. The work would involve trimming of vegetation, selected compacting and grading, and setup of modular offices and other construction facilities.

A relatively level and stable surface is required for the safe and effective installation of the PV arrays. Topographic, geotechnical, and hydrologic studies will be used to determine the necessary grading and compaction.

Trenching would occur within each array to accommodate the electrical cables. The trenches would be up to ~ 1.8m in width and 2m deep, for a total combined length of approximately 10 km. Minimal ground disturbance may occur within the trenched corridors to restore them after soil has been replaced in the trenches, so that the corridor can conform to the existing surface contours.

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)[4] 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 on-site substation.

Establishment of Access Roads to the Site

The site can be accessed from the R38 that runs east to the boundary of the proposed site and that connects the town of Standerton and Bethal. Within the site itself, access is already established and is used for the power station. Where possible, these existing roads will be utilised for construction purposes (and later limited access for maintenance). Internal access roads between the project components will be required. Access track construction would normally comprise of compacted rock-fill with a layer of higher quality surfacing stone on top. The strength and durability properties of the rock strata at the proposed site are not known at this stage; this will need to be assessed via

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

a geotechnical study to be conducted by the project proponent. Depending on the results of these studies, it may be possible in some areas, to strip off the existing vegetation and ground surface and level the exposed formation to form an access track surface. The final layout of the access roads will be determined following the identification of site related sensitivities.

Installation of PV Panels and Construct Substation & Inverters

The PV panels will be arranged in arrays, the mounting structure will be preferably fixed onto the ground with the use of rammed or screw anchor foundations (see typical example Figure 2.7). . Where the soil conditions do not lend themselves to these technologies, concrete or chemical anchors will be deployed. This approach reduces installation time, will make the installation of the plant less invasive for the territory and facilitate the decommissioning at the end of its production cycle. The height of the PV panel structure will be up to 3.5m for fix mounted structures. In case of single/dual axis structures, the height of Panel Structure, can reach up to 6 meters.

Figure 2.7: Frame, structural details (Lesedi Solar PV Project, Kimberly, South Africa. Source: Power Technology.com).

Inverters will be installed to facilitate the connection between the solar energy facility and the Eskom electricity grid via the 11 kV (for connection at station board) or 132 kV (for connection at HV yard) power line. The position of the inverters within the footprint of the broader site will be informed by the final positioning of the PV components.

The construction of a substation would require a survey of the site, site clearing and levelling and construction of access road/s (where required), construction of a level terrace and foundations, assembly, erection, installation and connection of

equipment, and rehabilitation of any disturbed areas and protection of erosion sensitive areas.

Establishment of Ancillary Infrastructure

Ancillary infrastructure will include; a workshop, laydown area and office. The laydown area will be a temporary structure. The establishment of these areas/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.

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. Upon completion of commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

2.5.3 Operational Phase

The solar energy facility is expected to be operational for a minimum of 20 years, with an opportunity for a lifetime of 50 years or more with equipment replacement and repowering. The project will operate continuously, 7 days a week, during daylight hours. While the project will be largely self-sufficient upon completion of construction, monitoring and periodic, as needed maintenance activities will be required.

An Operation and Maintenance plan will be compiled for the facility. Key elements of the Operation and Maintenance plan include monitoring and reporting the performance of the project, conducting preventative and corrective maintenance, receiving visitors, and maintaining security of the project.

The operational phase will create 3-8 full-time employment positions. No large scale energy storage mechanisms for the facility which would allow for continued generation at night or on cloudy days are proposed. An operational PV plant has no direct water requirements associated with the generation of electricity. Water is required primarily for the construction of the facility and well as for human consumption (sanitation) during operation. In many instances, water is used to clean off dust or dirt that builds up on the panels. A volume of approximately 6500m^3 per annum would be required during the operational phase. This will be acquired from the Tutuka Power Station adjacent to the proposed project.

2.5.4 Decommissioning Phase

Depending on the continued economic viability of the facility following the initial 20 year operational period, the solar energy facility will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to extend the operational phase, existing components would either continue to operate or be dissembled and replaced with new, more efficient 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

When the project is ultimately decommissioned, the equipment to be removed will depend on the proposed land use for the site at that time. At this time, all above ground facilities that are not intended for future use at the site will be removed. Underground equipment (e.g. foundation, wiring) will either be removed, or cut off 1m below the ground surface, and the surface restored to the original contours. Much of the above ground wire, steel, and PV panels of which the system is comprised are recyclable materials and would be recycled to the extent feasible. The components of the plant would be deconstructed and recycled or disposed of in accordance with regulatory requirements. The site will be rehabilitated and can be returned to the agricultural or other beneficial land-use.

Future plans for the site and infrastructure after decommissioning

The following elements/materials will be removed from the site:

- Steel/aluminium mounting structure elements and concrete foundation (if any)
- PV modules, Inverter, transformers and all electrical equipment which were needed for the PV plant operation;
- Metal fence including:
  - fence mounting structure
  - concrete foundation (if any)
  - Gates
- Inverters and O&M buildings including the concrete foundation
- Electrical wire

All equipment such as electrical equipment like PV modules, inverters, transformers and other electrical tools will be recycled. All elements which cannot be recycled like concrete mounting structures foundation (if any) and inverter cabin foundation will be dumped into authorized dump. Then, the restoration of the site to the original condition will be completed by removing all residual materials like concrete fragments etc. as well as removing all transporting means form the site. All these activities need to be carried out according to the local/national prescription related to the waste disposal regulation.

APPROACH TO UNDERTAKING THE SCOPING PHASE CHAPTER 3

An Environmental Impact Assessment (EIA) process refers to that process (in line with the EIA Regulations) which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts associated with a proposed project or activity. The EIA process comprises two main phases: i.e. **Scoping Phase** and **EIA Phase**. The EIA process culminates in the submission of an EIA Report (including an Environmental Management Programme (EMPr)) to the competent authority for decision-making. The EIA process is illustrated below:

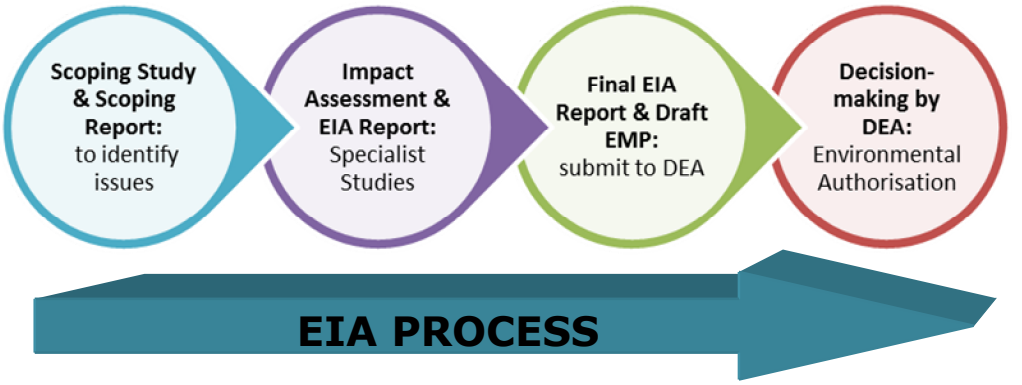

Figure 3.1: The Phases of an EIA Process

The Scoping Phase for the proposed Tutuka Solar Energy Facility has been undertaken in accordance with the EIA Regulations (GNR543), in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No. 107 of 1998). This scoping process is aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders, relevant government authorities, and interested and affected parties (I&APs).

This chapter outlines the process which was followed during the Scoping Phase of the EIA process.

3.1. Objectives of the Scoping Phase

This Scoping Phase aims to:

» Identify and evaluate potential environmental (biophysical and social) impacts and benefits of the proposed development (including design, construction,

operation and decommissioning) within the broader study area through a desk-top review of existing baseline data and specialist studies.
» Identify potentially environmental impacts and sensitive environmental features and areas on the site to inform the preliminary design process of the facility.
» Define the scope of studies to be undertaken within the EIA process.
» Provide the authorities with sufficient information in order to make a decision regarding the scope of issues to be addressed in the EIA process, as well as regarding the scope and extent of specialist studies that will be required to be undertaken as part of the EIA Phase of the process.

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

» Describe the scope and nature of the proposed activities.
» Describe the reasonable and feasible project-specific alternatives to be considered through the EIA process, including the "do nothing" option.
» Identify and evaluate key environmental issues/impacts associated with the proposed project, and through a process of broad-based consultation with stakeholders and desk-top specialist studies, identify those issues to be addressed in more detail in the Impact Assessment Phase of the EIA process, as well as potentially sensitive environmental features and areas which should be considered in the preliminary design phase.
» Conduct an open, participatory, and transparent public involvement process and facilitate the inclusion of stakeholders concerns regarding the proposed project into the decision-making process.

3.2. Overview of the Scoping Phase

The Scoping Phase has been undertaken in accordance with the EIA Regulations (GNR543), in terms of NEMA. Key tasks undertaken within the scoping phase includes:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Submission of an application form for authorisation to the competent authority (DEA) in terms of Regulation 12 and 26 of Government Notice No R543 of 2010.
» Undertaking a public involvement process throughout the Scoping process in accordance with Chapter 6 of Government Notice No R543 of 2010 in order to identify issues and concerns associated with the proposed project.
» Undertaking of independent specialist studies in accordance with Regulation 32 of Government Notice No R543 of 2010.

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

These tasks are discussed in detail below.

3.2.1 Authority Consultation and Application for Authorisation in terms of GNR543 of 2010

As Eskom is a State Owned Enterprise, the National Department of Environmental Affairs (DEA) is the competent authority for this application. As the project falls within the Mpumalanga Province, the Mpumalanga Department of Economic Development, Tourism and Environmental Affairs (DETEA) is the commenting authority for the project. Consultation with these authorities has been undertaken throughout the Scoping Phase. This consultation has included the submission of an application for authorisation to DEA. Authorisation to continue with the Scoping Phase of the project was granted when this application was accepted by DEA, and allocated the reference number **14/12/16/3/3/2/754.**

A record of all authority correspondence undertaken prior to and within the Scoping Phase is included within **Appendix C**.

3.2.2 Public Participation

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

» All relevant stakeholders and I&APs are identified and consulted with.
» Information containing all relevant facts in respect of the application is made available to stakeholders and I&APs.
» Participation by stakeholders and I&APs is facilitated in such a manner that all are provided with a reasonable opportunity to comment on the application.
» Comments received from stakeholders and I&APs are recorded and considered in the EIA process, where appropriate.

The following sections detail the tasks which were undertaken as part of the public participation process.

i. <u>Stakeholder identification</u>

The first step in the public involvement process was to initiate the identification of relevant stakeholders and interested and affected parties (I&APs). This process

was undertaken through existing contacts and databases, recording responses to site notices and newspaper advertisements, as well as through the process of networking. Stakeholder groups identified include:

- National government departments, including:
  - South African Heritage Resources Agency (SAHRA)
  - Department of Water and Sanitation (DWS)
  - Department of Agriculture, Forestry and Fisheries (DAFF)
  - National Department of Energy (DoE)
  - Department of Mineral Resources (DMR)
  - The South African Civil Aviation Authority (CAA)
- Provincial government departments including:
  - Provincial Government of the Mpumalanga Province – Mpumalanga DEDET
  - Mpumalanga Department of Public Works, Roads and Transport
  - Mpumalanga Provincial Heritage Resources Authority (MPHRA)
  - Mpumalanga Department of Mineral Resources (DMR):
- Parastatals including:
  - South African National Roads Agency Limited (SANRAL)
- Local and District Municipalities having jurisdiction over the study area being the:
  - Lekwa Local Municipality
  - Gert Sibande District Municipality
- Neighbouring landowners and occupiers
- Other potentially affected parties and landowners
- Industry and business
- Community Based Organisations and
- Non-Governmental Organisations.

The process of identification of stakeholders and I&APs will be on-going throughout the EIA process.

ii. Stakeholder Database

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to **Appendix C** for a listing of recorded parties). While I&APs have been encouraged to register their interest in the project from the start of the process, the identification and registration of I&APs will be on-going for the duration of the EIA process. The I&AP database will be updated throughout the EIA process, and will act as a record of the parties involved in the public involvement process.

iii. Adverts and Notifications

In order to notify and inform the public of the proposed project and invite members of the public to register as interested and affected parties (I&APs), the project, and EIA process was advertised in the following newspapers:

» Standerton Advertiser (Afrikaans & isiZulu: 14 January 2015)
» Ibis Newspaper (English: 12 January 2015)

A second advert was placed announcing the date and venue of the public meeting and the availability of the draft scoping report. This advert appeared in the following newspapers:
» Standerton Advertiser (19 March 2015)
» Ibis Newspaper (17 March 2015)

Site notices (in English and isiZulu) were placed at visible points on the entrance of the Tutuka power station on 11 December 2014, in accordance with the requirements of the EIA Regulations. Further notices were placed at the Standerton Public Library and at the Lekwa Local Municipality. In addition to the advertisements and site notices, key stakeholders and registered I&APs were notified in writing of the commencement of the EIA process. Copies of all the advertisements, site notices and written notifications are included within **Appendix C**.

iv. Public Involvement and Consultation

In order to provide information regarding the proposed project and the EIA process, a background information document (BID) for the project was compiled at the outset of the process (refer to Appendix C). The BID was distributed to identified stakeholders and I&APs, additional copies were made available at public venues within the broader study area, and it was posted electronically on the Savannah Environmental website.

Through consultation with key stakeholders and I&APs, issues for inclusion within the issues-based scoping study were identified and confirmed. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities have been provided, and will continue to be provided in order for I&APs to have their issues noted as follows:

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

» Written, faxed or e-mail **correspondence**

Networking with I&APs will continue throughout the duration of the EIA process.

v. Identification and Recording of Issues and Concerns

No comments have been received to date regarding the proposed project. All comments received from stakeholders and I&APs on the proposed project will be included in the Final Scoping Report. A Comments and Response Report will be compiled to include all comments received during the scoping phase of the process, including those received in the public review period of the draft Scoping Report.

3.2.3 Evaluation of Issues Identified through the Scoping Process

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

Specialist	Area of Expertise	Appendix
Megan Diamond (Feathers Environmental Services)	Avifauna	Appendix D
Marianne Strohbach (Savannah Environmental)	Ecology	Appendix E
Jaco van der Walt (Heritage Contracts and Archaeological Consulting CC (HCAC))	Heritage and Archaeology	Appendix F
Barry Millstead (BM Geological Services)	Palaeontology	Appendix G
John Marshall (Afzelia Environmental Consultants and Environmental Planning and Design)	Visual	Appendix H
Candice Hunter (Savannah Environmental) and Anton Pelser (external reviewer)	Social	Appendix I
Garry Paterson (ARC-Institute for Soil, Climate and Water)	Soils and Agricultural Potential	Appendix J
Robert Taylor (Limosella Consulting)	Wetlands	Appendix K

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/impact:

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

The evaluation of the issues resulted in a statement regarding the potential significance of the identified issues, as well as recommendations regarding further studies required within an EIA.

Specialist Scoping Reports are contained within **Appendices D – K**.

3.2.4 Public Review of Draft Scoping Report and Public Meeting

This is the **current stage** of the Scoping Phase. The Draft Scoping Report has been made available for public review from **17 March 2015 – 20 April 2015** at the following locations:

» Thuthukani Public Library
» Standerton Public Library
» www.savannahSA.com

In order to give I&APs an opportunity to raise any issues and concerns about the proposed development, a public meeting will be held as follows during the review period for the draft scoping report.

» Date: Wednesday, 08 April 2015
» Time: 17:00
» Venue: Ulwazi Primary School Hall, Thuthukani, Mpumalanga

Details of the availability of the draft scoping report for public review and public meeting were advertised in the following regional and local newspapers:

» Standerton Advertiser (19 March 2015)
» Ibis Newspaper (17 March 2015)

In addition, all registered I&APs were notified of the availability of the report and public meeting by letter (refer to Appendix C).

3.2.5 Final Scoping Report

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

3.3 Regulatory and Legal Context

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

3.3.1 Requirement for an EIA

The EIA Regulations were revised in December 2014 in terms of GNR 982 – 985. In terms of Sub-Regulations 53(2) and 53(3) of these Regulations) Transitional Arrangements):

" If a situation arises where an activity or activities, identified under the previous NEMA Notices, no longer requires environmental authorisation in terms of the current activities and competent authorities identified in terms of section 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), and where a decision on an application submitted under the previous NEMA regulations is still pending, the competent authority will consider such application to be withdrawn". And "where an application submitted in terms of the previous NEMA regulations, is pending in relation to an activity of which a component of the same activity was not identified under the previous NEMA notices, but is now identified in terms of section 24(2) of the Act, the competent authority must dispense of such application in terms of the previous NEMA regulations and may authorise the activity identified in terms of section 24(2) as if it was applied for, on condition that all impacts of the newly identified activity and requirements of these Regulations have also been considered and adequately assessed."

Therefore, similarly listed and additional activities relevant to the current application have been identified and are listed in the table below. They are no new listed activity as per the revised EIA Regulations of December 2014 in terms of GNR 982 – 985.

Activity listed in GNR 544 – 546	Activity listed in GNR 983 - 985	Relevance to the project
GN 544, activity 10 The construction of facilities or infrastructure for the	GN983, activity 11 (i) The development of facilities or infrastructure for the	An overheard power line and on-site substation will be constructed to connect the PV facility to the

Activity listed in GNR 544 – 546	Activity listed in GNR 983 - 985	Relevance to the project
transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV;	transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts	Eskom grid
GN 544, activity 11 The construction of: **(xi)** infrastructure or structures covering 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse.	GN983, activity 12 The development of (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse, or c) within 32m of a watercourse	The PV facility will include the construction of buildings (workshop area and site office) and infrastructures (underground cabling, panels) within 32 metres of a watercourse.
GN 544, activity 18 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from **(i)** a water course	GN983, activity 19 The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse	Construction of the PV facility may require the infilling or excavation and removal of soil of more than 5 cubic metres from a watercourse.
GN 544, activity 22 The construction of a road, outside urban areas, Where no road reserve exists where the road is wider than 8 metres (i) Where no road reserve exists where the road is wider than 8 m;	GN983, activity 24 The development of- (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres	The facility will require construction of new access roads. These may exceed 8 metres in width.
GN 544, activity 29 The expansion of facilities for the generation of electricity where:	**GN 983, activity 36** The expansion and related operation of facilities for the generation of electricity from	The development footprint of the current Tutuka power station will be expanded by 1 hectare or more with the construction

Activity listed in GNR 544 – 546	Activity listed in GNR 983 - 985	Relevance to the project
(ii) regardless the increased output of the facility, the development footprint will be expanded by 1 hectare or more;	a non-renewable resource where - (ii) regardless the increased output of the facility, the development footprint will be expanded by 1 hectare or more;	of the PV facility.
GN 544, activity 47 The widening of a road by more than 6 metres, (ii) Where no reserve exists, where the existing road is wider than 8 metres –	GN983, activity 56 The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (ii) where the existing reserve is wider than 13,5 meters	The facility will require the widening/lengthening of existing access roads within the site.
GN 545, activity 1 The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	GN984, activity 1 The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more	The proposed facility will consists on of arrays of photovoltaic (PV) panels with an electricity output of 65.9MW.
GN 545, activity 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	GN983, activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare	The development footprint of the solar energy facility would be in excess of 20ha.
GN 546, activity 4 The construction of a road wider than 4 metres with a reserve less than 13.5 metres a) In Mpumalanga	GN 985, activity 4 The construction of a road wider than 4 m with a reserve less than 13,5m. a) In Mpumalanga	*Access roads will be constructed during the development of the proposed facility within CBA as identified by the Mpumalanga Biodiversity Conservation Plan*

Activity listed in GNR 544 – 546	Activity listed in GNR 983 - 985	Relevance to the project
ii. Outside Urban areas, in: **(ee)** Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	**ii. Outside Urban areas,** **(ee)** Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	
GN 546, activity 10 The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres a) In Mpumalanga ii. Outside Urban areas, in: **(ee)** Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	GN 985, activity 10 The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres a) In Mpumalanga ii. Outside Urban areas, in: **(ee)** Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	The solar energy facility may require facilities for the temporary storage of fuels / oils during construction to be situated on site of a combined capacity of up to 80m³ within CBA as identified by the Mpumalanga Biodiversity Conservation Plan
GN 546, activity 13 The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, **(a)** Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority.	GN 984, activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation GN 985, activity 12 The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (c) In Mpumalanga (ii) Critical biodiversity areas as identified in systematic biodiversity plans	The solar facility may result in the clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation within CBA as identified by the Mpumalanga Biodiversity Conservation Plan

Activity listed in GNR 544 – 546	Activity listed in GNR 983 - 985	Relevance to the project
GN546 Item 14: The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (a) In Mpumalanga: i. All areas outside urban areas	GN 985, activity 12 The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (c) In Mpumalanga (ii) Critical biodiversity areas as identified in systematic biodiversity plans	The solar energy facility will be located outside urban areas and will require the clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation cover.
GN 546, activity 19 The widening of a road by more than 4 meters or the lengthening of a road by more than 1 kilometres a) In Mpumalanga ii. Outside Urban areas, in: (cc). sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority	GN 985, activity 18 The widening of a road by more than 4 meters or the lengthening of a road by more than 1 kilometres a) In Mpumalanga ii. Outside Urban areas, in: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Access roads may be widened or lengthened within a CBA as identified by the Mpumalanga Biodiversity Conservation Plan during the development of the proposed facility.

3.3.2 Regulatory Hierarchy

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

» *Department of Energy (DoE):* This Department is responsible for policy relating to all energy forms, including renewable energy, and is responsible for developing and approving the IRP (Integrated Resource Plan for Electricity).
» *National Energy Regulator of South Africa (NERSA):* This body is responsible for regulating all aspects of the electricity sector, and will ultimately issue licenses for solar energy developments to generate electricity.
» *Department of Environmental Affairs (DEA):* This Department is responsible for environmental policy and is the controlling authority in terms of NEMA and

the EIA Regulations. The DEA is the competent authority for this project, and charged with granting the relevant environmental authorisation.

» *The South African Heritage Resources Agency (SAHRA):* SAHRA is a statutory organisation established under the National Heritage Resources Act, No 25 of 1999, as the national administrative body responsible for the protection of South Africa's cultural heritage.
» *National Department of Agriculture, Forestry, and Fisheries (DAFF):* This Department is responsible for activities pertaining to subdivision and rezoning of agricultural land. The forestry section is responsible for the protection of tree species under the National Forests Act (Act No 84 of 1998).
» *South African National Roads Agency (SANRAL):* This Agency is responsible for the regulation and maintenance of all national routes.
» *National Department of Water and Sanitation (DWS):* This Department is responsible for water resource protection, water use licensing and permits.
» *South African Civil Aviation Authority (CAA):* This department is responsible for aircraft movements and radar, which are aspects that may have bearing on location and planning for renewable energy facilities.

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

» *Mpumalanga Department of Economic Development, Environment and Tourism–*
(DEDET): This department is the provincial commenting authority for this project.
» *Mpumalanga Department of Public Works, Roads and Transport* – This department is responsible for roads.
» *Mpumalanga Provincial Heritage Resources Authority (MPHRA):* This deals with heritage resources within the Mpumalanga Province.
» *Mpumalanga Department of Mineral Resources (DMR):* Approval from this department may be required to use land surface contrary to the objects of the Act in terms of Section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act, approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.

At **Local Level**, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In the Mpumalanga Province, both the local and district municipalities play a role. The local municipality is the Lekwa Local Municipality which forms part of the Gert Sibande 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.

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

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

- National Environmental Management Act (Act No. 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA (GNR R543 in Government Gazette 33306 of 18 June 2010)
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
  - Public Participation in the EIA Process (DEA, 2010)
  - Integrated Environmental Management Information Series (published by DEA)
- Lekwa Local Municipality Integrated Development Plan
- International guidelines – the Equator Principles and the International Finance Corporation and World Bank Guidelines.

Several other Acts, standards or guidelines have also informed the project process and the scope of issues evaluated in the scoping report, and to be addressed in the EIA. A listing of relevant legislation is provided in Table 3.1. A more detailed review of legislative requirements applicable to the proposed project will be included in the EIA phase.

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

Legislation	Applicable Sections
National Legislation	
Constitution of the Republic of South Africa (Act No 108 of 1996)	» Bill of Rights (S2) » Environmental Rights (S24) – i.e. the right to an environment which is not harmful to health and well-being » Rights to freedom of movement and residence (S22) » Property rights (S25) » Access to information (S32) » Right to just administrative action (S33)
National Environmental Management Act (Act No 107 of 1998)	» NEMA requires, inter alia, that: * Development must be socially, environmentally, and economically sustainable. * Disturbance of ecosystems and loss of

Legislation	Applicable Sections
	biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. * A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions. » EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. » The Transitional Arrangements as contained in Chapter 8 of the 2014 EIA Regulations as promulgated on 8 December 2014 regarding pending applications with specific reference to Regulation 53(1) which reads as follows: » 53. (1) An application submitted in terms of the previous NEMA regulations and which is pending when these Regulations take effect, including pending applications for auxiliary activities directly related to- * prospecting or exploration of a mineral or petroleum resource; or * extraction and primary processing of a mineral or petroleum resource, must despite the repeal of those Regulations be dispensed with in terms of those previous NEMA regulations as if those previous NEMA regulations were not repealed. » In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. » In terms of GNR 543 of 18 June 2010, a Scoping EIA Process is required to be undertaken for the proposed project.
Environment Conservation Act (Act No 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7) » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35) » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not

Legislation	Applicable Sections
	the responsibility of any other authority (S36) » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development (S38) » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44)
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to 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 S56 (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). » This Act also regulates alien and invader species.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas" » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards » 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.

Legislation	Applicable Sections
	» Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan.
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants & restrictions in terms of where these species may occur - Regulation 15 of GN R1048 and Regulation 598 GN 37885 of NEM:BA (Act No. 10 of 2004) » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048 & Regulation 598 GN 37885 of NEM:BA (Act No. 10 of 2004)).
National Water Act (Act No 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.
National Environmental Management: Waste Act (Act No 59 of 2008)	» The purpose of this Act is to reform the law regulating waste management in order to protect health and the environment by providing for the licensing and control of waste management activities. » The Act provides listed activities requiring a waste license » Standards for the storage and handling of waste have been published in terms of this Act
National Forests Act (Act No 84 of 1998)	» Protected trees: According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'. » Forests: The Act prohibits the destruction of indigenous trees in any natural forest without a licence.
National Veld and Forest Fire Act (Act 101 of 1998)	» In terms of S12 the applicant would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.

Legislation	Applicable Sections
	» In terms of S13 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 capable of carrying a veldfire across it. » In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.
Aviation Act (Act No 74 of 1962)	Obstacle limitations and marking outside aerodrome or heliport
Provincial Legislation and Policy	
Mpumalanga Province Provincial Growth and Development Strategy	The Mpumalanga Provincial Growth and Development Strategy (MPGDS) is a nine-year strategy (2004-2014) which aims to achieve the objectives of Vision 2014. As a provincial policy framework, it sets the tone and pace for shared growth and development in the Province. It addresses the key social, economic, environmental and spatial imperatives in the Province.
Mpumalanga Biodiversity Conservation Plan.	» The Mpumalanga Biodiversity Conservation Plan contains various classes of environmental features of conservation value, such as protected areas; irreplaceable areas etc. » Mapping of critical biodiversity areas is also provided in this document.
Guideline Documents, Policies and White Papers	
Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads	» Outlines the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits
Gert Sibande District Municipality and Dr Pixley Ka Isaka Seme Local Municipality, Integrated Development Plan	» According to the Municipal Systems Act of 2000, all Municipalities have to undertake an Integrated Development Planning (IDP) process to produce Integrated Development Plans (IDPs). As the IDP is a legislative requirement it has a legal status and it supersedes all other plans that guide development at local government level.
The White Paper on the Energy Policy of the Republic of South Africa (December 1998)	» Investment in renewable energy initiatives, such as the proposed solar energy facility, is supported by this white Paper.
The White Paper on Renewable Energy (November 2003)	» This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 4

This section of the Draft Scoping Report provides a description of the environment that may be affected by the **Tutuka PV Solar Energy Facility**. This information is provided in order to assist the reader in understanding the receiving environment within which the proposed facility is situated. Features of the biophysical, social and economic environment that could directly or indirectly be affected by, or could affect, the proposed development have been described. This information has been sourced from existing information available for the area, and aims to provide the context within which this EIA is being conducted.

The entire proposed project development area on portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS is described below. A more detailed description of each aspect of the affected environment is included within the specialist scoping reports contained within **Appendices D – K**.

4.1 Regional Setting: Location of the Study Area

The proposed Tutuka Solar PV Facility is located approximately 28 km north-east of Standerton in the Mpumalanga Province. The site falls within the Lekwa Local Municipality which falls within the Gert Sibande District Municipality. The identified sites fall within the Tutuka coal fired power station boundary (refer to **Figure 4.1**). Access to the site is provided from the R38 that runs east to the boundary of the proposed site and that connects the town of Standerton and Bethal.

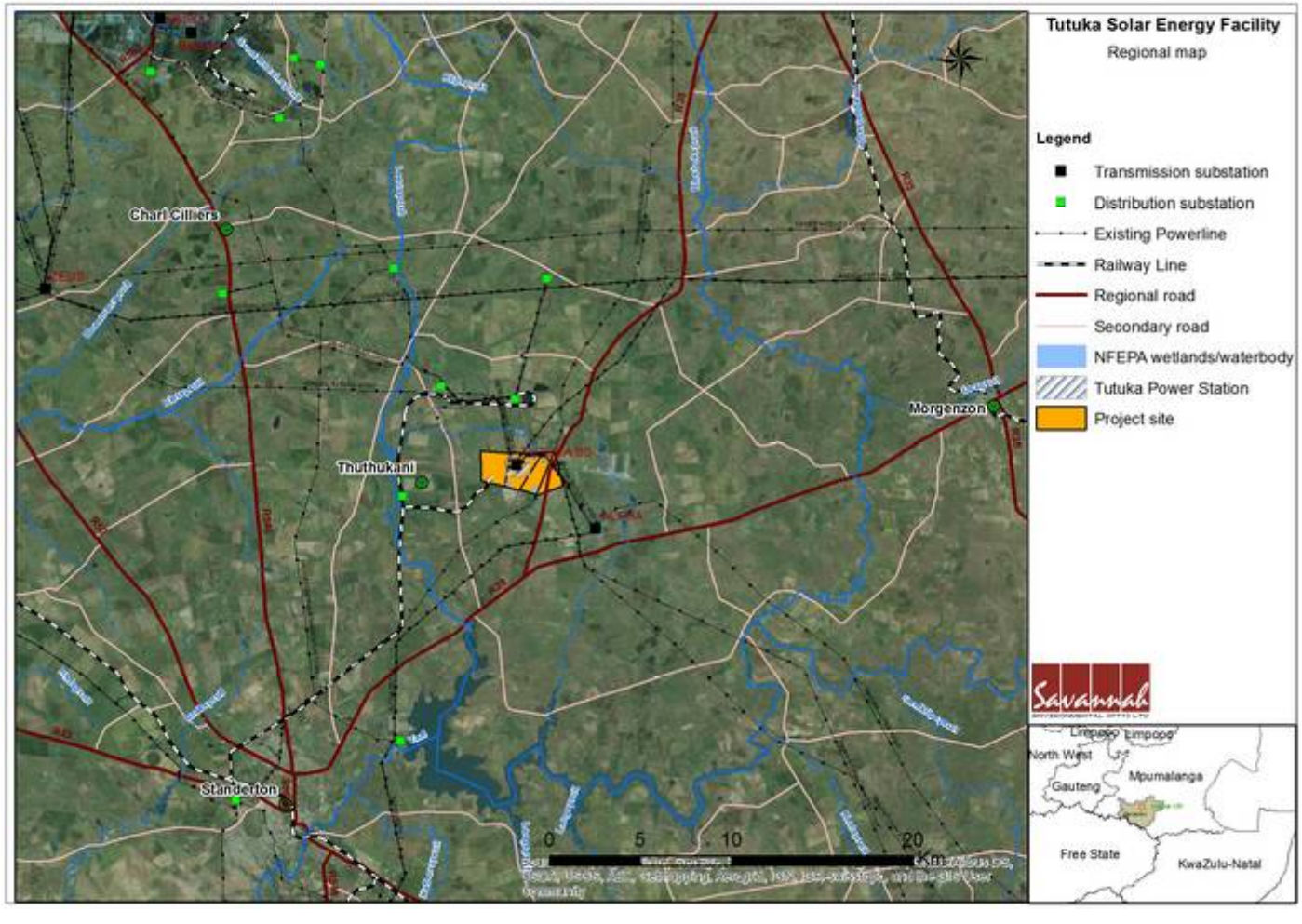

Figure 4.1: Regional context of the Tutuka PV Solar Energy Facility project site showing the site location as well as existing infrastructure in the area

4.2 Climatic Conditions

The climate for the Tutuka site has been derived from climatic data summarised for Standerton, located about 22 km south-west of Tutuka. The area receives about 650 - 750 mm of rain on average per year. From May to September, rainfall is minimal, with most rainfall occurring from late October to March, peaking between November and January. Temperatures in summer peak during December and January at a daily average of 26°C, with an average of 17°C for June. During July, night temperatures are on average -1°C, with frosts during winter being common.

4.3 Biophysical Characteristics of the Study Area

4.3.1 Topography and Geology

The site is expected to be relatively flat to slightly undulating. Within close proximity of the site are several valley floor wetlands (vleis), of which one has been expanded to form a dam for farming purposes. The soils are expected to be mainly dark cracking clay soils with a high swell-shrink potential, being plastic and sticky when wet. Fertility is high, but due to occasional seasonal inundations, soils may not always be suitable for crop-based agriculture.

Figure 4.2 shows that both the tow identified alternative areas are completely underlain by rocks of the Early Permian Vryheid Formation.

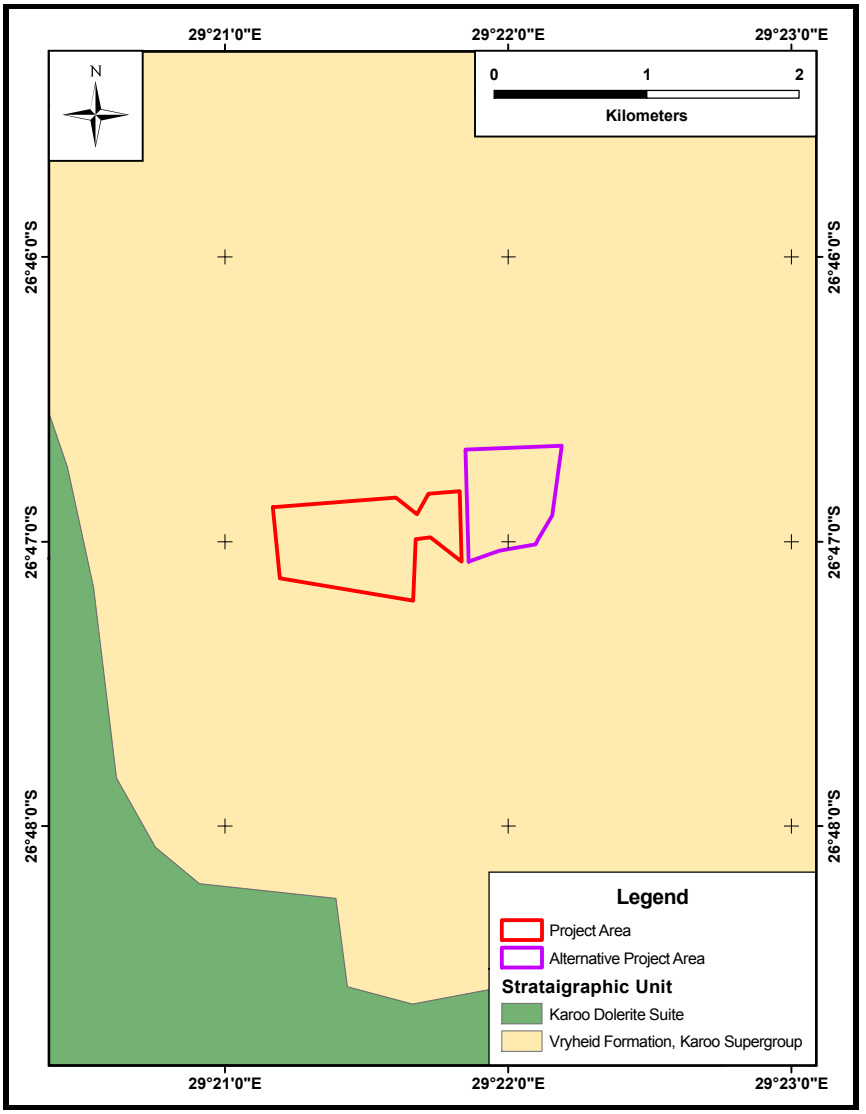

Figure 4.2: Map of the geology underlying the project area and its surroundings

4.3.2 Soil, Agricultural Potential and Land Capability

The area under investigation is covered by only one land type – **Ca1** (soils of moderate agricultural potential). The distribution of soils with high, medium and low agricultural potential within each land type is also given, with the dominant class shown in **bold type** in Table 4.1.

Table 4.1 Land types occurring (with soils in order of dominance)

Land Type	Depth (mm)	Dominant soils	Percent of land type	Characteristics	Agric. Potential (%)
	300-900	Arcadia 30/40	57%	Dark brown to black, structured, swelling clay soils, often calcareous	High: 1.5

Ea17	600-1000	Rensburg 10/20	16%	Dark brown to black, structured, swelling clay soils, often calcareous, on grey, mottled, structured clay	**Mod: 67.6** Low: 30.9
	1000-1200 +	Valsrivier/Swartland 31/32	13%	Brown to dark brown, structured clay loam to clay soils, often on weathering rock	

4.3.3 Vegetation

i. Vegetation overview

The site falls within the original extent of the Soweto Highveld Clay Grassland (**Figure 4.3)** as defined by Mucina and Rutherford (2006). The short to medium high dense tussock grassland is dominated almost entirely by *Themeda triandra*, with other prominent grasses such as *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Elionurus muticus*, *Eragrostis* species, *Heteropogon contortus* and *Setaria* species. Overall grass diversity is relatively high, as is the diversity of herbs and geophytes (Mucina and Rutherford 2006). Many of the herbs resprout every year from below-ground storage tubers, usually early in the growing season before the grasses reach their full cover. Some of the more common low shrubs scattered in the grassland include *Anthospermum* species, *Felicia muricata* and *Ziziphus zeyheriana*.

Mucina and Rutherford (2006) already classified this grassland as endangered, with only about 0.2% of its original extent protected, and a mere 52% remaining in a natural state. It is listed under the National List of threatened ecosystems as Vulnerable.

ii. Mpumalanga Conservation Planning

The Mpumalanga Biodiversity Conservation Plan classified the western half of the study area as of Least Concern, whilst the roughly the eastern half of the study area is considered Important and Necessary for meeting biodiversity targets. Although most of the study area appears to have been previously disturbed, the actual state of the ecosystem will have to be studied in detail during the peak growing season, before a definite assessment statement can be made as to the ecological state of the proposed development.

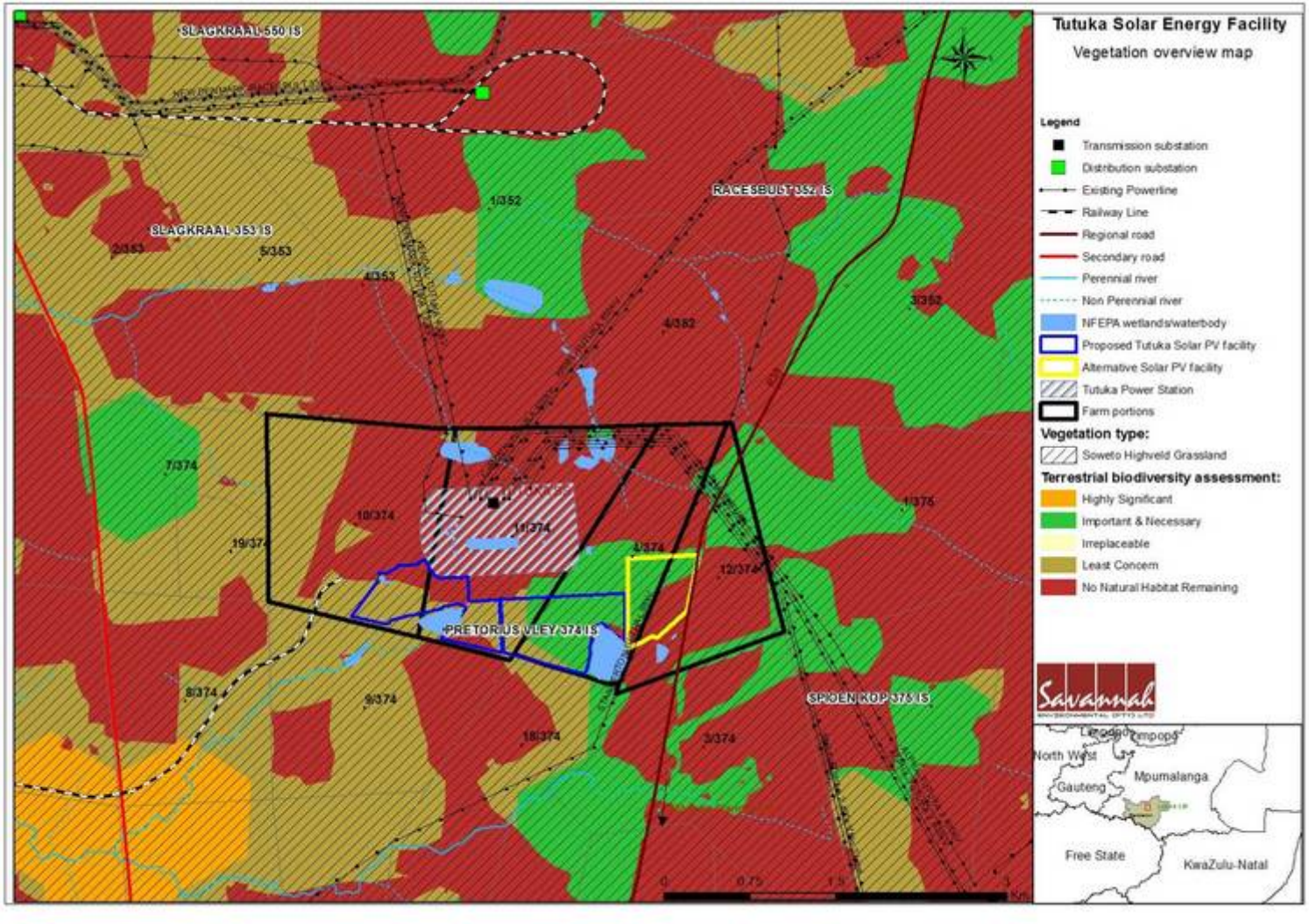

Figure 4.3: The original extent of the vegetation types on the proposed development site (after Mucina and Rutherford, 2006)

iii. Species of conservation concern

Flora community

A total of 973 indigenous plant species have been recorded in the Tutuka Area according to the SANBI database. It is unlikely that all of these species will occur within the project area due to the level of disturbance of the site, whilst species not previously recorded may be present. Of the previously recorded species, 27 have a red-data status. The presence of these species on site will have to be verified during a detailed field study.

Faunal Community

Due to the previous transformation and disturbance on the proposed project site, it is not expected that any of the listed species breed or depend on the proposed project area for survival.

A combined total of at least 190 bird species has been recorded within the relevant SABAP quarter degree squares and pentads. The presence of these species in the broader area provides an indication of the diversity of species that could potentially occur at the three identified sites. Of the 190 species, ten are Red List species, six near-endemics, four regional endemics and one endemic species. Based on the micro habitats available on site, existing avifaunal data and the conservation status of each species (EN = Endangered; VU = Vulnerable; NT = Near-threatened; Bonn = Protected Internationally under the Bonn Convention on Migratory Species), a priority species list has been developed which details those species most likely to be impacted upon by the solar energy development and its associated infrastructure (refer to Table 1, Appendix D). It is likely that this list will be refined following the site visit during the EIA phase.

4.3.4 Drainage and Wetlands

This relatively flat (~0.6% south facing slope) study area contains a cluster of NFEPA wetlands. Wetlands appear to form within both the proposed alternative sites draining into earthen dams located within the 500m buffer zone. Inspection of aerial photos from 2012, provided by the office of the surveyor general, showed no obvious rivers or channelled waterways on or within 500m of the sites although furrows have been dug to drain water off the power station and onto the sited. All wetlands on site will be investigated during the site visit of the EIA phase.

4.4. Land uses and Visual Quality

The area around the Tutuka PV site is characterised by three distinctive land uses, namely:

» Heavy industrial (**Figure 4.4**) development including the Tutuka Power Station and associated conveyors and stockpiles. The main coal stockpile site appears to be approximately 7km to the north and north east that is linked to the power station with an extensive conveyor system. There is also an above ground conveyor running approximately 3.5km east of the power station linking the facility to an existing pulverised fuel ash dump. This dump does appear to be largely rehabilitated.
» Urban development including the small settlement of Thuthukani which lies approximately 5km to the west respectively of the proposed alternative development sites. It is assumed that this settlement largely houses workers from the power station and associated facilities.
» Agricultural development is the main development type surrounding the proposed site. There is a mixture of arable agriculture and grazing land.

Figure 4.4: View of Tutuka Power Station. Note that the Tutuka PV Solar Energy Facility will be seen largely against this industrial backdrop

The majority of the affected area falls into the Rural Agricultural Landscape category. Whilst this is a productive area it does appear largely natural. The existing power station and associated features have already impacted on this landscape and have changed the character particularly from immediately adjacent areas from which detail of the industrial elements are apparent and the landscape appears to be industrialised.

From a distance however, whilst the main elements of the power station are visible, they are seen in the broader more natural context of a largely unspoilt Highveld rural landscape. Even though the main industrial elements are obvious, because there is a clear division, the natural elements can be appreciated in their own right.

Possible Sensitive Receptors or places within the landscape which could be sensitive to landscape change include:

- Area Receptors which include:
  - Urban areas including Thuthukani.
- Areas those are likely to be important for recreational use such as the Grootdraai Dam and surrounding areas approximately 8km to the south of the proposed development alternatives.
- Linear Receptors which include main routes through the area. It is likely that these routes will be mainly used by local people although the R38 and R39 are regional routes and are likely to carry a proportion of tourism / recreational related traffic.
- Point Receptors that include isolated and small groups of homesteads that are generally associated with and located within the Agricultural Landscape that surrounds the proposed development site.

4.5. Access and Transport Routes in the Region

Access to the site is provided from the R38 that runs east to the boundary of the proposed site and that connects the town of Standerton and Bethal. As far as possible, these existing access roads will be utilised for construction purposes (and later limited access for maintenance).

4.6 Social Characteristics of the Study Area and Surrounds

The purpose of the section is to provide an overview of the current socio-economic baseline environment and context in which the proposed project will take place within the Lekwa Local Municipality (LLM) in the Mpumalanga Province. This section of the report will provide a strategic understanding of the socio-economic profile of the study area, in order to develop a better understanding of the socio-economic dynamics as a background to the development of the project. The data presented in this section has been largely derived from the Mpumalanga Census 2011 Municipal Report, DM IDP 2015/2016, LM IDP 2013-2014, the Census Survey 2011 (Stats SA), as well as the local government handbook 2012.

4.6.1 Population

The population trends in a geographical area affect the rate of economic growth through the provision of labour and entrepreneurialism and the demand for goods and services. These trends also indicate the number of people who are likely to be impacted by the proposed project. Mpumalanga is the second-smallest province in South Africa after Gauteng with a surface area of only 76 495km^2; taking up 6.3% of South Africa's land area and with a population of just over 4-million people. The proposed development will be constructed in the GSDM within the LLM. The population of the GSDM in 2011 was approximately 1 043 194 people, of which 115 662 people reside in the LLM. The average annual population growth rate in the study area is estimated by comparing data

from 2001 to 2011. The LLM is a sparsely populated area of about 25 people per square km in comparison with the DM (33 km²).and the rest of Mpumalanga (53 km²).

4.6.2 Employment profile

The LLM is largely populated by the potentially economically active population. In the LLM the unemployment rate is 25.9% and there are approximately 11 637 people who are unemployed who are aged 15-64 years. This implies that there is a lot of human capital available for any kind of work, but also that there is space for training and developing economically active population in the relevant fields needed. This could increase the employment level and decrease the poverty level in the local area. Local workers should be utilised as much as possible for the proposed development in order to alleviate local unemployment.

4.6.3 Household income levels

Household income is one of the most important determinants of welfare in a region. The ability to meet basic needs, such as adequate food, clothing, shelter and basic amenities, is largely determined by the level of income earned by the households. Poverty is often defined as the lack of resources to meet these needs. Household income levels are one avenue for determining poverty levels in a community. Households that have either no income or low income fall within the poverty level (R0- R38 200 per annum); indicating the difficulty to meet basic needs requirements. A middle-income is classified as earning R38 201- R307 600, and a high income is classified as earning R307 601 or more per annum.

The LM has a high number of households that fall within a low income category (60.9%) and the low percentage of the households that fall within the middle and high income category. The high percentage of low income households indicates that that there is a high demand for employment opportunities which will help decrease the dependence on forms of assistance either from government and or non-government organisations.

4.6.4 Access to services

A large number of people in the local municipality have access to basic services. There is still room for improvement in the provision of basic services. Especially in the rural/farm areas where there's a need to expand basic services such as water, electricity and sanitation. Lekwa Local Municipality forms part of the areas that were spatially designated and distorted, the main challenge is on ensuring that rural communities also have the same rights and benefits as urban communities in terms of basic services.

4.6.5 Economic trends

In 2009, the three largest contributors to the Mpumalanga provincial economy were manufacturing (20.1%), mining (18.6%) and community services (16.4%). The manufacturing sector dominated the district economy of Gert Sibande in 2009 with a 32.8% share. Gert Sibande District was the second largest contributor to the provincial economy. In 2009, Gert Sibande was the main contributor to Mpumalanga's manufacturing (54.8%) and agriculture sectors (41.3%).

The main industries in the LLM include agriculture, mining and power generation. Standerton is the major urban node and is a large commercial and industrial town which specialises in cattle, dairy, maize and poultry farming. The main contributors to the local economy include Agriculture, forestry and fishing (30%), community, social and personal services (13%), and private households (12%).

4.7 Heritage features of the region

4.7.1 Heritage and archaeology

Very few Early Stone Age sites are on record for Mpumalanga and no sites dating to this period are expected for the study area. An example in Mpumalanga is Maleoskop on the farm Rietkloof where ESA tools have been found. This is one of only a handful of such sites in Mpumalanga.

The MSA has not been extensively studied in Mpumalanga but evidence of this period has been excavated at Bushman Rock Shelter, a well-known site on the farm Klipfonteinhoek in the Ohrigstad district. This cave was excavated twice in the 1960s by Louw and later by Eloff. The MSA layers show that the cave was repeatedly visited over a long period. Lower layers have been dated to over 40 000 BP (Before Present) while the top layers date to approximately 27 000 BP (Esterhuizen & Smith in Delius, 2007). MSA material is found widely across South Africa and some MSA manifestations can be expected in the study area.

The Later phases of the Stone Age began at around 20 000 years BP. This period was marked by numerous technological innovations and social transformations within these early hunter-gatherer societies. These people may be regarded as the first modern inhabitants of Mpumalanga, known as the San or Bushmen. They were a nomadic people who lived together in small family groups and relied on hunting and gathering of food for survival. Evidence of their existence is to be found in numerous rock shelters throughout the Eastern Mpumalanga where some of their rock paintings are still visible.

A number of these shelters have been documented throughout the Province (Bornman, 1995; Schoonraad in Barnard, 1975; Delius, 2007). These include areas such as Witbank, Ermelo, Barberton, Nelspruit, White River, Lydenburg and Ohrigstad.

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

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

The Iron Age is characterised by the ability of these early people to manipulate and work Iron ore into implements that assisted them in creating a favourable environment to make a better living. No Sites dating to the Early or Middle Iron Age have been recorded or is expected for the study area. The same goes for the Later Iron Age period where the study area is situated outside the southern periphery of distribution of Late Iron Age settlements in Mpumalanga. This phase of the Iron Age (AD 1600-1800's) is represented by various tribes including Ndebele, Swazi, BaKoni, Pedi marked by extensive stonewalled settlements found throughout the Mpumalanga escarpment

4.7.2 Palaeontology (Fossils)

'Paleontological' means any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace.

The identified alternative locations are both underlain by potentially fossiliferous sedimentary rocks of the Early Permian Vryheid Formation. The potential for the proposed project to result in a negative impact upon the palaeontological heritage of the site has been assessed as moderate. The fossils known to be present within the formation elsewhere in South Africa are known to contain highly scientifically and culturally significant fossils, particularly the plant macrofossils of the *Glossopteris* flora. Any damage caused to the fossil materials that may be present within the strata underlying the project area would be both permanent and irreversible.

SCOPING OF ISSUES ASSOCIATED WITH THE PROPOSED TUTUKA PV SOLAR ENERGY FACILITY CHAPTER 5

This chapter presents a description of the potential issues identified for the proposed Tutuka PV Solar Energy Facility and its associated infrastructure, and provides recommendations for further studies required to be undertaken in the EIA phase. Specialist scoping reports are included within **Appendix D - K** wherein the potential issues relating to the project are identified and described in detail. Some environmental impacts are expected to be of greater significance than others and require a greater level of investigation.

A discussion of the potential cumulative impacts associated with the proposed project is presented in Section 5.5.

5.1 Approach to the Identification of Issues

An understanding of the activities to be undertaken during the construction process is necessary to predict the potential impacts of the facility on the environment. These have been explained in detail in Chapter 2 of this report and include:

Construction Phase:

» land clearing for site preparation and access routes
» transportation of supply materials and fuels
» construction of foundations involving excavations and placement of concrete (if required)
» construction of on-site substation, overhead power line and underground cables
» operating cranes for unloading and installation of PV panels (where required)
» commissioning of new installations
» waste removal and rehabilitation of disturbed sites.

Environmental issues: associated with construction activities may include, amongst others, alteration of land use, soil erosion, visual impacts, impacts on heritage sites, and threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna and social impacts (as described in Section 5.2).

Operational Phase

Operational activities will include regular maintenance of the PV installation and all associated site infrastructure.

Environmental issues: specific to the operation of the Solar Energy Facility could include visual impacts, impacts on biodiversity and impacts on agriculture due to the changes in land use (as described in Section 5.2).

Decommissioning Phase

Decommissioning activities would include removal of project infrastructure and site rehabilitation. Similar to the construction phase, environmental issues associated with decommissioning activities may include, among others, noise impacts, soil erosion, and threats to biodiversity and ecological processes, including habitat alteration and impacts to fauna. Impacts associated with decommissioning are expected to be similar to those expected for the construction phase.

5.2 Scoping of Issues associated with the Proposed Solar Energy Facility and Associated infrastructure

The text and tables below provide an indication of the potential direct and indirect environmental issues and impacts which have been identified during the Scoping phase of the EIA and which may be relevant during the construction and operational phases of the Solar Energy Facility. Impacts associated with decommissioning of the project are expected to be similar to those associated with the construction phase.

5.2.1 Potential impacts on avifauna

While renewable energy sources such as solar energy hold great potential to alleviate dependence on fossil fuels they are not without their environmental risks and negative impacts. Poorly sited or designed solar energy facilities can have negative impacts on not only vulnerable species and habitats but also entire ecological processes. These impacts are extremely variable and are dependent on a number of contributing factors which include the design and specifications of the development, topography, habitats capable of supporting various bird species as well as the number and diversity of birds present at the development site. Solar energy facilities may impact birds and bird populations in three key ways (Table 5.1). These can be grouped as either lethal, direct mortality impacts (i.e. collisions with the PV panels) that affect individual birds; or the non-lethal, less direct impacts (habitat destruction and disturbance) that are common to most forms of development.

Table 5.1: Potential impacts on avifauna

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 & 546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	Construction		
Habitat Loss	This impact is likely to have dire consequences for the smaller grassland bird species (i.e. the larks) with small home ranges as entire territories could be removed during construction activities. The grassland vegetation present on both the alternative sites appears to be degraded to some extent and as a result may not be able to support the more sensitive grassland species and any habitat destruction impacts that may occur are likely to only affect local bird populations. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	N/A
Disturbance and Displacement	Construction of solar energy facilities requires a significant amount of machinery and labour to be present on site for a period of time. For shy, sensitive species or ground nesting birds' construction activities are likely to be a cause of temporary disturbance or even result in displacement from the site entirely. In addition, species commuting around the area may become disorientated, avoid the site and fly longer distances than usual as a result and for some species this may have critical energy implications (Smallie, 2013). The study area is already subjected to a fairly significant degree of disturbance associated with the mining and energy generation activities in the immediate vicinity of the two sites. It is therefore difficult to predict at this stage how significant the disturbance impacts will be on local bird populations in the short or long-term. However based on the footprint of the PV facility and the bird species likely to occupy the study area, low to moderate impacts are probable.	Local	Confirmation of any breeding in the areas during subsequent phases of the EIA process will result in identification of any no go areas.

Issue	Nature of Impact and Applicable listed activities (GN 544, 545 & 546 of 18 June 2010)	Extent of Impact	'No go' areas
	» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Operation Phase			
Mortality as a direct collisions with solar panels	Bird mortality has been shown to occur due to direct collisions with solar panels. Species affected included water birds, small raptors, doves, sparrows and warblers (Kagan *et al*, 2014). In some cases, the reflective surfaces of PV panels act as attractants for approaching birds. These surfaces may be confused for large water bodies, causing disorientation in the same manner as windows do, resulting in injury or death. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None identified at this stage
Collisions with power line infrastructure	Collisions are the biggest single threat posed by power lines to birds in southern Africa (van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with power lines. Several existing power lines traverse through the study area and it is a proven fact that placing a new line next to an existing line reduces the risk of collisions to birds. The reasons for that are two-fold, namely it creates a more visible obstacle to birds and the resident birds, particularly breeding adults, are used to an obstacle in that geographic location and have learnt to avoid it (APLIC 1994).	Local	None identified at this stage
Disturbance and Displacement	Ongoing maintenance activities at the operational facility, are likely to cause some degree of disturbance to birds in the general vicinity. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15*	Local	None identified at this stage

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 & 546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	» *GN 546: 14(i)*		
Other Impacts	Birds could have an impact on the PV arrays once the facility becomes operational. These include: » Defecation on the PV cells by birds utilising or flying over the facility. A build-up of faecal matter on the panels is likely to cause interruptions to and/or reduced production of power at the facility; » Certain bird species may be attracted to the solar arrays, using the PV structures on which to perch, roost or even nest. An increase in the number of birds roosting, nesting and feeding at the facility could lead to increased defecation on the solar infrastructure and panel obstruction, resulting in conflict between the local bird populations and facility operators. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None identified at this stage

Gaps in knowledge and recommendations for further study

At this early stage of the assessment process, the confidence with which these impacts have been evaluated is low. In addition, the identification of those species that may be impacted upon is also extremely difficult, primarily due to the lack of available knowledge and experience in South Africa regarding solar PV plants, and their possible impacts. Predictions in this study are based on experience of these and similar species in different parts of South Africa, through the authors' experience working in the avifaunal specialist field since 2006. However bird behaviour cannot be reduced to formulas that will hold true under all circumstances.

A more detailed analysis of micro habitats (focusing on those habitats within the site boundaries) and the species that these habitats are able to support will be conducted by means of a site visit to the study area during the EIA phase as described in Chapter 7.

5.2.2 Potential impacts on ecology (flora and terrestrial fauna)

This relatively flat (~0.6% south facing slope) study area contains a cluster of NFEPA wetlands. Wetlands appear to form within the alternative sites draining into earthen dams located within the 500m buffer zone (Figure 5.1). Inspection of aerial photos from 2012, provided by the office of the surveyor general, showed no obvious rivers or channelled waterways on or within 500m of the sites although furrows have been dug to drain water off the power station and onto the sited. All wetlands on site will be investigated during the field survey.

Potentially sensitive areas were delineated for the scoping study from visual inspection of Google imagery and available delineations of the Mpumalanga Biodiversity Conservation Plan (as available from the BGIS website). The areas thus identified as sensitive (Figure 5.2) are depressions, seepage areas and wetlands such as dams and vleis (as mapped by the BGIS website) as well as possibly intact natural vegetation. These habitats are sensitive because of their ecosystem functions – providing specialised niches for flora and fauna, creating corridors in the landscape, filtering water, catching sedimentation and concentrating water runoff from catchments. The sensitivity analysis provided may only be considered as a *preliminary* assessment that will be updated after a detailed field visit and a detailed wetland delineation. Overall, it may be possible to position the PV arrays in such a way around confirmed wetlands and seepage areas to prevent any negative impact. The possibility of placement on the eastern section of the study area needs to be verified during a field study.

Ecological impacts of the proposed development will be mostly on the vegetation and supporting substrate. Potential expected impacts are listed below, but it must be stressed that this evaluation is preliminary and will only be finalised after a detailed field study of the area. Impacts on animals are regarded as minimal unless it affects their specific (limited) habitat, as animals are capable of moving away during construction and smaller species possibly resettling afterwards.

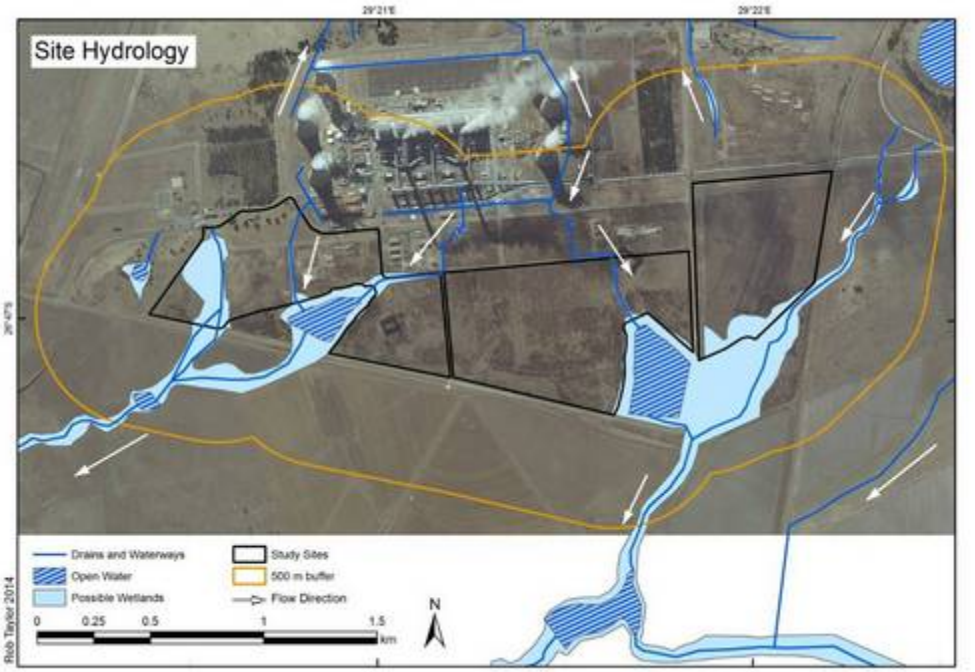

Figure 5.1: Site (black boundary) hydrology showing drains and waterways. The arrows indicating the direction of water flow.

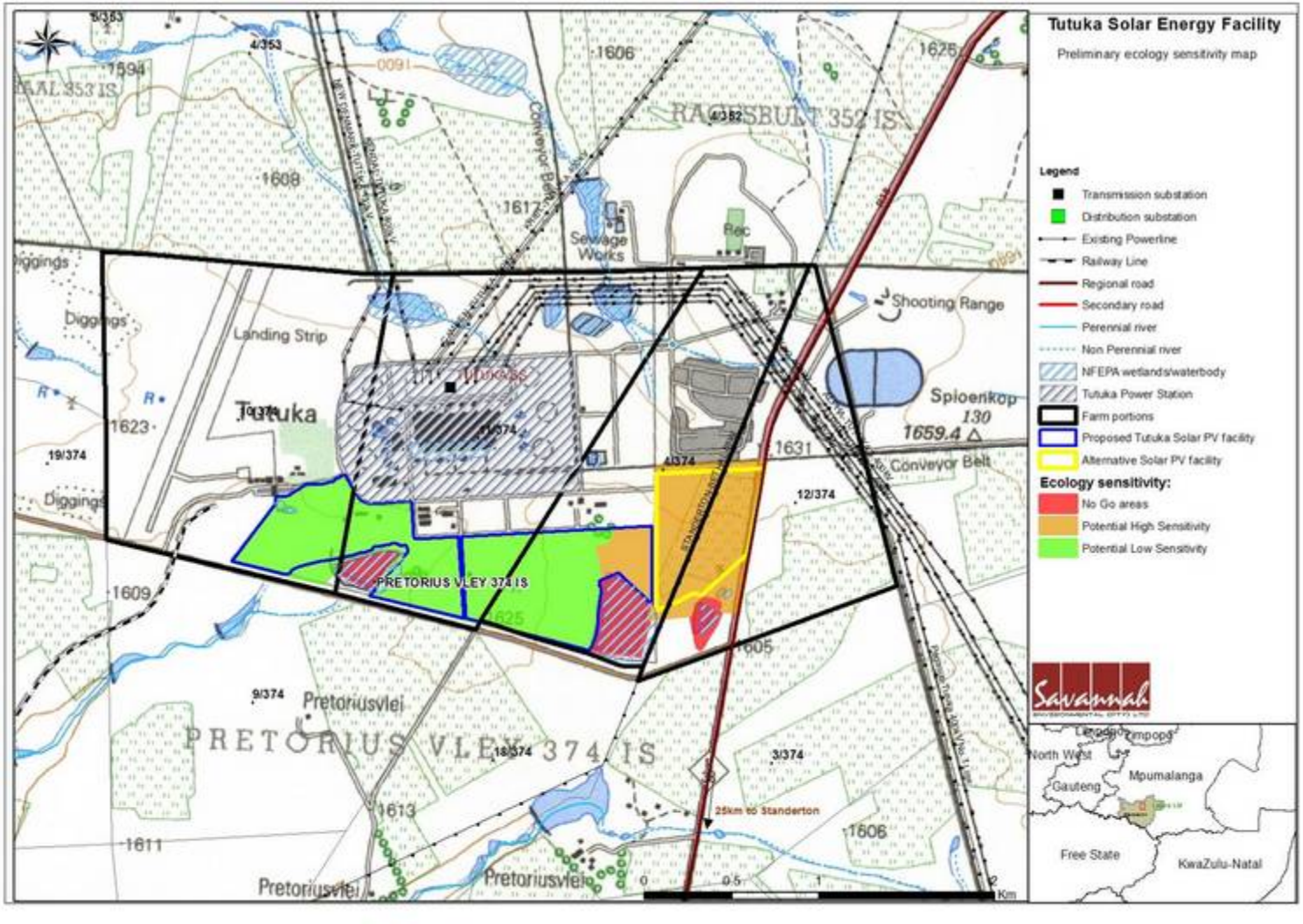

Figure 5.2: Preliminary ecological sensitivity map of the study site and surrounding area

Table 5.2: Potential impacts on ecology

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**No-Go Areas**
	Construction Phase		
Disturbance or loss of indigenous natural vegetation	Construction of infrastructure may lead to direct loss of semi-natural vegetation, causing a reduction in the overall extent of specific species and vegetation cover. Consequences of the potential impact of loss of indigenous semi-natural vegetation occurring may include: » Increased vulnerability of remaining vegetation portions to future disturbance, including erosion; » General loss of habitat for sensitive species; » General reduction in biodiversity; » Disturbance to processes maintaining biodiversity and ecosystem goods and services; or » Direct loss of ecosystem goods and services. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	The only "no-go" areas so far identified are confirmed wetland areas outside the development site; areas of potential high sensitivity relate to the possible presence of a small seepage area and/or natural vegetation in a relatively intact natural state within the site. A more detailed investigation will be undertaken as part of the EIA phase.
Disturbance or loss of threatened / protected plants	Several protected or threatened plant species are expected to occur on and adjacent to the proposed development site. Flora is affected by loss or change of habitat due to infrastructure development, as plants are immobile. In the case of threatened plant species, a loss of a population or individuals could lead to a direct change in the conservation status of the species, possibly extinction. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations. Consequences of this may include: » Fragmentation of populations of affected species » Reduction in area of occupancy of affected species » Loss of genetic variation within affected species	Local	The only "no-go" areas identified to date are confirmed wetland areas. Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely.

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**No-Go Areas**
	» *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Loss of habitat for threatened and /or protected vertebrates	Threatened animal species are indirectly affected primarily due to loss or alteration of habitat. Animals are generally mobile and, in most cases, can move away from a potential threat. The biggest threat to any fauna species may come from collision with vehicles during construction, or getting trapped in excavations, or being killed intentionally (illegally) by construction staff. Threatened species include those classified as critically endangered, endangered, or vulnerable. For any other species, a loss of individuals or localised populations is unlikely to lead to a change in the conservation status of the species. However, in the case of threatened animal species, loss of a population or individuals could lead to a direct change in the conservation status of the species. This may arise if the proposed infrastructure is located where it will impact on such individuals or populations or the habitat that they depend on. Consequences may include: » Reduction in area of occupancy of affected species; and » Loss of genetic variation within affected species. There are some red data terrestrial vertebrate species that could occur in the study area. The presence of these red data fauna species must be confirmed. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	The only "no-go" areas identified to date are confirmed wetland areas. Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely.
Impact on surface water resources/wetlands	» Loss of riparian systems resulting from the physical removal of the narrow strips of riparian zones within the road crossings or at pylon positions, being replaced by hard engineered surfaces. This biological impact would	Local	The delineation of the study area has already taken larger mapped

Issue	Nature of Impact and Applicable listed activities (GN 544, 545 &546 of 18 June 2010)	Extent of Impact	No-Go Areas
	however be localised, as a large portion of the remaining catchment would remain intact. » Increase in sedimentation and erosion within the development footprint » The generally low slopes and soil conditions in the area have, over time, created several smaller wetlands – ranging from small depressions to larger seepage areas, vleis and wetlands, of which the exact nature and extent still needs to be determined during a detailed field visit. » Construction of the PV array, if it occurring within the immediate catchments of any of these wetland areas, would lead to some direct or indirect changes to the surface hydrology of these areas, but would not greatly affect the seepage of water into lower-lying wetlands. This effect on the hydrology of the larger landscape or loss of habitat for species that depend on this habitat type should be minimal, if a suitably wide buffer zone will be maintained between the wetlands and the proposed development. Further recommendations will depend on the wetland study during the EIA phase. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		wetlands into consideration, but smaller wetlands may still exist within the study area; the delineation of wetlands will have to be studied during a more detailed investigation undertaken as part of the EIA phase.
Establishment and spread of declared weeds and alien invader plants	Major factors contributing to the invasion by alien invader plants includes high disturbance (such as clearing for construction activities, disturbed servitudes next to transport routes or past cultivation) and unsustainable grazing practices. Exotic species are often more prominent near infrastructural disturbances than within less disturbed natural vegetation. Consequences of this may include: » Loss of indigenous vegetation; » Change in vegetation structure leading to change in various habitat characteristics;	Local	None

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**No-Go Areas**
	» Change in plant species composition; » Change in soil chemical properties; » Loss of sensitive habitats; » Loss or disturbance to individuals of rare, endangered, endemic and/or protected species; » Fragmentation of sensitive habitats; » Change in flammability of vegetation, depending on alien species; » Hydrological impacts due to increased transpiration and runoff; and » Impairment of wetland function. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Unexpected impacts	The chances for the following occurring are extremely small, but unexpected accidents do happen. During construction, clear method statements must be available to make it clear how to deal with the following immediately should these occur: » Any accidental spill of hydrocarbons (oil, fuel, etc.) » Any accidental spill of other chemicals » Any occurrence of wild fires	Local to regional	None
Operation Phase			
Disturbance or loss of indigenous natural vegetation due to shading	PV panels create large areas of intensive shade that will not be tolerated by most of the species present on site, as these have evolved with a high daily irradiance. Consequently, it can be expected that within the Solar Energy Facility footprint, species composition will change significantly. No locally representative studies or experiments have been undertaken up to date, thus it cannot be predicted which and what density of vegetation may persist. The majority of indigenous grasses, having the C_4 carbon-fixing mechanism, are	Local	The only "no-go" areas identified to date are confirmed wetland areas.

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**No-Go Areas**
	adapted to very high levels of irradiance. A sparser or less stable vegetation beneath the PV panels may: » Increase the magnitude of negative effects of disturbances to remaining vegetation, including erosion- and invasion risk; » Lead to a reduction in biodiversity and ecosystem resilience; » Increase habitat fragmentation (depending on location of impact); » Disturb processes maintaining biodiversity and ecosystem goods and services; or » Lead to a direct loss of ecosystem goods and services. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Impact on surface water resources/wetlands	» Impact on riparian systems through the possible increase in surface water runoff on riparian form and function. » Impact on localized surface water quality - During both preconstruction, construction and to a limited degree the operational activities, chemical pollutants (hydrocarbons from equipment and vehicles, cleaning fluids, cement powder, wet cement, shutter-oil, etc.) associated with site-clearing machinery and construction activities could be washed downslope via the ephemeral systems. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* *GN 546: 14(i)*	Local	The delineation of the study area has already taken larger mapped wetlands into consideration, but smaller wetlands may still exist within the study area; the delineation of wetlands will have to be studied during a more detailed investigation undertaken as part of the EIA phase.
Altered runoff patterns due to rainfall interception by PV panels and	PV panels create large surfaces of rainfall interception, concentrating rainfall at the edges from where it flows onto the ground in larger, concentrated quantities opposed to small drops being directly absorbed by the ground or	Local and surroundings	The only "no-go" areas identified to date are confirmed wetland areas.

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**No-Go Areas**
compacted areas	intercepted by vegetation. This may lead to a localised increase in runoff during rainfall events, which may result in accelerated erosion. Likewise, access roads and areas where soils have been compacted during construction will have a low rainfall infiltration rate, hence creating an increase in runoff. Runoff will thus have to be monitored and channelled where necessary to prevent erosion or degradation of lower-lying drainage lines, seepage areas, and rivers beyond the development area. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		Due to the previous transformation of most of the area, the presence of critical habitats for any species is unlikely.

Gaps in knowledge and recommendations for further study:

» The initial desk-top investigation of the study area indicates that placement of components of the solar energy facility could be on previously transformed semi-natural areas, but that there may also be small sections of vegetation with a high sensitivity value. However, it is not expected that the development will compromise the survival of any of the species of conservation concern, provided the final layout is designed in accordance to findings of a field investigation.
» The presence and delineation of all wetlands will need to be confirmed by a detailed wetland study.
» It must be noted that there is a possibility of species that have not been captured in the POSA SANBI species database for the area up to date, may in fact be found within the study area.
» A detailed ecological survey and sensitivity assessment will be undertaken during the EIA phase according to the methods outlined in Chapter 7.

5.2.3 Potential Impacts on Soil and Agricultural Potential

Much of the area comprises black or brown, structured clay soils, usually moderately deep. The moderately high rainfall in the area means that rain-fed cultivation can be successfully practiced on suitable soils. However, the high clay content and shrink-swell nature of these soils means that they have a tendency to become waterlogged and are often difficult to cultivate, despite a good degree of natural fertility. The landscape represented by land type **Ca1** is dominated by soils of moderate agricultural potential, but almost one-third of the area will have shallow or wetter soils, so more detailed survey investigation would be required to delineate the areas of the various soil types.

The major impact on the natural resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. With the possibility of moderate potential agricultural soils in the vicinity, this impact would in all probability have a degree of significance, although local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or less a natural state following rehabilitation, with little impact.

Table 5.4: Potential Impacts on Soil, Land Use and Agriculture

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
Construction Phase			
Loss of agricultural land use	Due to direct occupation by PV panels and other infrastructure, including roads, for the duration of the project. This will lead to land that is no longer available to be utilised due to construction of infrastructure. This will take affected portions of land out of agricultural production. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Site	None
Soil erosion	Due to alteration of the surface run-off characteristics, this may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None
Loss of topsoil	Due to poor topsoil management (burial, erosion, etc.) during construction related soil profile disturbance (levelling, excavations, road surfacing etc.) and resultant decrease in that soil's agricultural suitability. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None
Operation Phase			
Loss of agricultural land use	Loss of agricultural land use due to direct occupation by PV installation and other infrastructure, including roads, for the duration of the project.	Local	None

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	» *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Soil erosion	Due to alteration of the surface run-off characteristics, this may be caused by construction related land surface disturbance, vegetation removal, the establishment of hard standing areas and roads, and the presence of panel surfaces. Erosion will cause loss and deterioration of soil resources and may occur during all phases of the project. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None

Gaps in knowledge and recommendations for further study:

The area investigated is comprised of mainly moderately deep to deep soils, with a small percentage of shallow soils. As such, the area can be considered as moderate potential for agricultural purposes, taking into consideration the annual rainfall. Mitigation measures can be put in place to reduce the significance of certain impacts, such as erosion. These will be detailed in the EMPr for the project. A more detailed soil survey will be necessary to determine the detailed soil patterns that might not be obvious in this report, where the soil information is based on a reconnaissance scale survey, revealing only broad soil patterns. Detail regarding the above is provided in further detail in Chapter 7.

5.2.4 Potential impacts on Heritage & Paleontological and Resources

Paleontological impacts:
The effects of the required construction operations to the geological strata underlying the project area will be restricted to the Early Permian Vryheid Formation; this geological unit is known to be fossiliferous. The probability of the project resulting in a negative impact on the paleontological heritage of the Vryheid Formation has been assessed as moderate. Any negative impact on the fossil materials will potentially be highly significant due to the scientific and cultural importance of many of the fossils that may be expected to be present.

The entire surface extents of both alternative project areas have been extensively modified by human activity. Accordingly, there appears to be little chance of undamaged or *in situ* fossil materials existing at surface. As such there is little point to conducting a site investigation on either site prior to commencement of the construction phase of the project.

Heritage Impacts:
Based on the current information obtained for the area at a desktop level it is anticipated that any archaeological sites that occur within the proposed development area will have a Generally Protected B (GP.B) field rating and all sites should be mitigatable and no red flags are identified. Graves are of high social significance and can be expected anywhere in the landscape.

Table 5.5: Potential Impacts on Heritage & Paleonthology

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	Construction Phase		
Potential impacts on heritage resources	» Archaeology: Almost no archaeological sites are on record close to the study area. This does not mean that there are no sites but can be attributed to the lack of systematic research in the area. There is a low - medium likelihood of finding MSA material scattered over the study area. » Historical finds: Historical finds include middens, structural remains and cultural landscape. No homesteads/structures are visible on Google earth in the study area. Without a field survey it is not possible to determine if there are remnants of demolished buildings. » Burials and Cemeteries: Graves and informal cemeteries can be expected anywhere on the landscape and the location of any graves will have to be confirmed during a field visit. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None identified to date. To be confirmed during EIA Phase
Potential movement, damage, or destruction of fossil material	» Damage or destruction of fossil materials during the construction of project infrastructural elements to a maximum depth of those excavations. Many fossil taxa (particularly vertebrate taxa) are known from only a single fossil and, thus, any fossil material is potentially highly significant. Accordingly, the loss or damage to any single fossil can be potentially significant to the understanding of the fossil heritage of South Africa and to the understanding of the evolution of life on Earth in general. Where fossil material is present and will be directly affected by the construction of the project's infrastructural elements the result will potentially be the irreversible damage or destruction of the fossil(s). » Movement of fossil materials during the construction phase, such that they are no longer *in situ* when discovered. The fact that the fossils are not *in situ* would either significantly reduce or completely destroy their scientific	Local	None identified to date. To be confirmed during EIA Phase

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	significance. » The loss of access for scientific study to any fossil materials present beneath infrastructural elements for the life span of the existence of those constructions and facilities. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Operation Phase			
Potential impact on sense of place	The proposed solar energy facility and its infrastructure could directly impact on both the visual context and sense of place of historical sites. » *GN 544: 10 (i), 11(iii) (x) (xi), 18(1), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local and regional	None identified to date. To be confirmed during EIA Phase

Gaps in knowledge and recommendations for further study

In terms of the heritage, this scoping study revealed that a range of various heritage sites can occur in the greater area. Previous work in the area indicated that graves, historical structures as well as stone walled sites can be expected in the greater study area. Therefore in order to comply with the National Heritage Resources Act (Act 25 of 1999), it is recommended that a Phase 1 Archaeological Impact Assessment must be undertaken.

This desktop study has not identified any paleontological reason to prejudice the progression of the Tutuka Solar Energy Facility; subject to the recommended damage mitigation procedures being enacted as outlined in the Paleontological report **(Appendix G)**. No further detailed investigations are required.

5.2.5 Potential Visual Impacts

The nature of a view is generally more critical to areas that are associated with recreation, tourism and in areas where view is critical to land values. Sensitive receptors or places within the landscape which could be sensitive to landscape change due to current use include:

- Area Receptors which include;
  - Urban areas including Thuthukani. Should there be a significant impact on this area, it is possible that there could be significant objection from residents. However, should the development be visible it is also likely that residents would not be as sensitive to views of the development as people who are not associated with local industry would be.
  - Areas that is likely to be important for recreational use such as the Grootdraai Dam and surrounding areas approximately 8km to the south of the proposed development alternatives.
- Linear Receptors which include main routes through the area. It is likely that these routes will be mainly used by local people although the R38 and R39 are regional routes and are likely to carry a proportion of tourism / recreational related traffic.
- Point Receptors that include isolated and small groups of homesteads that are generally associated with and located within the Agricultural Landscape that surrounds the proposed development site.

The preliminary assessment indicates that:

- A recreational area to the south that is associated with the Grootdraai dam is outside the zone of theoretical visibility of both alternatives and is therefore unlikely to be impacted.
- The urban area of Thuthukani is outside the zone of theoretical visibility of both alternatives and is therefore unlikely to be impacted.

» The R38 Regional roads is inside the zone of theoretical visibility could be impacted whereas the R39 is outside the zone of theoretical visibility and is therefore unlikely to be impacted.
» There are a number of homesteads that are indicated as potentially being affected. Impacts on homesteads close and to the south of the proposed development could have high significance.

The Zones of Theoretical Visibility (ZTV) for site alternatives 1 and 2 have been assessed using Arc Spatial Analyst GIS and are represented in Figure 5.3 and Figure 5.4. The following can be deduced:

» Alternatives 1 and 2 will be visible over a similar area.
» The proposed development could be visible intermittently from as far as the visual horizon from the north.
» Neither alternative will be visible from the residential area of Thuthukani or the recreational area around Grootdraai Dam.
» Alternative 1 is likely to be visible over a slightly wider area to the south east of the site when compared with alternative 2.
» Alternative 2 is likely to be visible over a slightly greater area to the north of the site when compared with alternative 1.
» Both alternatives are likely to be visible from a small number of homesteads to the south and east of the proposed development sites.
» Neither alternative will be visible from the R39.
» Both alternatives will be visible from the R38 for a distance of approximately 5km in the vicinity of the Power Station.

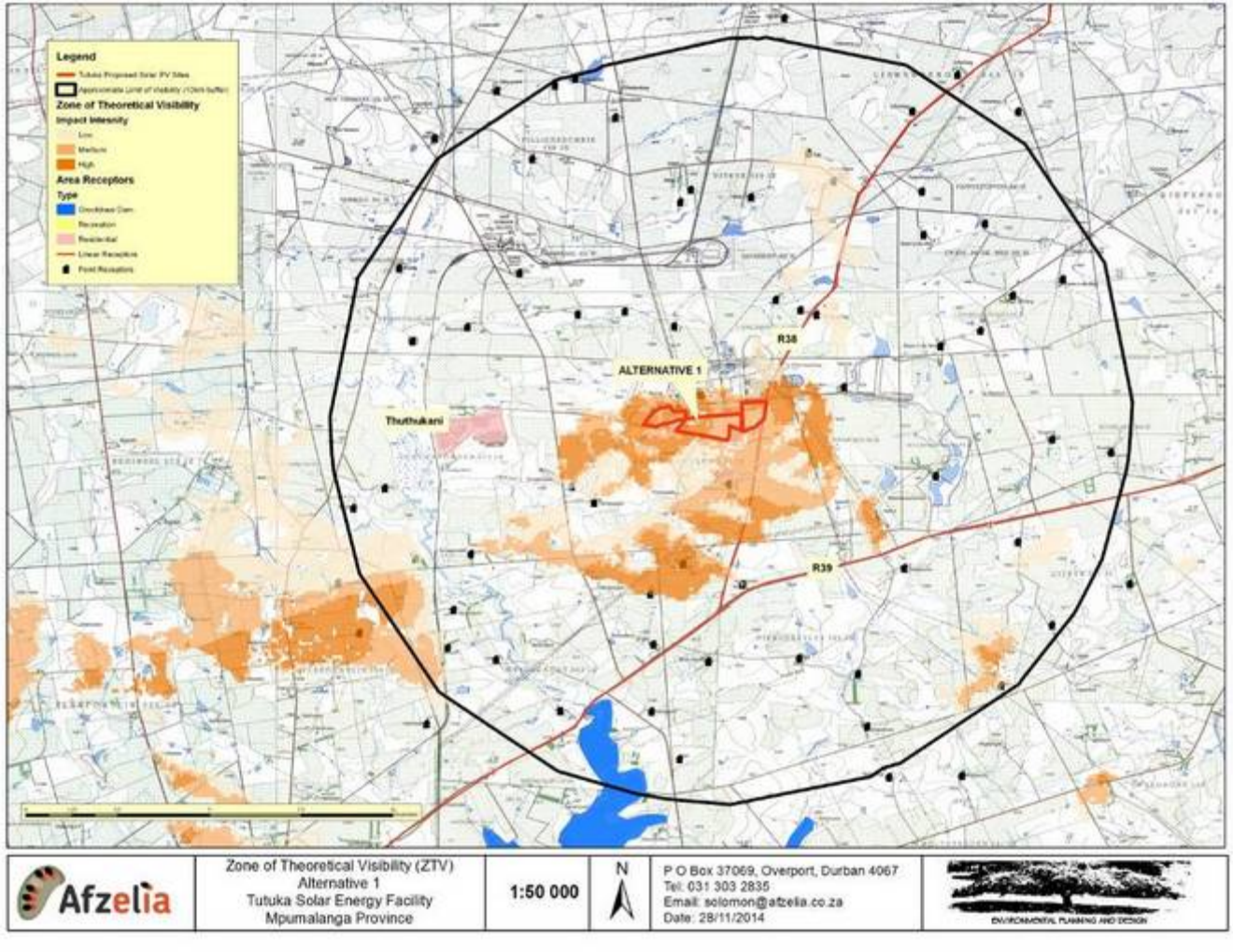

Figure 5.3: Zone of Theoretical Visibility – Alternative 1

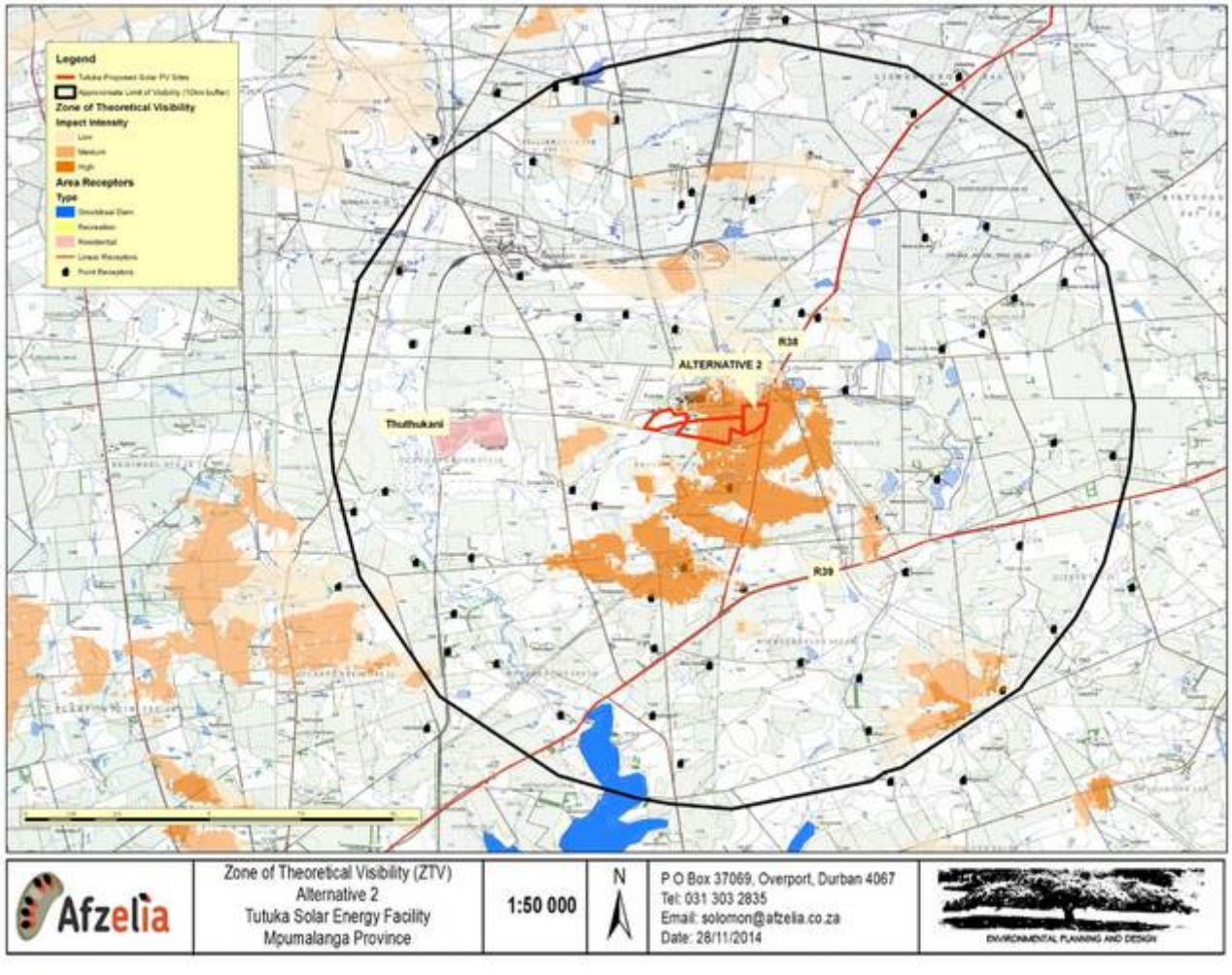

Figure 5.4: Zone of Theoretical Visibility – Alternative 2

Table 5.6: Potential visual impacts

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	Construction Phase		
Change of character of the broader landscape	» Construction is likely to be most obvious from within the Industrial Landscape within which it is proposed and from the Agricultural areas immediately surrounding it. Changes to these character areas due to construction are not likely to be significant. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None identified
Change in the nature of outlook for individual visual receptors	» It is possible that construction could impact on a small number of homesteads to the south and east of the development area. » It is possible that construction could impact on users of the R38. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	Not possible to confirm without a site visit, but unlikely.
	Operation Phase		
Change of character of the broader landscape	» The proposed development is likely to be most obvious from within the Industrial Landscape within which it is proposed and from the Agricultural areas immediately surrounding it. Changes to these character areas are not likely to be significant. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local	None identified
Change in the nature of outlook for individual visual receptors	» It is possible that the proposed development could impact on a small number of homesteads to the south and east of the development area.	Local	Not possible to confirm without a site visit, but unlikely.

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	» It is possible that the proposed development could impact on users of the R38. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		

Gaps in knowledge and recommendations for further study:

Whilst visual impacts are indicated as likely to be low due to the nature of the proposed development and the fact that there is potential to impact on a reasonably cohesive rural landscape. It is however recommended that a detailed assessment be undertaken within the EIA Phase in order to confirm the significance of impacts.

5.2.6 Potential Social Impacts

Potential impacts are expected to be both positive and negative. The potential positive social impacts during the construction phase are largely linked to the creation of employment and skills development opportunities. The potential negative impacts are linked to the impact on local road surfaces associated with the transport of heavy components and the impact on local communities and current farming activities associated with the presence of construction workers on the site.

During the operation phase the potential exists for further, albeit limited, job creation and some skills development (positive impacts). However, there is also the potential for impacts on the social dynamics of the study area due to the construction of the proposed project. On a regional scale, the operation of the project could potentially result in positive changes in the quality of lives of many by means of strengthening the current electricity supply for the greater area. On a national scale, the proposed project could assist in meeting the government's target for renewable energy.

A number of key social issues are potentially associated with the construction and operation of the solar energy facility as noted in Table 5.7.

Table 5.7: Potential social impacts

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
	Construction phase		
Socio-economic benefits (positive impacts)	» Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard. » It is anticipated that the more skilled positions could be filled by individuals from the broader country. » Should employment be linked to training and capacity building it would further the positives in this regard. » At this stage it is not anticipated that local procurement would be achievable for the technology requirements associated with a project of this nature. Local procurement would be more focused on the procurement of general construction materials, goods and services. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local and regional	N/A
Negative socio-economic impacts	» A large number of construction vehicles utilising the regional road of the R38 and internal access roads for a period of 18-24 months during the construction phase could have a negative impact on the roads. Construction vehicles crossing over the roads to access the site could increase the risk of accidents as well as continuous utilisation of the road over the construction period with heavy construction vehicles could increase the wear and tear on the R38 and internal access roads. » An influx of workers and jobseekers to an area (whether locals are employed or outsiders are employed) could increase the safety risks in the local area and have an impact on the local social dynamics. Should locals be employed it could minimise the perceived and actual risk in this regard. » An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed. Therefore	Local and regional	N/A

Issue	Nature of Impact and Applicable listed activities (GN 544, 545 &546 of 18 June 2010)	Extent of Impact	'No go' areas
	introducing an external workforce to the local area will put pressure on local services and local community. This would, however, also depend on the size of the workforce. » During the construction phase adjacent landowners could be negatively affected by the dust and noise created as a result of the construction activities. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*		
Operation phase			
Socio-economic benefits (positive impacts)	» During the operational phase employment opportunities would be created which could result in benefits to unemployed individuals within the local communities. » Capacity building and skills development throughout the life of the facility could be to the benefit of the employees and could assist them in obtaining transferable skills. » During the operational phase local procurement for general materials, goods and services (e.g. transport, catering and security) and other spin-off benefits could materialise. » The presence of permanent security personnel at the facility could be beneficial to the overall security measures implemented in the area. » The proposed project could assist in the generation of "green energy" which would lessen South Africa's dependence on coal generated energy and the impact of such energy sources on the bio-physical environment. The project thereby providing clean, renewable energy supply. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local and Regional	N/A

Issue	**Nature of Impact** and **Applicable listed activities (GN 544, 545 &546 of 18 June 2010)**	**Extent of Impact**	**'No go' areas**
Negative socio-economic impacts	» The permanent visual impact associated the solar energy facility (solar facility / access roads / firebreaks and so forth) would alter the landscape. Perceptions with regards to the intensity of such an impact are expected to differ among landowners, stakeholders and other individuals. It is anticipated that each person would experience such an impact in a different way depending on their perception of solar energy facility itself, the activities undertaken on the surrounding area, their interest in the project and their exposure to the project on a daily basis. The proposed development is located in an industrial area so the visual implications and impact on sense is predicted to be of low significance. » The facility could increase the risk of veld fires in the area. » The distribution power line required to evacuate power into the Eskom grid via the one of the substations near the proposed facility could further the negative visual impacts on the landscape. » *GN 544: 10 (i), 22 (ii), 29 (ii) & 47(ii)* » *GN 545: 1 & 15* » *GN 546: 14(i)*	Local and Regional	N/A

Gaps in knowledge and recommendations for further study:

The identification and assessment of social impacts will be guided by the Guidelines for specialist SIA input into EIAs (adopted by DEA&DP in the Western Cape in 2007 and supported by DEA). The approach will include:

» Review of existing project information, including the Planning Documents;
» Collection and review of reports and baseline socio-economic data on the area (IDPs, Spatial Development Frameworks etc.);
» Site visit and interviews with key stakeholders in the area including local land owners and authorities, local community leaders and councillors, local resident associations and residents, local businesses, community workers etc.;
» Identification and assessment of the key social issues and opportunities;
» Preparation of Draft Social Impact Assessment (SIA) Report, including identification of mitigation/optimisation and management measures to be implemented; and
» Finalisation of the SIA Report.

5.3 Cumulative impacts

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

» Cumulative impacts associated with the scale of the project.
» Cumulative impacts associated with other relevant approved or existing solar developments/power generation facilities within 30 km radius of the proposed facility.

Most development impacts are indirect, subtle, and cumulative or unfold over several years following construction or commencement of the operation of the development. While a possible mechanism for an impact to occur can usually be identified, the actual likelihood of occurrence and its severity are much harder to describe (Hill and Arnold, 2012).

There are no other solar developments in the study area, but the presence of the existing Tutuka Power Station in close proximity to the site could result in cumulative impacts. Based on the outcomes of the desk-top scoping study, the

anticipated cumulative impacts on agricultural resources, ecology, heritage sites, and visual and social receptors are not considered to be of high significance, these are summarised as follows:

Ecological impacts: Renewable energy facilities generally results in permanent loss of land on a site. Any impacts on natural vegetation in this area are considered significant. Therefore, numerous developments (regardless of their nature) within the study area are expected to have an impact on vegetation at a regional level. However, it must be noted that this impact can be effectively avoided through the placement of infrastructure outside of natural vegetation and sensitive habitats, where possible.

Avifauna Impacts: Cumulative impacts on avifauna are expected to be as a result of habitat loss, and impacts associated with power lines (i.e. collisions and electrocutions). Impacts associated with the proposed project are expected to be low, subject to implementation of mitigation measures at the site, considering the existing industrial structures and the number of existing Eskom power lines and railway line infrastructure that are present close to the project site. The existing infrastructure has already impacted on the environment used by birds, and they would have adjusted to these changes to some extent. The project presents a consolidation of impacts in one area to some extent. However, the development of the project would contribute to the cumulative loss of habitat for birds in the area.

Agricultural resources: Permanent loss of land on a site for the PV facility could lead to an increase in soil erosion. Mitigation measures are required for the impacts associated with erosion and the possible loss of agriculture land. The proposed site is considered as moderate potential for agricultural purposes; however the land is vacant and not used for any agricultural purposes.

Heritage impacts: Cumulative impacts in terms of archaeological contexts are once-off permanent destructive events. Infrastructure development may lead to spatially extended impacts in the vicinity, hence the need to demarcate areas for zero impact. Cumulative negative impacts on heritage resources (including archaeological and paleontological sites) are expected to be of low significance provided such sites are avoided by development. Positive impacts could result as the potential for the discovery of heritage artefacts in the region will increase with the increased numbers of developments in the area.

Visual impacts: This relates to a relatively low level of additional visual intrusion seen in the context of the large level of intrusion due to existing major industrial elements, cumulative impacts of this new development to the larger area is likely to have low or no influence on the nature of the area due to heavy industrial and large mining areas located next to the project site. Existing

industrial structures are likely to provide significant screening particularly from middle distance and distance views. From a distance small scale development may also be viewed against a backdrop of larger industry which is also likely to make it less obvious.

Social impacts: The development of numerous an additional industrial facilities within the study area will have a cumulative impact on several existing issues within the area, predominately within rural settlements associated with the potential influx of workers and job seekers. With the increased population density, this may lead to a cumulative impact on housing requirements, services (i.e. water, electricity and sanitation), health issues, safety and security. The main social impact, however, will be the increased traffic into the area as a result that coal is currently trucked to the site which may impact on the conditions of the local roads.

Positive impacts: Cumulative positive impacts are, however, also anticipated. The proposed construction will result in job creation opportunities, business opportunities for local companies, skills development and training. The development of renewable energy facilities will have a positive impact at a national and international level through the generation of "green energy" which would lessen South Africa's dependency on coal generated energy and the impact of such energy sources on the bio-physical environment. The proposed project would fit in with the government's aim to implement renewable energy projects as part of the country's energy generation mix over the next 20 years as detailed in the Integrated Resource Plan (IRP).

CONCLUSIONS CHAPTER 6

Eskom Holding SOC Ltd is proposing to establish a 65.9MW photovoltaic solar energy facility and associated infrastructure on a site within the Tutuka coal fired power station boundary, approximately 28 km north-east of Standerton in Mpumalanga Province.

This Scoping Report aimed at detailing the nature and extent of the Solar Energy Facility on the proposed study area, identifying potential issues and impact associated with the proposed project, and defining the scope of the studies required within the EIA. This was achieved through an evaluation of the proposed project, involving the project proponent, specialist consultants, and a consultation process with key stakeholders and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the "do nothing" option) have been identified for consideration within the EIA process.

The conclusions and recommendations of this Draft Scoping Report are the result of desk-top evaluations, on-site inspections of impacts identified by specialists, and the parallel process of public participation. Through the public consultation process every effort is being made to include representatives of all stakeholder groupings in the study area and the Province.

A summary of the conclusions of the evaluation of the proposed Tutuka PV Solar Energy Facility project is provided below. Recommendations regarding investigations required to be undertaken within the EIA are provided within the Plan of Study for EIA, contained within Chapter 7 of this report.

6.1. Conclusions drawn from the Evaluation of the Proposed Site for Development of a Solar Energy Facility

The proposed **Tutuka PV Solar Energy Facility** is expected to have a net generating capacity of up to 65.9 MW and includes the following associated infrastructure:

» Solar panels (fixed/tracking technology) with an export capacity of up to 65.9MW.
» Mounting structures for the solar panels to be rammed steel piles or piles with pre-manufactured concrete footings, alternative making use of ground screws to support the PV panels.

- Central invertor/transformer stations to collect all energy generated from the PV panels. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- An on-site substation or switching station.
- A power line to facilitate the connection of the solar energy facility from the on-site substation to Tutuka power station or nearest grid connection within the Tutuka power station.
- Internal access roads
- Associated buildings including a workshop area for maintenance, storage, and control facility with basic services such as water and electricity

Two alternative sites are being considered for the proposed project – the alternative site 1 with a development footprint of approximately 99ha and alternative site 2 of approximately 36ha (which would accommodate a smaller facility if selected). The majority of potential impacts identified to be associated with the construction and operation of the proposed solar energy facility are anticipated to be localised and restricted to the development footprint. A more accurate understanding of the final development footprint will be obtained during the EIA Phase with the availability of a facility layout plan and detailed specialist investigations.

The key issues and potential impacts identified through this scoping study associated with the Tutuka PV Solar Energy Facility project are summarised in Table 6.1

Table 6.1: Summary of the potential impacts associated the Tutuka PV Solar Energy Facility development

Construction / Decommissioning Impacts	Extent
Habitat Loss	L
Disturbance and Displacement	L
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for threatened and /or protected vertebrates	L
Impacts on wetlands	L
Establishment and spread of declared weeds and alien invader plants.	L
Disturbance or loss of indigenous natural vegetation	L
Disturbance or loss of threatened / protected plants	L
Loss of habitat for threatened and /or protected vertebrates	L
Impacts on wetlands	L
Establishment and spread of declared weeds and alien invader plants.	L
Potential impacts on heritage resources	L
Potential movement, damage, or destruction of fossil material	L
Loss of agricultural land use	L
Soil erosion	L
Degradation of vegetation	L
Socio-economic benefits could accrue through job creation (primarily lower skilled levels) during the construction phase. The local community could thus benefit in this regard;	L-R
It is anticipated that the more skilled positions could be filled by individuals from South Africa;	L-R
An influx of an outside workforce could put pressure on municipal services, as indicated from the local policies reviewed	L
Visual impact of construction traffic, deliveries, laydown areas, accommodation, offices.	L
Impact on surface water resources (riparian systems)	L

Operational Impacts	Extent
Mortality as a direct collisions with solar panels	L
Collisions with power line infrastructure	L
Disturbance and Displacement	L
Disturbance or loss of indigenous natural vegetation due to shading	L
Altered runoff patterns due to rainfall interception by PV panels and compacted areas	L
Loss of agricultural land use	L
Soil erosion	L
Contribution of clean energy	N
Employment opportunities	L-R
General landscape degradation or changes to landscape character	L
Change to the views of visual receptors.	L
Impact on surface water resources (riparian systems)	L

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

As is evident from the table above, the majority of potential impacts identified to be associated with the construction of the Tutuka PV Solar Energy project are anticipated to be localised and restricted to the proposed site itself (apart from social impacts – job creation which could have more of a regional positive impact), while operational phase impacts range from local to regional and national (being the positive impact of contribution of clean energy as part of the energy mix in South Africa). The extent of all the above mentioned impacts will be further assessed in detail and confirmed.

The conclusions of the studies undertaken within this Scoping Study are as follows:

Avifauna: Given the presence of existing habitat degradation and disturbance associated with the mining and energy generation activities in the study area, it is anticipated that the proposed Tutuka Solar Photovoltaic Facility can be constructed at either alternative PV sites with acceptable levels of impact on the resident avifauna. Potential impacts that were identified relating to the PV plant itself are: bird collisions with PV panels; loss of habitat; disturbance; and the nesting of birds on plant infrastructure, of which habitat destruction is likely to be the most significant. Potential impacts of associated infrastructure include the following: collision of large terrestrial birds with overhead power lines; electrocution of birds on pylons; nesting of birds on pylons; habitat destruction and disturbance. Certain levels of habitat destruction and disturbance may also result from the construction of internal access roads, additional on-site substations and operations building.

Ecologically sensitive areas on the site: The Mpumalanga Biodiversity Conservation Plan classifies the western half of the study area as of Least Concern, whilst the roughly the eastern half of the study area is considered Important and Necessary for meeting biodiversity targets. Although most of the study area appears to have been previously disturbed, the actual state of the ecosystem will have to be studied in detail during the peak growing season, before a definite assessment statement can be made as to the ecological impact of the proposed development. The largest concerns currently identified are:

» All wetland areas on and adjacent to the study area will have to be delineated to determine suitable buffer areas between them and the proposed development
» The ecological state of the vegetation of the study area, on especially the eastern part regarded as Important and Necessary to meet Mpumalanga Biodiversity Targets, needs to be assessed in detail to correctly identify its conservation status/irreplaceability rating
» Depending on the state of the vegetation in the eastern portion of the study area, all or parts thereof may not be regarded suitable for the proposed development.

- All indigenous and alien invasives, weeds and potential invasives within the development area will have to be cleared prior to development and controlled after construction until decommissioning
- An ongoing monitoring program will be necessary to control and/or eradicate newly emerging invasives
- Newly cleared soils will have to be revegetated and stabilised as soon as construction has been completed
  - Soils are prone to capping and erosion and need to be stabilised by a permanent grass or suitable indigenous vegetation layer.
  - Many of the naturally occurring grass species become moribund and die off if not grazed or burnt regularly. It is thus recommended to implement a regular mowing program (to replace the effect of grazing and burning) to reduce dead biomass accumulation on grass tufts. This will also greatly reduce the risk of fire, which is a natural component of grassland dynamics.

Heritage and palaeontology: This desktop study has not identified any paleontological reason to prejudice the progression of the Tutuka Solar Energy Facility within either the alternative locations, subject to the recommended damage mitigation procedures being enacted. The geological strata underlying the project area will be restricted to the Early Permian Vryheid Formation; this geological unit is known to be fossiliferous. The probability of the project resulting in a negative impact on the palaeontological heritage of the Vryheid Formation has been assessed as moderate.

This scoping study revealed that very few known heritage sites occur in the larger region but this can be attributed to a lack of research in the area. Every site is relevant to the Heritage Landscape, but it is anticipated that no site in the study area could have conservation value. The following conclusions are applicable to the following sites:

- Archaeological sites: If any sites occur in the study area they could be mitigated either in the form of conservation of the sites with in the development or by a Phase 2 study where the sites will be recorded and sampled before the client can apply for a destruction permit for these sites prior to development.
- Historical finds and Cultural landscape: No structures occur in the study area however this assumption will have to be verified in the field.
- Burials and cemeteries: Formal and informal cemeteries as well as pre-colonial graves occur widely across Southern Africa. It is generally recommended that these sites are preserved with in a development. These sites can how ever be relocated if conservation is not possible, but this option must be seen as a last resort and is not advisable. The presence of any grave sites must be confirmed during the field survey and the public consultation process.

Soils & agricultural potential: The major impact on the natural resources of the study area would be the loss of arable land due to the construction of the various types of infrastructure. With the possibility of moderate potential agricultural soils in the vicinity, this impact would in all probability have a degree of significance, although local in extent.

Social impacts: The most important potential social benefits associated with the construction and operations of the project refer to the job opportunities and possible socio-economic spin-offs created. New economic activities such as this project having the potential to assist with the developmental challenges that much of province is faced with, providing employment and skills development to local community and contributing to the social, economic and institutional development of the local area. The benefit of employment opportunities and disposable income in the local project area has the opportunity to improve levels of health, education and service delivery with the exposure to such opportunities. Additional employment and associated indirect economic benefits will maintain and improve the quality of life of these communities. Continued investment in the project area will also support development. The main negative impacts are associated with the influx of in-migrants and intrusion impacts associated with the construction phase and the visual impact of the facility and associated infrastructure while in operation, with possible subsequent negative social consequences and/or impacts.

Visual / Social Receptors: The brief assessment undertaken for the scoping stage indicates that because the project is proposed against the backdrop of the Tutuka Power Station which includes associated infrastructure such as internal buildings, HV overhead power lines, coal stockpiles, a PFA tip and above ground conveyors, visual impacts of the proposed solar array and associated infrastructure are generally unlikely to be significant.

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance although rural areas are clearly defined particularly from a distance and it is assumed that the majority of people would prefer rural views over views over heavy industry. Proposed development is likely to be viewed against the backdrop of existing industrial elements and so there is unlikely to be any significant further loss of the rural landscape character in the area.

In terms of visual intrusion or obstruction impacting on visual receptors, the initial investigation indicates that generally these impacts are not likely to be significant. However, there are a number of homesteads in close proximity to the proposed development and impacts on these needs to be investigated in detail in the field.

Whilst visual impacts are indicated as likely to be low, due to the nature of the proposed development and the fact that there is potential to impact on a reasonably cohesive rural landscape, a detailed assessment is recommended.

Environmental fatal flaws: At this stage, no fatal flaws have been identified to be associated with the Tutuka PV Solar Energy Facility on site portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS, next to the Tutuka power station. Further investigation is required. It is recommended that the proposed site can be considered in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

Areas of potential environmental sensitivity were identified through the scoping phase. These are shown in Figure 6.1. These include depressions, seepage areas and wetlands such as dams and vleis, as well as possibly intact natural vegetation.

The sensitivity map indicates potentially sensitive areas identified through scoping within which more detailed investigation is required. These potential sensitive areas will, therefore, be further investigated and assessed through detailed specialist studies (including field surveys) during the EIA phase of the process (refer to Chapter 7 for more details). The sensitivity map will be further refined in the EIA phase on the basis of these detailed specialist studies, in order to inform the final design of the facility. In order to assess potential impacts within sensitive areas, the preliminary layout for the solar energy facility will be based on sensitivities identified in the scoping phase, and provided for consideration in the EIA phase.

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

In order to connect the Tutuka PV Solar Energy Facility to the power grid, the Eskom intends on building on-site substation and power line for which will connect into the existing substation located on the site.

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

At this stage, there are no fatal flaws associated with the associated infrastructure of the Tutuka PV Solar Energy Facility site on portions 4, 10, 11 and 12 of the farm Pretorius Vley 374 IS. Further investigation is required to confirm this. It is recommended that the proposed site can be considered in an EIA phase assessment according to the Plan of Study contained in this report (refer to Chapter 7).

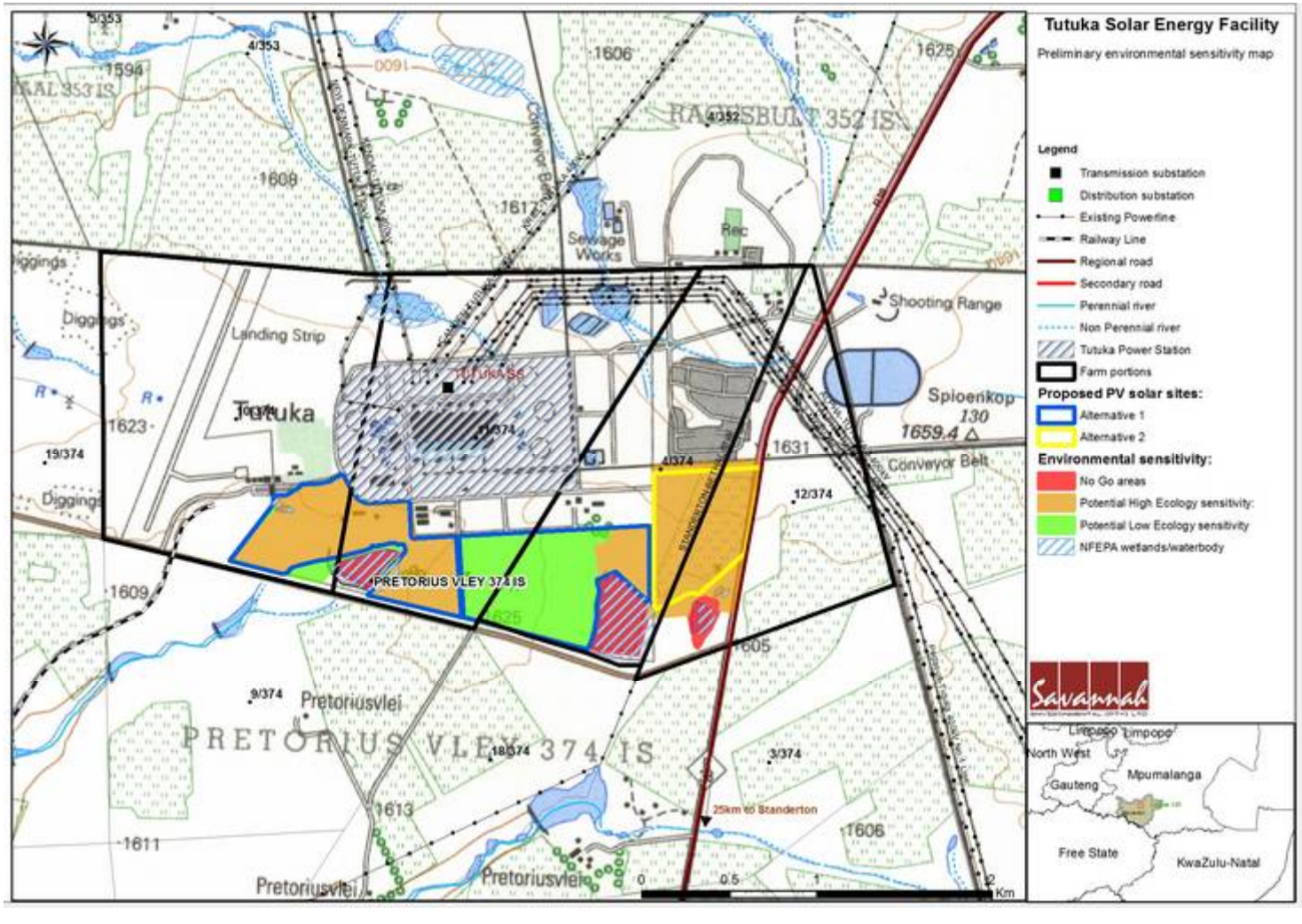

Figure 6.1: Desktop environmental sensitivity map of the proposed Tutuka PV Solar Energy Facility

PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT CHAPTER 7

This Draft Scoping Report includes a description of the nature and extent of the proposed Tutuka PV Solar Energy facility and associated infrastructure with details regarding the Scoping Phase, as well as the issues identified and evaluated through the Scoping Phase. This chapter provides the Plan of Study for the Environmental Impact Assessment (EIA) which is relevant to both the development of the solar facility and the proposed power line.

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

7.1. Aims of the EIA Phase

The EIA Phase will aim to achieve the following:

» Provide an overall assessment of the social and biophysical environment affected by the Tutuka PV Solar Energy Facility (including associated infrastructure) and its associated infrastructure.
» Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the Tutuka PV Solar Energy Facility (including infrastructure) and its associated infrastructure.
» Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
» Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA will address potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with Tutuka PV Solar Energy Facility and its associated infrastructure, including design, construction, operation and decommissioning; and will aim to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project. All feasible alternatives (including the 'do nothing' alternative) will be assessed.

7.2. Authority Consultation

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

» Submission of a Final Scoping Report following a 30-day public review period of this draft scoping report (and consideration of comments received).
» Submission of a Final EIA Report following a 30-day public review period of the draft EIA Report.
» A consultation meeting and site visit with DEA and DEDET in order to discuss the findings and conclusions of the EIA Report.

7.3. Consideration of Alternatives

The following project alternatives will be investigated in the EIA Phase:

» **The 'do nothing' alternative:** Eskom does not establish the proposed Tutuka PV Solar Energy Facility on the Tutuka power station.
» **Site Alternatives:** A study area of approximately 99ha just south of the Tutuka Power Station (alternative site 1), with an additional 36ha south-east of the power station (alternative site 2) will being investigated.
» **Layout/design alternatives:** In terms of the design of the facility, feasible alternatives in terms of the layout of the PV panels and corridors/servitudes for associated infrastructure such as the access roads and power line will be considered.
» **Alternative technology combinations:** The facility is proposed to consist of photovoltaic **(PV) panels** (the preferred technology (static or tracking) is to be confirmed in the EIA phase) with a net generating capacity of up to 65.9MW.

7.4. Assessment of Potential Impacts and Recommendations regarding Mitigation Measures

Based on the findings of the Scoping Study, the following issues were identified as requiring no further investigation within the EIA:

Palaeontology:
The desktop study conducted by Dr Barry Millstead has not identified any paleontological reason to prejudice the progression of the Tutuka Solar Energy Facility within either the preferred project location, subject to the recommended

damage mitigation procedures being implemented. The entire surface extents of both alternative project areas have been extensively modified by human activity. Accordingly, there appears to be little chance of undamaged or in situ fossil materials existing at surface. As such there is little point to conducting a site investigation on either site prior to commencement of the construction phase of the project.

Based on the findings of the Scoping Study, the following issues were identified as requiring further investigation within the EIA:

Table 7.1: Issues requiring further investigation during the EIA Phase and activities to be undertaken in order to assess the significance of these potential impacts relevant to Tutuka PV Solar Energy Facility.

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
Avifauna	The following is recommended for the EIA phase of this avifaunal study: » Approximations of bird community structure of the proposed development site and immediate environs through standard survey techniques (i.e. point-counts or line transects). » Identification of risk-categories of bird functional groups, relative to their range, foraging behaviour and habitat fidelity. » Identification of resident' species by conducting thorough nest searches and proving breeding attempts per species. In order to confirm breeding attempts it is vitally important that the site visit be scheduled in the appropriate seasons. » The micro habitats on site will be assessed for their suitability for the key species, » A personal observation list of species recorded whilst on site will be compiled. » The literature review will be revised. » All identified direct, indirect and cumulative impacts will be rated according to a pre-determined set of criteria, as supplied by Savannah Environmental (Pty) Ltd (refer to Section 7.5). » The sensitivity zones and suitable buffer zones will be identified and mapped. » Where necessary and possible recommended mitigation measures for the management of the identified impacts will be developed and described.	Megan Diamond o Feathers Environmental Services
Ecology (Flora and fauna)	As part of the EIA process, a field survey of the vegetation will be undertaken, and results will include: » As part of the EIA process, a detailed field survey of the vegetation will be undertaken, preferably between February to April, and results will include: * A phytosociological classification of the vegetation found on the study area according to vegetation survey data and its TWINSPAN analysis * A corresponding description of all defined plant communities and their typical habitats, including a full species list for each plant community and a representative photographic record taken on site of each community * A map of all plant communities within the boundaries of the study area * A description of the sensitivity of each plant community, based on sensitivity criteria	Marianne Strohbach of Savannah Environmental

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	* A full assessment of direct, indirect and cumulative impacts * There are some red data terrestrial vertebrate species that could occur in the study area. The presence of these red data fauna species will be confirmed during the site visit.	
Wetlands	The delineation method documented by the Department of Water Affairs and Forestry (2005), will be followed throughout the field survey. This guideline describes the use of indicators to determine the outer edge of the wetland and riparian areas such as soil and vegetation forms as well as the terrain unit indicator. A hand held GPS will be used to capture GPS co-ordinates in the field. 1:50 000 cadastral maps and recent aerial imagery will be used as reference material for the mapping of the preliminary wetland boundaries. These will be converted to digital image backdrops and delineation boundaries will be imposed accordingly after the field survey.	Robert Taylor of Limosella Consulting
Soils & Agricultural potential	The landscape represented by land type Ca1 has a great mixture of agricultural potential, so more detailed survey investigation would be required to delineate the areas of the various soil types. The above requirements together with requirements for an EIA specialist report includes: » Identify and assess all potential impacts (direct, indirect and cumulative) and economic consequences of the proposed development on soils and agricultural potential. » Describe and map soil types (soil forms) and characteristics (soil depth, soil colour, limiting factors, and clay content of the top and sub soil layers). » Map soil survey points. » Describe the topography of the site. » Do basic climate analysis and identify suitable crops and their water requirements. » Summarise available water sources for agriculture. » Describe historical and current land use, agricultural infrastructure, as well as possible alternative land use options. » Describe the erosion, vegetation and degradation status of the land. » Determine and map, if there is variation, the agricultural potential across the site. » Provide recommended mitigation measures, monitoring requirements, and rehabilitation guidelines for all identified impacts.	Garry Patterson of ARC-Institute for Soil, Climate and Water
Archaeology, Heritage and Palaeontology	The following methodology will be adopted for the EIA phase study to assess direct, indirect and cumulative impacts on heritage resources:	» Jaco van der Walt of Heritage Contracts and Archaeological

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	Archaeology and Heritage: » This scoping study revealed that a range of various heritage sites can occur in the greater area. Previous work in the area indicated that graves, historical structures as well as stone walled sites can be expected in the greater study area. Therefore in order to comply with the National Heritage Resources Act (Act 25 of 1999) a Phase 1 Archaeological Impact Assessment must be undertaken. During this study sites of archaeological, historical or places of cultural interest must be located, identified, recorded, photographed and described. During this study the levels of significance of recorded heritage resources must be determined and mitigation proposed should any significant sites be impacted upon, ensuring that all the requirements of SAHRA are met.	Consulting
Visual Impacts	The following methodology will be used in preparation of the VIA report. » Identification of issues raised in scoping phase, and site visit: Likely issues have already been identified in this scoping analysis. These issues will be verified from a site visit as well as response from stakeholders to the scoping documentation. » Description of the receiving environment and the proposed project. The receiving environment has been described and categorised. This will be verified from a site visit. » Establishment of view catchment area, view corridors, viewpoints and receptors Zones of theoretical visibility and visual receptors have been established from GIS analysis. These will be verified from a site visit. Viewpoints will be identified from a site visit to represent views of visual receptors. » Indication of potential visual impacts using established criteria. Areas of likely visual impacts have been identified and described from this scoping exercise. These impacts will be verified from a site visit.	John Marshall of Afzelia Environmental Consultants and Environmental Planning and Design
Social Impacts	The main aim for the social report will be to determine the social impacts that may arise from the proposed development. The proposed approach that will be used for the SIA study will be based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on the international best practice, the key objectives in the SIA process will include: » Describing and obtaining an understanding of the proposed development (type, scale, location), the communities likely to be affected and determining the need and scope of the	Candice Hunter of Savannah Environmental and Anton Pelser (external review)

Issue	Activities to be undertaken in order to assess significance of impacts	Specialist
	SIA; » Collecting baseline data on the current social environment and historical social trends; » Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities; » Assessing and documenting the significance of direct, indirect and cumulative social impacts associated with the proposed project; » Assessing the project (including any feasible alternatives) and identifying potential mitigation and enhancement measures; » Developing an Environmental Management Programme.	
Cumulative impact assessment	» Assess the potential for cumulative impacts associated with combined visibility for two or more solar facilities from one location. » Asses the sequential visibility (e.g. the effect of seeing two or more solar facilities along a single journey, e.g. road or walking trail) » Consider the potential impact of solar facilities on the landscape, specifically given South African's strong attachment to the land and the growing number of solar plant applications. » Identify significant positive cumulative impacts, specifically the establishment of a number of renewable energy facilities in the Gert Sibanda LM, will create a number of socio-economic opportunities for the region, which, in turn, will result in a positive social benefit. » Address the cumulative impacts associated with the construction of multiple facilities (i.e. solar developments/power generation facilities) within approximately 30km from the study area on the ecological, heritage, soil and agricultural potential and avifaunal impacts of the area once a preliminary layout is available.	Savannah Environmental

7.5. Methodology for the Assessment of Potential Impacts

Direct, indirect and cumulative impacts of the above issues, as well as all other issues identified will be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional:
  - Local extending only as far as the development site area – assigned a score of 1;
  - Limited to the site and its immediate surroundings (up to 10 km) – assigned a score of 2;
  - Will have an impact on the region – assigned a score of 3;
  - Will have an impact on a national scale – assigned a score of 4; or
  - Will have an impact across international borders – assigned a score of 5.
- The **duration**, wherein it will be indicated whether:
  - The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - Medium-term (5–15 years) – assigned a score of 3;
  - Long term (> 15 years) - assigned a score of 4; or
  - Permanent - assigned a score of 5.
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment;
  - 2 is minor and will not result in an impact on processes;
  - 4 is low and will cause a slight impact on processes;
  - 6 is moderate and will result in processes continuing but in a modified way;
  - 8 is high (processes are altered to the extent that they temporarily cease); and
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
  - Assigned a score of 2 is improbable (some possibility, but low likelihood);
  - Assigned a score of 3 is probable (distinct possibility);
  - Assigned a score of 4 is highly probable (most likely); and
  - Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).

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

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

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

S = Significance weighting
E = Extent
D = Duration
M = Magnitude
P = Probability

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

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

As Eskom has the responsibility to avoid and/or minimise impacts as well as plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts will be discussed. Assessment of mitigated impacts will demonstrate the effectiveness of the proposed mitigation measures.

The results of the specialist studies and other available information will be integrated and synthesised by the Savannah Environmental project team. The EIA Report will be compiled, and will include:

» **Detailed description** of the proposed activity
» A description of the property(ies) on which the activity is to be undertaken and the location of the activity on the property(ies)
» A description of the **environment that may be affected by the activity** and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
» Details of the **public participation process** conducted, including:

  - Steps undertaken in accordance with the plan of study for EIA;
  - A list of persons, organisations and Organs of State that were registered as interested and affected parties;
  - A summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response to those comments; and
  - Copies of any representations, objections and comments received from registered interested and affected parties
- A description of the **need and desirability** of the proposed project and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity
- An indication of the methodology used in determining the **significance** of potential environmental impacts
- A description and comparative **assessment of all alternatives** identified during the environmental impact assessment process
- A summary of the findings and recommendations of **specialist reports**
- A description of all environmental issues for each phase of the project that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures
- An assessment of each identified potentially significant impact
- A description of any assumptions, uncertainties and gaps in knowledge
- an environmental **impact statement** for each Phase of the project which contains:
  - A summary of the key findings of the environmental impact assessment; and
  - A comparative assessment of the positive and negative implications of the proposed activity and identified alternatives
- A draft **environmental management programme** for each phase of the project
- Copies of specialist reports

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

7.6. Public Participation Process

A public participation process will be undertaken by Savannah Environmental. Consultation with key stakeholders and I&APs will be on-going throughout the EIA Phase. Through this consultation process, stakeholders and I&APs will be encouraged to identify additional issues of concern or highlight positive aspects of

the project, and to comment on the findings of the EIA Phase. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their inputs regarding the project, various opportunities will be provided for stakeholders and I&APs to be involved in the EIA Phase of the process, as follows:

» Focus group or public meetings (pre-arranged and stakeholders invited to attend).
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants).
» Written, faxed or e-mail correspondence.

The Draft EIA Report will be made available for public review for a 30-day period prior to finalisation and submission to the DEA for review and decision-making. In order to provide an overview of the findings of the EIA process and facilitate comments, a public feedback meeting will be held during this public review period.

7.7. Key Milestones of the Programme for the EIA

The envisaged key milestones of the programme for the EIA Phase are outlined in the following table.

Key Milestone Activities	Proposed timeframe[5]
Public review period for Draft Scoping Report	17 March 2015 – 20 April 2015
Finalisation of Scoping Report, release of the Final Scoping Report to the public, and submission of the Final Scoping Report to DEA	April 2015
Authority acceptance of the Final Scoping Report and Plan of Study to undertake the EIA	within 30 days of acknowledgement of the Final Scoping Report
Undertake specialist studies and public participation process	March 2015 – May 2015
Make Draft EIA Report and Draft EMP available to the public, stakeholders and authorities	May 2015
Finalisation of EIA Report, release of the Final EIA Report to the public, and submission of the Final EIA Report to DEA	June 2015
Authority review period and decision-making	July 2015 – October 2014

[5] Indicative dates

REFERENCES *CHAPTER 8*

» Diamond, M. 2014. Avifaunal Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Strobach, M. 2014. Ecology Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Van der Walt, J. 2014. Heritage Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Millstead, B. 2014. Paleontological Impact Assessment (desktop) for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Marshall, J. *et al*. 2014. Visual Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Hunter, C. 2014. Social Impact Assessment (desktop) for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process

» Taylor, R. 2014. Wetland Scoping Report for the Proposed Tutuka PV Solar Energy Facility near Standerton, Mpumalanga Province, as Part of an Environmental Impact Assessment Process