ENVIRONMENTAL IMPACT ASSESSMENT PROCESS
FINAL ENVIRONMENTAL IMPACT REPORT

PROPOSED WOLMARANSSTAD 75MW SOLAR ENERGY FACILITY, NORTH WEST PROVINCE
(DEA Ref No: 14/12/16/3/3/2/716)

FINAL EIA REPORT
APRIL 2015

Prepared for:

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PROJECT DETAILS

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Title	:	Environmental Impact Assessment Process EIA Report: Proposed Wolmaransstad 75MW Solar Energy Facility, North West Province
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Client	:	Bluewave Capital SA (Pty) Ltd
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PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Bluewave Capital SA (Pty) Ltd (hereafter referred to as Bluewave) a Solar Developer, is proposing the establishment of a commercial solar electricity generating facility and associated infrastructure situated north-west of the town of Wolmaransstad, within the North West Province. The proposed project will have a maximum contracted capacity of up to 75 megawatts (MW) and will be known as the Wolmaransstad 75MW Solar Energy Facility. The project site falls within the jurisdiction of the Maquassi Hills Local Municipality which forms part of the Dr Kenneth Kaunda District Municipality (refer to Figure 1.1).

Bluewave has appointed Savannah Environmental as the independent Environmental Assessment Practitioner to undertake the Environmental Impact Assessment (EIA) for the proposed project. The EIA process has been undertaken in accordance with the requirements of the Department of Environmental Affairs (DEA) (as per the acceptance of Scoping) and the EIA Regulations of June 2010 (GNR543) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The EIA Report consists of nine chapters:

» Chapter 1 provides background and an introduction to the proposed project and the environmental impact assessment.
» Chapter 2 describes the proposed project and explains the overall project requirements from a technical perspective.
» Chapter 3 explains the regulatory and legal context for electricity generation projects and the EIA process.
» Chapter 4 explains the approach to undertaking the EIA phase.
» Chapter 5 describes the existing biophysical and socio-economic environment.
» Chapter 6 describes the assessment of environmental impacts associated with the proposed Wolmaransstad 75MW solar energy facility.
» Chapter 7 describes the assessment of cumulative environmental impacts associated with the proposed solar energy facility.
» Chapter 8 presents the conclusions of the impact assessment as well as an impact statement.
» Chapter 9 contains a list of references for the EIA report and specialist reports.

The Scoping Phase of the EIA process identified potential issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addresses those identified potential environmental impacts and benefits associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for

potentially significant environmental impacts. The EIA report aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

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

INVITATION TO COMMENT ON THE DRAFT EIA REPORT

Members of the public, local communities and stakeholders were invited to comment on the draft EIA Report which was made available for public review and comment at the following locations from **3 March 2015 - 15 April 2015.**

» Maquassi Hills Local Municipality Library – 19 Kruger Street.
» www.savannahSA.com

PUBLIC FEEDBACK MEETING

In order to facilitate comments on the Draft EIA Report and provide feedback on the findings of the studies undertaken, a public feedback meeting was held during the review period. All interested and Affected Parties are invited to attend the public meeting on 17 March 2015.

EXECUTIVE SUMMARY

Bluewave Capital SA (Pty) Ltd (hereafter referred to as Bluewave) a Solar Developer, is proposing the establishment of a commercial solar electricity generating facility and associated infrastructure situated north-west of the town of Wolmaransstad, within the North West Province.

The proposed Wolmaransstad 75MW Solar Energy Facility will make use of photovoltaic (PV) technology and will have a generating capacity of up to 75MW and will comprise of the following infrastructure:

» Photovoltaic (PV) panels of between 4m – 6m in height (fixed or tracking technology) with a contracted capacity of up to 75MW
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels
» Cabling between the project components, to be lain in trenches ~ 1-2m deep
» Power inverters between the PV arrays (±4.5m^2)
» Overhead power line to evacuate the power into the Eskom grid via the existing Goat DS 132/88kV Substation or the Wolmaransstad Municipality 88/11kV Substation
» Main and internal access roads (up to 7m wide)
» Water storage facility/ reservoir
» Office, workshop area for maintenance and storage
» Temporary laydown area
» Perimeter fencing

The nature and extent of this facility, as well as potential environmental impacts associated with the construction and operation of a facility of this nature are explored in more detail in this Environmental Impact Assessment (EIA) Report

OVERALL CONCLUSION (IMPACT STATEMENT)

From the assessment of potential impacts undertaken within this EIA, it is concluded that there are no environmental fatal flaws associated with the proposed site identified for the development of the Wolmaransstad 75MW Solar Energy Facility. Some areas of high sensitivity were however identified. In summary, the most significant environmental impacts associated with the project, as identified through the EIA, include:

» Potential impacts on flora and fauna
» Potential impact on listed floral species
» Potential impacts on the local soils, land capability and agricultural potential of the site
» Potential visual impacts
» Potential heritage impacts
» Potential social and economic impacts
» Potential cumulative impacts

OVERALL RECOMMENDATION

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the Wolmaransstad 75MW Solar Energy Facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the identified impacts can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

» Areas of very high ecological sensitivity determined through the EIA must be avoided as far as possible at the detail design stage.
» Following the final design of the facility, a final layout must be submitted to DEA for review and approval prior to commencing with construction.
» Alternative layout option 1 is the preferred alternative. Should there be a technical reason why layout option 1 cannot be developed, layout option 2 is also considered to be acceptable as it will result in a nominal increase in the number of listed species affected.
» Currently is anticipated that approximately 100 *Acacia erioloba* trees and other listed species could be affected by the proposed development. A site walk through should be undertaken by an ecologist to determine the position and number of listed species that will be affected by the facility footprint.
» An application must be made to the Department of Agriculture, Forestry and Fisheries and provincial conservation authority for the permitting of the removal or relocation of listed plants and trees.
» While no heritage sites were identified on the site, chance find procedures must be implemented to mitigate the potential discovery of informal graves.

TABLE OF CONTENTS

PAGE

APPENDICES

DEFINITIONS AND TERMINOLOGY

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

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

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

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

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

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

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

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

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

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

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

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

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

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

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

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

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

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

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

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

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

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

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

Riparian: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).

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.

Wetland: land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin et al., 1979).

Water course: as per the National Water Act means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CO_2	Carbon dioxide
DEA	National Department of Environmental Affairs
DEADP	Department of Environment Affairs and Development Planning
DoE	Department of Energy
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GHG	Green House Gases
GWh	Giga Watt Hour
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IPP	Independent Power Producer
km^2	Square kilometres
km/hr	Kilometres per hour
kV	Kilovolt
MAR	Mean Annual Rainfall
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NGOs	Non-Governmental Organisations
NWA	National Water Act (Act No. 36 of 1998)
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework

INTRODUCTION CHAPTER 1

1.1. Project Background

Bluewave Capital SA (Pty) Ltd (hereafter referred to as Bluewave) a Solar Developer, is proposing the establishment of a commercial solar electricity generating facility and associated infrastructure situated north-west of the town of Wolmaransstad, within the North West Province. The proposed project will have a maximum contracted capacity of up to 75 megawatts (MW) and will be known as the Wolmaransstad 75MW Solar Energy Facility.

Bluewave appointed Savannah Environmental as the independent Environmental Assessment Practitioner to undertake the Environmental Impact Assessment (EIA) for the proposed project. The EIA process has been undertaken in accordance with the requirements of the Department of Environmental Affairs (DEA) (as per the acceptance of Scoping) and the EIA Regulations of June 2010 (GNR543) promulgated in terms of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The proposed Wolmaransstad 75MW Solar Energy Facility will make use of photovoltaic (PV) technology with a generating capacity of up to 75MW and will comprise of the following infrastructure:

» Photovoltaic (PV) panels of between 4m – 6m in height (fixed or tracking technology) with a contracted capacity of up to 75MW
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels
» Cabling between the project components, to be lain in trenches ~ 1-2m deep
» Power inverters between the PV arrays (±4.5m^2)
» Overhead power line to evacuate the power into the Eskom grid via the existing Goat DS 132/88kV Substation or the Wolmaransstad Municipality 88/11kV Substation
» Main and internal access roads (up to 7m wide)
» Water storage facility/ reservoir
» Office, workshop area for maintenance and storage
» Temporary laydown area
» Perimeter fencing

The nature and extent of the proposed Wolmaransstad 75MW Solar Energy Facility, as well as the potential environmental impacts associated with the construction, operation and decommissioning associated with the proposed

project is explored in more detail in this EIAR. This EIAR consists of the following chapters:

» Chapter 1 provides background and an introduction to the proposed project and the environmental impact assessment.
» Chapter 2 describes the proposed project and explains the overall project requirements from a technical perspective.
» Chapter 3 explains the regulatory and legal context for electricity generation projects and the EIA process.
» Chapter 4 explains the approach to undertaking the EIA phase.
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» Chapter 8 presents the conclusions of the impact assessment as well as an impact statement.
» Chapter 9 contains a list of references for the EIA report and specialist reports.

1.2. Overview of the Proposed Development

The proposed Wolmaransstad 75MW Solar Energy Facility project site falls within the jurisdiction of the Maquassi Hills Local Municipality which forms part of the Dr Kenneth Kaunda District Municipality. The proposed project is proposed to be developed on the Remainder of Portion 2 of the Farm Wolmaransstad and Townlands 184 (SG Code: TOHO000000000018400002) - refer to Figure 1.1.

In order to achieve an output of 75 MW, approximately 270 hectares (ha) of land would be required (for the PV array only). In addition, an area of approximately 25 ha of land is required to accommodate the associated infrastructure including roads and laydown areas. A broader study area of approximately 463 ha has been considered within which to site the proposed facility taking into consideration any identified environmentally sensitive areas.

The proposed PV facility will connect to the Goat DS 132/88kV Substation which is situated on the project development site, thereby facilitating direct grid connection of the proposed PV facility and minimising the potential associated impacts of power lines off-site. The proposed interconnection strategy will be subject to any determinations enforced by Eskom.

The proposed Wolmaransstad 75MW is independent of the authorised Wolmaransstad Municipality Solar Energy Facility project (DEA Ref: 14/12/16/3/3/1/1089) which will have a generating capacity of 5MW and will

occupy an area of approximately 19 ha on the same farm, in close proximity to the Goat DS Substation.

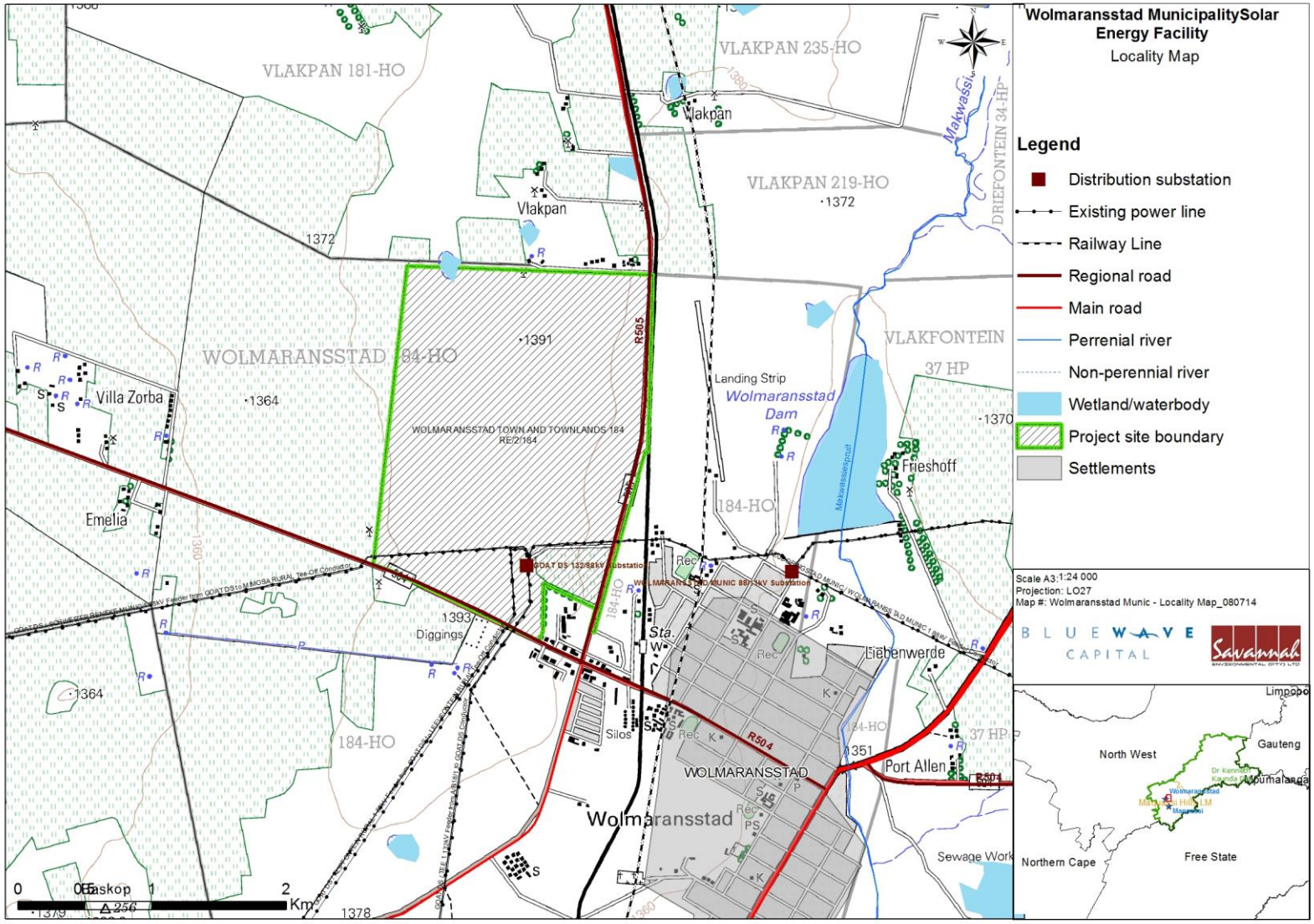

Figure 1.1: Locality map for the proposed site for the Wolmaransstad 75MW Solar Energy Facility, and existing grid connection infrastructure.

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

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

1.3. Conclusions from the Scoping Phase

Specialist input: Several desktop specialist studies were undertaken for the purposes of identifying potential impacts and potential fatal flaws relating to the proposed Wolmaransstad 75MW Energy Facility. The impacts identified as potentially resulting from the project broadly included agricultural, ecological, heritage, visual and social impacts.

Public participation: During the public participation process conducted during Scoping, the proposed project was generally well received from the recipient community, interested and affected parties as well as stakeholders. No objections to the proposed project were received on any environmental or social basis.

Approval of the Scoping Report: No environmental or social fatal flaws were identified to be associated with the broader site during the Scoping stage of the EIA process and the Final Scoping Report was accepted by DEA in January 2015.

1.4. Requirement for an Environmental Impact Assessment Process

The proposed Wolmaransstad 75MW Solar Energy Facility is subject to the requirements of the EIA Regulations published in terms of Section 24(5) of the National Environmental Management Act (NEMA, Act No. 107 of 1998). This section provides a brief overview of the EIA Regulations and their application to this project and contains the requirements of the DEA.

EIA Regulations overview: NEMA is the national legislation that provides for the authorisation of "listed activities". In terms of Section 24 (1) of NEMA, the potential impact on the environment associated with these activities must be

considered, investigated, assessed and reported on to the competent authority that has been charged by NEMA with the responsibility of granting environmental authorisations. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the North West Department of Economic Development, Environment and Tourism (DEDET) will act as a commenting authority for the application.

Compliance with the requirements of the EIA Regulations ensures that decision-makers are provided with an opportunity to consider the potential environmental impacts of a project early in the project development process and to assess if potential environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required in accordance with the EIA Regulations to provide the competent authority with sufficient information in order to make an informed decision. An application for authorisation has been accepted by DEA for the proposed project under application reference number **14/12/16/3/3/2/716.**

An EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts. It provides the developer with the opportunity of being fore-warned of potential environmental issues. Subsequently it may assist with the resolution of issues reported on in the Scoping and EIA Phases as well as promoting dialogue with interested and affected parties (I&APs) and stakeholders. In terms of sections 24 and 24D of NEMA, as read with the EIA Regulations R543, an EIA is required to be undertaken for this proposed project as the proposed project includes the following "listed activities" applicable to each of the four phases, in terms of GN R544, R545 and R546 (GG No 33306 of 18 June 2010 as amended).

Listed activities: The list of listed activities requiring Environmental Authorisation has been revised during the EIA Phase due to a clearer understanding of the project scope, its potential impacts and refinement of the layout plan in the EIA Phase. This is made possible through the availability of detailed designs provided by the applicant in response to the identified environmental sensitivities.

A summarised description of each of the listed activities is provided in Table 1 below. A full description of the impacts associated with the listed activities is provided in the impact assessment chapter (Chapter 6 and 7). The Conclusions chapter (Chapter 8) provides a concluding statement for each of the listed activities applied for and concludes whether the listed activity should be authorised, based on the outcome of the evaluation, impact assessment and relationship of the project footprint to the environment.

Table 1.2: Listed Activities applied for in terms of GN R 544, GN R 546 and GN R 547 for the proposed Wolmaransstad 75MW Solar Energy Facility.

Relevant Notice	Activity No	Description of listed activity
R. 544, 18 June 2010 (Listing Notice 1 of 2010)	Activity 10 (i)	*The construction of facilities or infrastructure for the transmission and distribution of electricity-* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts* ***The project will require the construction of a new overhead power line of more than 33kV in capacity (outside an urban area) to connect to the Goat DS 132/88 kV Substation. An on-site substation of greater than 33kV but less than 275kV will be required.***
R. 545, 18 June 2010 (Listing Notice 2 of 2010)	Activity 1	*The construction of facilities or infrastructure, for the generation of electricity where the output is 20 megawatts or more.* ***The solar energy facility will have a generating capacity of up to 75MW. Power lines and a substation are required as ancillary/support infrastructure***
R. 545, 18 June 2010 (Listing Notice 2 of 2010)	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.* ***The development footprint for the proposed solar energy facility will cover an area greater than 20 hectares. Approximately 270 hectares is required in order to realise the proposed 75MW generation capacity. Municipal owned agricultural land will be transformed to an industrial land use.***
R. 546, 18 June 2010 (Listing Notice 3 of 2010	Activity 4 (c)(i)(ee)	*The construction of a road wider than 4m with a reserve less than 13,5m, outside urban areas in critical biodiversity areas identified in systematic biodiversity plans* ***The proposed solar energy facility will require the construction of internal access roads wider than 4m located within a Tier 2 Terrestrial Critical Biodiversity Area and within a Tier 1 Aquatic Critical Biodiversity Area.***

R. 546, 18 June 2010 (Listing notice 3 of 2010)	Activity 12 (b)	*The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetation cover constitutes indigenous vegetation* *(b) Within critical biodiversity areas identified in bioregional plans* ***The proposed solar energy facility is situated in a Critical Biodiversity Area, the construction of which may result in the clearance of 300 m² or more of indigenous vegetation where 75% of which constitutes indigenous vegetation.***
R. 546, 18 June 2010 (Listing Notice 3 of 2010)	Activity 13 (e)(i)(ee):	*The proposed solar energy facility occurs within a Critical Biodiversity Area and may require the clearance of vegetative cover which may be more than 75% indigenous* ***The proposed solar energy facility occurs a within a Tier 2 Terrestrial Critical Biodiversity Area and within a Tier 1 Aquatic Critical Biodiversity Area and will require the clearance of vegetative cover which is more than 75% indigenous***
R. 546, 18 June 2010 (Listing Notice 3 of 2010)	Activity 14 (a) (i)	***The solar energy facility will be located outside of an urban area and may require the clearance of more than 75% of indigenous vegetative cover*** *The clearance of vegetation of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.*

1.5. Objectives of the EIA Process

The Scoping Phase for the proposed Wolmaransstad 75MW Solar Energy Facility was completed in November 2014 and the Scoping Report and Plan of Study for EIA approved by DEA in January 2015. The scoping phase served to identify potential impacts associated with the proposed project and to define the extent of studies required within the EIA Phase. The Scoping Phase included input from the project proponent, specialists with experience in the study area and in EIAs for similar projects, as well as a public consultation process with key stakeholders that included both government authorities and interested and affected parties (I&APs).

This EIA Phase (i.e. the current phase) and EIA report addresses identified environmental impacts (direct, indirect, and cumulative as well as positive and negative) associated with the different project development phases (i.e. design,

construction, operation, and decommissioning). The EIA Phase also recommends appropriate mitigation measures for potentially significant environmental impacts. The release of a draft EIA Report provides stakeholders with an opportunity to verify that issues they have raised through the EIA Process have been captured and adequately considered. The final EIA Report will incorporate all issues and responses raised during the public review phase prior to submission to DEA. The EIA phase was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of NEMA.

1.6. Details of the Environmental Assessment Practitioner and Specialist Team

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

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

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

» Steven Ingle - Steven Ingle, the principal author of this report is a senior environmental consultant with over 8 years of experience in the environmental field and holds a degree in Environmental Management. His competencies lie in environmental impact assessments for large scale infrastructure, property and mining projects, environmental due diligence and risk assessment, environmental compliance monitoring, waste management licensing and strategic environmental assessment.
» Karen Jodas - a registered Professional Natural Scientist and holds a Master of Science degree. She has 18 years of experience consulting in the environmental field. Her key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which

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

Savannah Environmental has developed a detailed understanding of impacts associated with the construction and operation of renewable energy facilities through their involvement in numerous EIA processes for these projects. In order to adequately identify and assess potential environmental impacts, Savannah Environmental has appointed specialist consultants as required.

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

» Agricultural potential and soils – Johann Lanz
» Ecology – Simon Todd
» Heritage resources – Jaco van der Walt
» Palaeontology – John Almond
» Visual – Mandy van der Westhuizen
» Social – Candice Hunter Savannah Environmental and Neville Bews

Curricula vitae for the Savannah Environmental project team and its specialist sub-consultants are included in Appendix A.

DESCRIPTION OF THE PROPOSED PROJECT CHAPTER 2

The following chapter provides an overview of the proposed Wolmaransstad 75MW Solar Energy Facility and provides details regarding the rationale and purpose of the project, details regarding the site selection process and methodology for designing the facility in response to the identified sensitivities.

The chapter further provides an overview of the project scope which includes the planning and design, construction, operation and decommissioning phases. The project will be submitted in line with the DoE requirements under the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. This chapter also explores the "Do-Nothing" alternative - that is the alternative of not establishing the proposed project.

2.1. Need and justification for the Proposed Project

2.1.1 Strategic Infrastructure Projects under the National Infrastructure Plan

According to South African Government Online[1] the South African Government adopted a National Infrastructure Plan (NRP) in 2012 that intends to transform South Africa's economic landscape while simultaneously creating significant numbers of new jobs and to strengthen the delivery of basic services. Under the NRP, Government will, over the three years from 2013/14, invest R827 billion in the building of new and the upgrading of existing infrastructure. In order to address these challenges and goals, Cabinet established the Presidential Infrastructure Coordinating Committee (PICC) and under their guidance developed 18 Strategic Integrated Projects (SIPs), three of which are energy-related SIPs and include:

» SIP 8: Green energy in support of South African economy - Support sustainable green energy initiatives on a National scale through a diverse range of clean energy options envisaged in the IRP.
» SIP 9: Electricity Generation to support socio-economic development: Accelerate construction of new electricity capacity in accordance with the IRP to meet the need of the economy and address historical imbalance.

In fulfilment of SIP 8 (green energy) and to meet the targets set in the Integrated Resource Plan (IRP 2010), the Department of Energy has introduced the REIPPP Programme, which is now in its fifth year. If selected as a preferred

[1] http://www.gov.za/issues/national-infrastructure-plan /index.html#energy

bidder in terms of the REIPPP Programme, the proposed Wolmaransstad 75MW Solar Energy Facility will contribute towards SIP 8 and SIP 9 due to the addition of clean energy to the grid and significant socio-economic benefits at a local, regional and national scale.

2.1.2 Rationale for the proposed project

The purpose of the Wolmaransstad 75MW Solar Energy Facility is to add new capacity for generation of renewable energy to the national electricity supply (which is short of generation capacity to meet current and expected demand) and to aid in achieving the goal of a 30% share of all new power generation being derived from independent power producers (IPPs), as targeted by the Department of Energy (DoE).

The power generated from the project will be sold to Eskom to feed into the national electricity grid. Bluewave will be required to apply for a generation license from the National Energy Regulator of South Africa (NERSA), as well as sign a power purchase agreement with Eskom (typically for a period of 20 years) in order to build and operate each facility. As part of the agreement, the IPP will be remunerated per kWh by Eskom who will be financially backed by Government. Depending on the economic conditions following the lapse of this period, each solar energy facility can either be decommissioned, or the power purchase agreement may be renegotiated and extended for a further period.

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

It is considered viable that long-term benefits for the community and/or society in general can be realised should the project prove to be acceptable from a technical and environmental perspective. The project has the potential to contribute to the national electricity supply and to increase the security of supply to consumers as well as supporting South Africa's commitment to reducing greenhouse gas emissions. Over 90% of South Africa's electricity generation is coal-based, resulting in annual per capita carbon emissions of approximately 8.9 tons per person, according to 2008 World Bank estimates. According to the

Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country, based on 2008 fossil-fuel CO_2 emissions. The nation is also the largest emitting country on the continent of Africa, pinpointing the importance of introducing greener solutions to the energy mix. Furthermore, it may provide both economic stimulus to the local economy through the construction process and long term employment (i.e. management and maintenance) during the operation phase.

2.1.3 Selection of the proposed project site

In scrutinising the environmental / land-use suitability of the Wolmaransstad area for the proposed project, Savannah Environmental was commissioned by Bluewave to conduct a screening investigation or regional assessment profile. A study area of 25km was evaluated against specific criteria, which included grid connectivity, land availability, the solar resource and environmental sensitivity / risks. The process allowed for technical and environmental criteria within the region to be tested against each other. The input components resulted in various layers of information that were merged using a Geographic Information System (GIS) platform to form a combined dataset (various combinations of positive and negative criteria) which defined preferred areas/zones for development based on environmental and planning criteria. The output of this exercise was a composite map indicating areas which are:

» ***Highly Preferred / Preferred:*** Low landscape value with a high to low capacity for change. Solar energy facility development may be possible, subject to site level assessment.
» ***Negotiable:*** Low to high landscape values, but with a high capacity to absorb change. Solar energy development in these areas may be possible, subject to site level assessment.
» ***Restricted / High Restricted:*** High value landscapes combined with low capacity of landscape to adapt to change. These areas should ideally be restricted from development.

The results of the assessment concluded that the majority of the land surface of the project site was shown to be "restricted" (at least one restriction), with at least one third of the site shown as being "highly preferred" (two or more positive aspects and no restrictions). The most notable restriction is the occurrence of an Aquatic Critical Biodiversity Area (CBA 1) system which overlaps with the western portion of the greater farm presenting a potential limiting factor. While the screening study did not address land ownership, the fact that the proposed project site is situated on municipal-owned land adds an additional socio-economic benefit not characteristic to projects situated on privately-owned land where such large-scale commercial PV facilities typically occur (in the form of revenue earned by the municipality throughout the lease and project lifetime).

Ultimately the proposed site located on the Remainder of Portion 2 of the Farm Wolmaransstad and Townlands 184 located east of Wolmaransstad was identified as being potentially feasible for solar development in terms of these criteria with no fatal flaws identified and a recommendation to proceed with the EIA process was made. Although catchment C25E is considered a Tier 1 CBA under the North West CBA layer, the area is not considered a priority catchment under the National Freshwater Ecosystems Priority Areas (NFEPA), suggesting that its significance is at the local level and that at a broader level it is not considered highly significant. The occurrence of the aquatic CBA therefore does not present a fatal flaw. No adjacent sites or other sites near to Wolmaransstad were identified as being more suitable for accommodating the proposed project. No site alternatives are therefore proposed for the development of this project as the placement of a PV facility is strongly dependent on the criteria described above.

It was on the basis of the optimised solar irradiation of the region (as reflected in Figure 2.1), grid connectivity conditions and absence of perceivable fatal flaws, that Bluewave approached the landowner (Maquassi Hills Local Municipality) and presented a business case for the development of a renewable energy facility on the property.

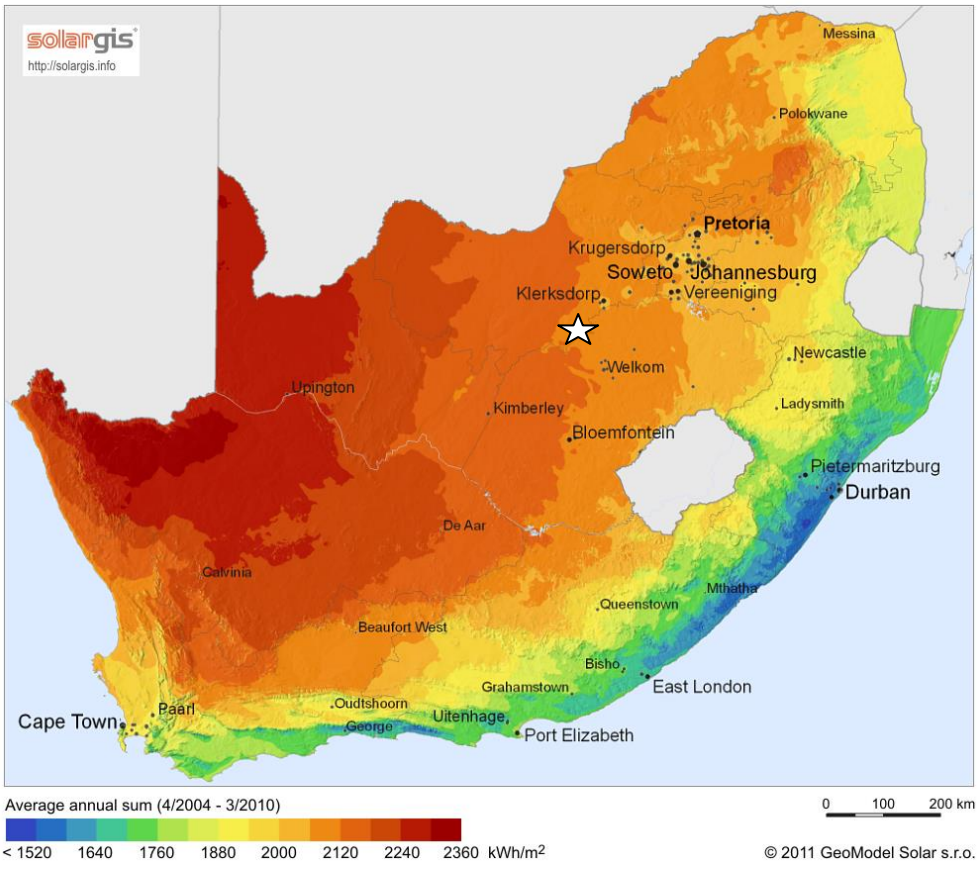

Figure 2.1: Solar irradiation map for South Africa (Source: GeoModel Solar, 2011) – proposed Wolmaransstad 75MW Solar Energy Facility indicated by star

2.1.4 Optimising the proposed PV facility within the site boundary and the consideration of alternative layouts

The Scoping process served to determine any areas of high environmental sensitivity and limit the extent of the greater farm portion available to PV development. This was done as a land capability assessment in order to evaluate and mitigate the impact on soil, land, air and water resources. Failure to manage land in accordance with its capability risks degradation of resources both on-site and off-site, leading to a decline in natural ecosystem values, agricultural productivity and infrastructure functionality. The land capability assessment was intended to allow the developer to test the merits of the site and discard other areas of the site which were under consideration due to environmental constraints (primarily ecological considerations).

Following presentation of a project area to the developer based on criteria determined during Scoping and EIA phase, technical requirements in terms of optimising the position of the PV array as well as the associated infrastructure within the boundaries of the project site were evaluated by the developer.

PV array: For the PV array, an optimal location within the broader site was identified based on the constraints identified during the land capability assessment undertaken at Scoping. This resulted in the PV array being sited outside of the high sensitive areas in the western section of the farm as far as possible. Technical considerations within the PV array area further allowed for the identification of two alternative layouts, which are considered in Section 2.5.

2.2. Project Description

The Wolmaransstad 75MW Solar Energy Facility is intended to generate electricity by harnessing solar energy (from the sun) by utilising photovoltaic (PV) technology and has a contracted capacity of up to 75MW. An area of approximately 270ha of the Remainder of Portion 2 of the Farm Wolmaransstad and Townlands 184, north east of Wolmaransstad is proposed to be occupied by the PV module arrays and associated infrastructure. The main components of the proposed facility include:

» Photovoltaic (PV) panels of between 4m – 6m in height (fixed or tracking technology) with a contracted capacity of up to 75MW
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels
» Cabling between the project components, to be lain in trenches ~ 1-2m deep
» Power inverters between the PV arrays (±4.5m^2)

» Overhead power line to evacuate the power into the Eskom grid via the existing Goat DS 132/88kV Substation or the Wolmaransstad Municipality 88/11kV Substation
» Main and internal access roads (up to 7m wide)
» Water storage facility/ reservoir
» Office, workshop area for maintenance and storage
» Temporary laydown area
» Perimeter fencing

The proposed project development site is situated north-east of Wolmaransstad on land falling immediately outside of the Wolmaransstad urban boundary. The project site is bordered by the R504 road to the south and the R505 road to the east.

The PV facility is proposed to connect to the Goat DS 132/88kV Substation[2] which is situated on the project development site, thereby enabling direct connection to the grid and no requirement for the construction of power lines outside the boundaries of the property.

Table 2.1 below provides relevant technical information for the proposed Wolmaransstad 75MW Solar Energy Facility.

Table 2.1: Indicative dimensions or measurements of infrastructure for the proposed Wolmaransstad 75MW Solar Energy Facility

Aspect	Value
Height of PV panels	< 6 m
Area of PV Array	240 ha
Ancillary infrastructure	30 ha
Number of inverters required	39
Area occupied by inverter / transformer stations / substations	10 000 m²
Capacity of on-site substation	33/132kV; 80MVA
Area occupied by both permanent and construction laydown areas	10 ha
Area occupied by buildings	1 200 m²
Length of internal roads	15 km
Width of internal roads	Up to 7m
Proximity to grid connection	On-site (within 400m)
Construction phase water requirements	3 000 m^3 per

[2] This proposed interconnection strategy will be subject to any determinations enforced by Eskom and the facility interconnection strategy will be subject to those determinations.

	month
Operational phase water requirements	300m^3 per month

A layout of the proposed Wolmaransstad 75MW Solar Energy Facility site and associated infrastructure (such as on-site substation, power line, access roads, and laydown areas) considered within this EIA Report has been generated (refer to Figure 2.1), which has responded to the environmental and social sensitivities identified as far as possible within the design parameters of the facility.

As far as possible, the direct impacts identified through the EIA process associated with the proposed project footprint have been considered in the layout. The primary consideration in this regard was avoidance of the dense stands of *Acacia erioloba* in the south western section of the study area which has been ascribed to have a very high ecological sensitivity. Although *Acacia erioloba* cannot be entirely avoided in the layout, these are located in less dense areas located primarily on historically cultivated fields ascribed to have a medium to high sensitivity.

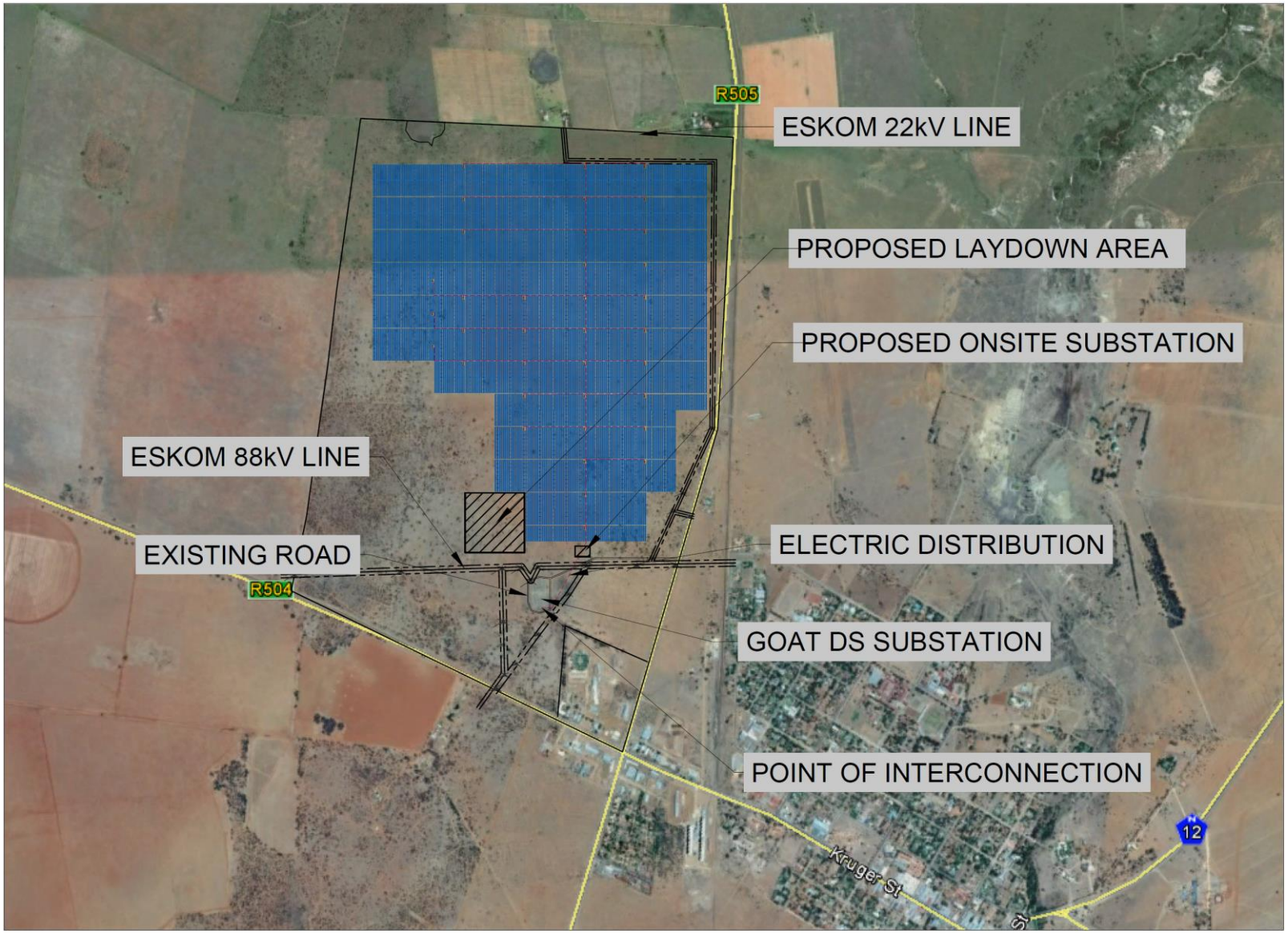

Figure 2.1: Layout for the proposed Wolmaransstad 75MW Solar Energy Facility.

2.3. Solar Energy as a Power Generation Technology

The generation of electricity can be explained as the conversion of energy from one form to another. Solar energy facilities operate by harnessing solar energy and converting it into a useful form (i.e. electricity). Solar technologies can be divided into two categories, those that harness solar energy to create thermal energy which in turn can be converted into electricity, and those that use the electromagnetic radiation of the sun and convert it directly into electricity. The latter is known as photovoltaic (PV) technology, which is proposed for this project, and is the direct conversion of sunlight into electricity without the use of water for power generation.

The use of solar energy for electricity generation is a non-consumptive use of a natural resource. Renewable energy is considered a 'clean source of energy' with the potential to contribute greatly to a more ecologically, socially, and economically sustainable future. The challenge now is ensuring solar energy projects are able to meet all economic, social, and environmental sustainability criteria in terms of NEMA.

2.4.1 How do Grid Connected Photovoltaic Facilities Function?

Solar energy facilities, such as those using PV technology use the energy from the sun to generate electricity through a process known as the Photoelectric Effect. 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. The former is constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are assembled together in multiples to make a solar panel. The latter is made by placing thin layers, hence the name thin-film, of semiconductor material onto various surfaces, usually glass. This project proposes using a thin-film PV technology which encloses the semiconductor between two sheets of glass.

A solar energy facility typically uses 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. The PV panels are designed to operate continuously for more than 20 years with minimal maintenance required.

Figure 2.2: Picture of a PV Panel

Figure 2.3: Picture of the installation of a typical PV array

The **Support Structure**

The photovoltaic (PV) modules will be mounted to steel support structures called tables. 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 a tracking mechanism where at a maximum tilt angle of 45° the lowest part of the panel 30cm from the ground.

The **Inverter**

The photovoltaic effect produces electricity in direct current (DC). Therefore an inverter must be used to change 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 33 kV for on-site transmission of the power. The inverter and transformer are housed within the power conversion station (PCS). 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

2.4. Water Requirements, Availability and Use

Water requirements: The proposed Wolmaransstad 75MW Solar Energy Facility will require the use of water during its construction and operation phase. The water requirement for the project is anticipated to be approximately 3000 m3 per month during the construction phase. Approximately 300 m3 per month is required for maintenance (cleaning panels) during the operational phase.

Water availability: There are no known boreholes located on the property for the supply of water to the site. The site is not serviced by the municipality for the supply of potable water. Water for the project will need to be trucked in by the local municipality (as supplier) during construction and operations and stored in the on-site water reservoir prior to use.

Bluewave will be required to obtain confirmation of water availability for the project from the Department of Water Affairs (DWA). DWA is required to provide a non-binding indication of water availability to the project. This non-binding agreement would be required for the purposes of bidding the project to the DoE.

Water Use: Section 21 of the National Water Act (Act 36 of 1998) identifies water uses for which registration or licensing is required including abstraction, storage, wastewater disposal and water resource impacts, amongst others. No water uses are triggered by the proposed project in terms of the Act.

2.5. Project Alternatives

In accordance with the requirements of the EIA Regulations[3], alternatives are required to be considered within any environmental impact assessment (EIA) process, and may refer to any of the following:

» Site alternatives
» Design or layout alternatives
» Technology alternatives
» The No-go alternative

2.5.1 Site Alternatives

As indicated in Section 2.1.3, the land capability assessment undertaken at Scoping and EIA allowed the developer to test the merits of the site and discard

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

other areas in the screening which were under consideration. No other feasible site alternatives have been assessed for this project.

2.5.2 Layout Alternatives

PV array: For the PV array, an optimal location within the broader site was identified based on the constraints identified during the land capability assessment undertaken at Scoping, which were verified during the EIA phase. This resulted in the PV array being sited outside of the high sensitive areas in the western section of the farm as far as possible. Technical considerations within the PV array area further allowed for the identification of two alternative layouts, described as follows:

» **PV Array Alternative 1 –** This layout enables the development of a contiguous (not split) PV array by undertaking the re-alignment of an overhead 22kV power line which traverses the site from north – south and re-aligns the 22kV power line adjacent to the R505. This alternative layout is the most cost effective layout and limits the PV footprint in the more ecologically sensitive western areas to a greater extent. This layout is therefore preferred.

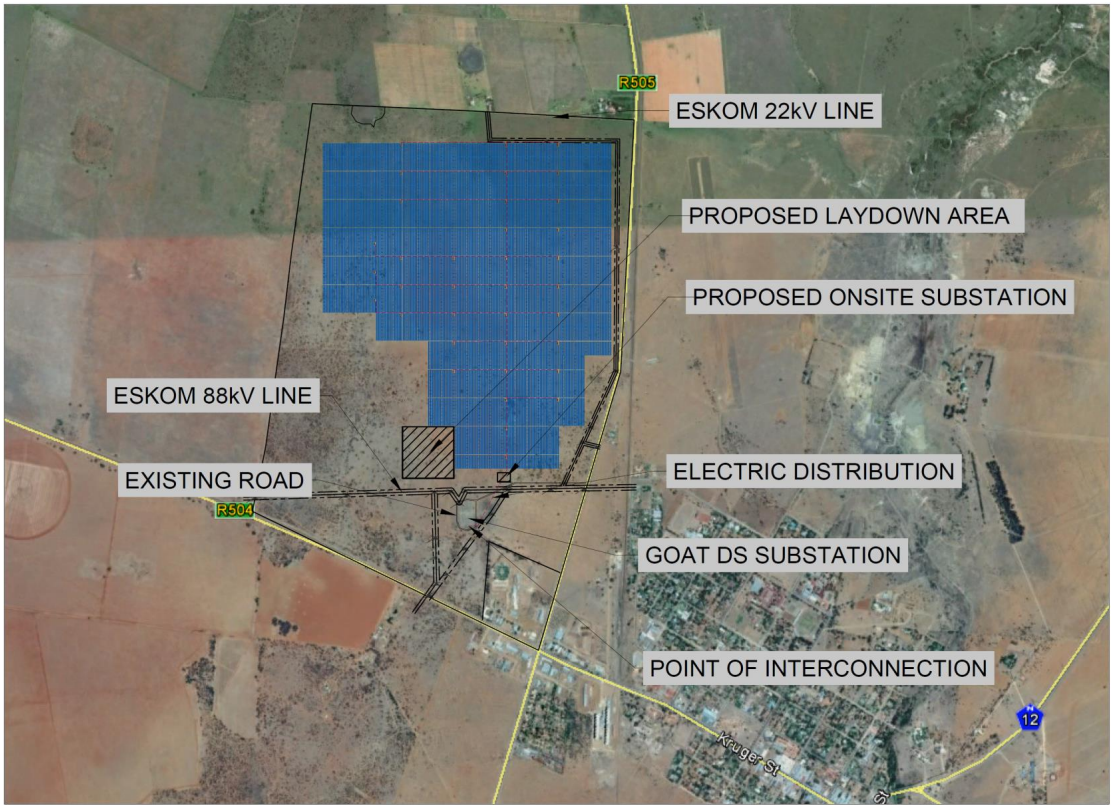

Figure 2.5: PV array layout alternative 1 requiring re-alignment of existing 22kV power line adjacent to R505.

» **PV Array Alternative 2 –** This layout responds to the existing 22kV power line and splits the PV array in eastern and western sections. This alternative layout is the least cost effective layout (increased wiring costs) and increases the PV footprint in the more ecologically sensitive western areas.

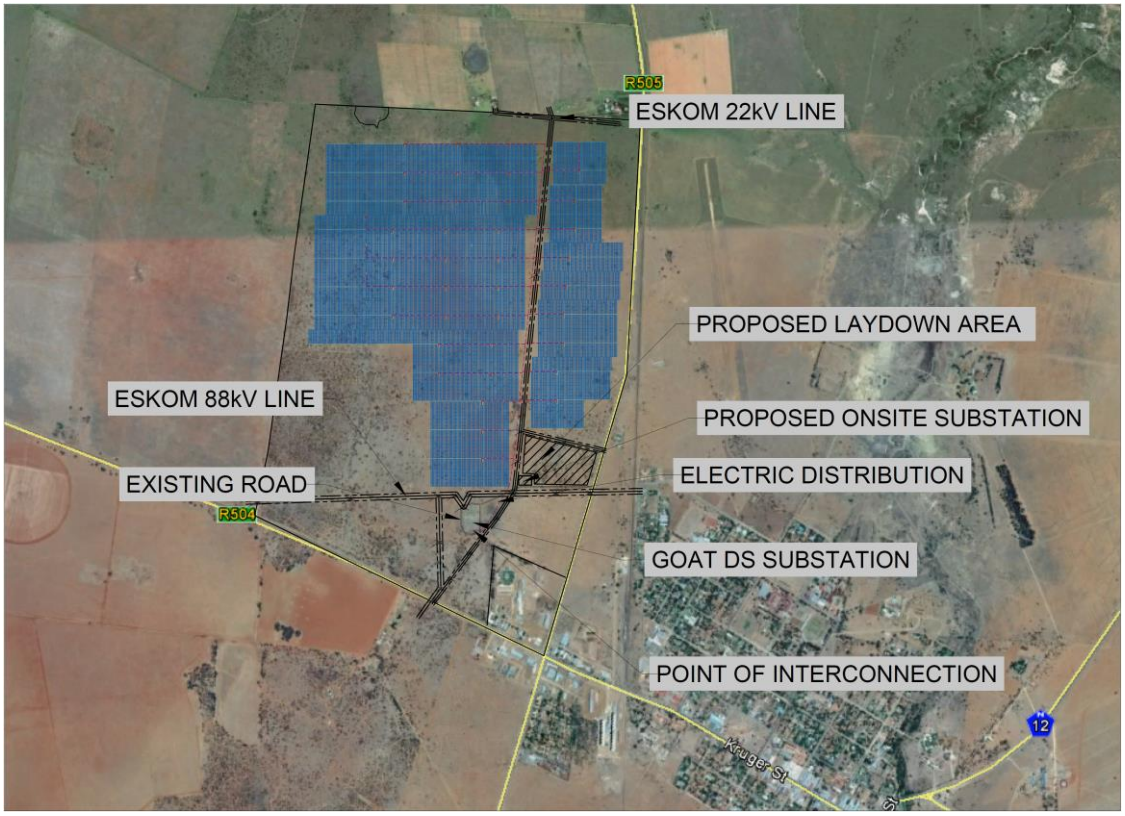

Figure 2.6: PV array layout alternative 2 requiring division of PV array into two sections to accommodate existing 22kV power line.

2.5.3 Technology Alternatives

As it is the intention of the developer to develop renewable energy projects as part of the DoE's REIPPP Programme, only renewable energy technologies are being considered. Solar energy is considered to be the most suitable renewable energy technology for this site, based on the site location, ambient conditions and energy resource availability (i.e. solar irradiation). Solar PV was determined as the most feasible option for the proposed site as large volumes of water are not needed for power generation purposes compared to concentrated solar power technology (CSP). PV is also preferred when compared to CSP technology due to the lower visual profile and lower water needs.

The environmental impacts of the solar technology choices are not the same. Therefore, the selection of technology will affect environmental impacts of the proposed development. The primary differences 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 impacts associated with the operation and decommissioning of the facility will be the same irrespective of the technology chosen. Two solar energy technology alternatives are being considered for the proposed project and include:

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

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. The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance. The two alternative technologies are assessed further in Chapter 6.

2.5.4. Grid Connection Alternatives

The power generated by the facility will be collected and transformed at an on-site substation situated within the site, occupying an area of approximately 1ha. The on-site substation will be located as close as possible to the existing Goat DS Substation in order to minimise the length of power line required. Grid connection alternatives will be determined by Eskom and once established will determine the ultimate final positioning of the substation. In particular the interconnection into Goat DS Substation via the eastern or western feeder bay will ultimately determine the shortest interconnection path from the array and hence the position of the substation.

2.5.5. Do Nothing Alternative

The no-go or do-nothing option would mean that the proposed Wolmaransstad 75MW Solar Energy Facility including all associated infrastructure would not be developed. Should this alternative be selected, there would be no direct impacts on the area designated for the construction of a PV plant and the indirect impacts associated with the construction and operation of the facility would not be registered. The existing land use which is predominantly informal grazing would continue indefinitely.

The benefits of the continuation of the land use through the no-go alternative will include:

» Maintaining rural character of the area and sense of place.
» No social disruption due to construction phase impacts and disturbance of sense of place during operation.
» Continued use of the site for grazing purposes.

The limitations of the continuation of the land use through the no-go alternative will include:

» The land is not used for intensive agricultural purposes and its value as viable agricultural land is limited.
» Loss of a renewable energy opportunity and anticipated economic and social benefits.

It is noteworthy that receipt of an environmental authorisation for the project may not necessarily result in the project being implemented due to other external factors, including whether the developers are awarded preferred bidder status by the DoE.

The 'do nothing' alternative will do little to influence the macro-level renewable energy targets set by government due to competition in the sector, and the number of renewable energy projects being bid to the DoE. However, good irradiation and optimal grid connection opportunities would suggest that the project site could experience pressure to develop a PV facility there, as the more optimal sites (i.e. in the Northern Cape) are developed. Furthermore, development near to urban areas is desirable in order to avoid electricity inefficiencies (such as line losses). The 'do nothing alternative is assessed further within this report however the socio-economic and environmental benefits of the Wolmaransstad 75MW Solar Energy Facility have been established to be significant and include:

» ***Increased energy security:*** The current electricity crisis in South Africa highlights the significant role that renewable energy can play in terms of power supplementation. In addition, given that renewables can often be deployed in a decentralised manner close to consumers, they offer the opportunity for improving grid strength and supply quality, while reducing expensive transmission and distribution losses.
» ***Resource saving:*** Conventional coal fired plants are major consumers of water during their requisite cooling processes. It is estimated that the achievement of the targets in the Renewable Energy White Paper will result in water savings of approximately 16.5 million kilolitres, when compared with wet cooled conventional power stations. This translates into revenue savings of R26.6 million. As an already water-stressed nation, it is critical that South Africa engages in a variety of water conservation measures, particularly due to the detrimental effects of climate change on water availability.
» ***Exploitation of our significant renewable energy resource:*** At present, valuable national resources including biomass by-products, solar radiation and wind power remain largely unexploited. The use of these energy flows will strengthen energy security through the development of a diverse energy portfolio.
» ***Pollution reduction:*** The releases of by-products through the burning of fossil fuels for electricity generation have a particularly hazardous impact on human health and contribute to ecosystem degradation. The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions.
» ***Climate friendly development:*** The uptake of renewable energy offers the opportunity to address energy needs in an environmentally responsible manner and thereby allows South Africa to contribute towards mitigating

climate change through the reduction of greenhouse gas (GHG) emissions. South Africa is estimated to be responsible for approximately 1% of global GHG emissions and is currently ranked 9th worldwide in terms of per capita carbon dioxide emissions.

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

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

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

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

The do-nothing alternative is assessed in Chapter 7.

2.6 Proposed Activities during the Project Development Stages

In order to construct the Wolmaransstad 75MW 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. Where possible, dimensions and figures of the relevant components are provided to assist the reader in better understanding the scope of the proposed project.

2.6.1 Design and Pre-Construction Phase

Pre-planning: Several post-authorisation factors are expected to influence the final design of the facility and could result in small-scale modifications of the PV array or associated infrastructure. While an objective of the Engineering, Procurement and Construction (EPC) Contractor who will be responsible for the overall construction phase of the project will be to comply with the approved facility design as far as possible, it should be understood that the construction process is dynamic and that unforeseen changes to the project specifications will result. This EIA Report therefore describes the project in terms of the best available knowledge at the time. The final facility design is required to be approved by the DEA. Importantly, should there be any substantive changes or deviations from the original scope or layout of the project, the DEA will need to be notified and where relevant, approval obtained.

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.

2.6.2 Construction Phase

Procurement and employment: The proposed Wolmaransstad 75MW Solar Energy Facility is likely to create approximately 500 employment opportunities depending on the final design. Of this 60% of the opportunities (300 employees) will be available to low-skilled workers (construction labourers, security staff etc.), 10% (50 employees) to semi-skilled workers (drivers, equipment operators etc.), and 30% (150 employees) to skilled personnel (engineers, land surveyors, project managers etc.). Approximately 70% of jobs will be sourced from local communities. The injection of income into the area in the form of wages will represent a significant opportunity for the local economy and businesses in the Wolmaransstad area. The majority of the employment opportunities, specifically the low and semi-skilled opportunities, are likely to be available to residents of Wolmaransstad and surrounding areas. 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 where unemployment is in the region of 33%.

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, stormwater 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.

The PV arrays require a relatively level and stable surface for safe and effective installation. Topographic, geotechnical, and hydrologic studies will be used to determine the necessary grading and compaction.

Trenching would occur within each array to bury 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. For the proposed Wolmaransstad 75MW Solar Energy Facility, transport of components would occur via the N12 from the direction of suppliers/distributors in Gauteng. 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 substation and power line.

Establishment of Construction Equipment Camp: Once the required equipment has been transported to site, a construction equipment camp will need to be established for each phase. The purpose of this camp is to confine activities and storage of equipment to one designated area to limit the potential ecological impacts associated with each phase of the project. The laydown area(s) will be used for assembly purposes and the general placement/storage of construction equipment. The storage of fuel for the on-site construction vehicles and equipment will need to be secured in a temporary bunded facility at the construction camp, so as to prevent the possibility of leakages and soil contamination. It is anticipated that not more than 20 000 litres of fuel stored on site at one time for the refuelling of vehicles and machinery will be required. Fuel stored on site will be stored in a steel tank/s within a secured and bunded area.

Construction crew accommodation: The majority of construction workers are likely to be accommodated in Wolmaransstad and no construction workers are

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

required to be temporarily housed on site. It is anticipated that construction crews will be transported to site at the start of each working day and from the site at the end of each working day.

Installation of the PV Power Plant: The construction phase involves installation of the solar PV panels and the entire necessary structural and electrical infrastructure to make the proposed Wolmaransstad 75MW Solar Energy Facility project operational. In addition, preparation of the soil and improvement of the access roads would continue throughout the majority of the construction process. For array installation, typically vertical support posts are driven into the ground. Depending on the results of the geotechnical report a different foundation method, such as screw pile, helical pile, micropile or drilled post/pile could be used. The posts will hold the support structures (tables) on which PV modules would be mounted. Brackets attach the PV modules to the tables. Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared. While cables are being laid and combiner boxes are being installed, the PV tables are erected. Wire harnesses connect the PV modules to the electrical collection systems. Underground cables and overhead circuits connect the multiple inverters to the on-site substation.

Establishment of Ancillary Infrastructure: Ancillary infrastructure for the project will include a workshop, construction and operational laydown areas and an office. Temporary construction phase laydown areas are planned to be situated in areas of approximately 2ha-3ha on the periphery of the PV arrays and will include the construction camp. 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. The extent of the level to be occupied by the infrastructure is detailed in Table 2.1.

Construct on-site substation and undertake internal electrical reticulation: New internal electrical reticulation will be required in order to connect the proposed facility to the on-site substation. A substation is constructed in the following simplified sequence:

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

» Step 8: Continued maintenance

The expected lifespan of the proposed on-site substation associated with the facility is anticipated to be in line with the economic life of the PV project (in excess of 20 years with continued maintenance). During the life-span of the substation, on-going maintenance is performed and inspections are undertaken by Eskom.

Construct Access and Internal Roads: The project site is bordered by the R504 to the south and the R505 to the east. Existing gravel roads branch off of these main roads and provide direct access to the site as well as the existing Goat DS Substation. Internal access roads of up to 7m in width will be required. It is not envisaged that any new access roads will be required to be constructed in order to access the site. However, internal access roads will be required to access the individual components within the facility during construction and operation. Where necessary, it may be required, in some areas, to strip off the existing vegetation and level the exposed ground surface to form an access track surface. The final layout of the access roads will be determined following the identification of site related sensitivities.

Undertake Site Rehabilitation: As construction is completed in an area, and as all construction equipment is removed from the project site, the site must be rehabilitated where practical and reasonable.

2.6.3 Operational Phase

The Wolmaransstad 75MW 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 continuous 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. 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 approximately 50 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.

2.6.4 Decommissioning Phase

Depending on the continued economic viability of the facility following the initial 20-year operational period, the project 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 activities explained below will form part of the project scope.

When the project is ultimately decommissioned, the equipment to be removed will depend on the proposed land use for the site at that time. For example, depending on the power needs at the time of decommissioning, the on-site substation could remain for use by the utility or other industrial activity.

Below is a discussion of expected decommissioning activities.

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: 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.

REGULATORY AND LEGAL CONTEXT CHAPTER 3

3.1 National Policy and Planning Context

The need to expand electricity generation capacity in South Africa is based on national policy and informed by on-going strategic planning undertaken by the Department of Energy (DoE). The hierarchy of policy and planning documentation that support the development of renewable energy projects such as solar energy facilities is illustrated in **Figure 3.1**. These policies are discussed in more detail in the following sections, along with the provincial and local policies or plans that have relevance to the development of the proposed Wolmaransstad 75MW Solar Energy Facility.

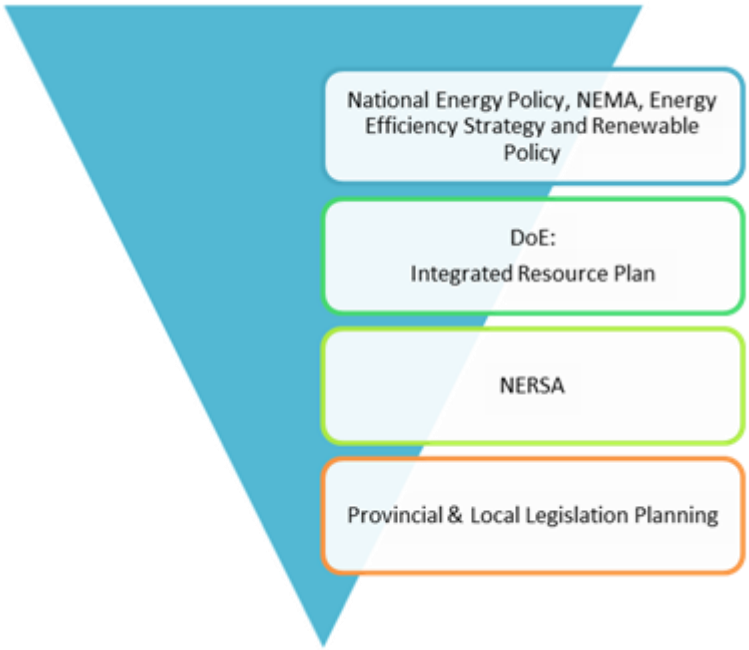

Figure 3.1: Hierarchy of electricity policy and planning documents

3.1.1 The National Energy Act (2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar:

> *"To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account*

environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…(Preamble)."

The National Energy Act aims to ensure that diverse energy resources are available, in sustainable quantities and at affordable prices, to the South African economy in support of economic growth and poverty alleviation, taking into account environmental management requirements and interactions amongst economic sectors, as well as matters relating to renewable energy. The Act provides the legal framework which supports the development of renewable energy facilities for the greater environmental and social good.

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

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

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

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

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

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

3.1.4 White Paper on the Renewable Energy Policy of the Republic of South Africa (2003)

The White paper on renewable energy supplements the Governments overarching policy on energy as set out in its White Paper on the Energy Policy of the republic of South Africa (DME, 1998). The White Paper on Renewable Energy Policy

recognizes the significance of the medium and long-term potential of renewable energy. The main aim of the policy is to create the conditions for the development and commercial implementation of renewable technologies. The White Paper on Energy Policy's position with respect to renewable energy is based on the integrated resource planning criterion of:

> *"Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options."*

This White Paper on Renewable Energy (November, 2003) sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. South Africa relies heavily on coal to meet its energy needs because it is well-endowed with coal resources; in particular. However South Africa is endowed with renewable energy resources that can be sustainable alternatives to fossil fuels, so far these have remained largely untapped. The White Paper on Renewable Energy sets a target of generating 10 000GWh from renewable energy sources. Therefore the policy supports the investment in renewable energy facilities sources at ensuring energy security through the diversification of supply.

The support for the Renewable Energy Policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind, and that renewable applications are, in fact, the least cost energy service in many cases from a fuel resource perspective (i.e. the cost of fuel in generating electricity from such technology) and more so when social and environmental costs are taken into account. In spite of this range of resources, the National Energy Policy acknowledges that the development and implementation of renewable energy applications has been neglected in South Africa.

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

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

The White Paper on Renewable Energy states "*It is imperative for South Africa to supplement its existing energy supply with renewable energies to combat Global Climate Change which is having profound impacts on our planet*."

3.1.5 Final Integrated Resource Plan, 2010 - 2030

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

» Improve the long term reliability of electricity supply through meeting adequacy criteria over and above keeping pace with economic growth and development;
» Ascertain South Africa's capacity investment needs for the medium term business planning environment;
» Consider environmental and other externality impacts and the effect of renewable energy technologies; and
» Provide the framework for Ministerial determination of new generation capacity (inclusive of the required feasibility studies).

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

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

3.1.6 Electricity Regulation Act, 2006

Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) and all subsequent relevant Acts of Amendment, NERSA has the mandate to determine the prices at and conditions under which electricity may be supplied by licence to Independent Power Producers (IPPs). NERSA has recently awarded electricity generation

licences for new generation capacity projects under the IPP procurement programme.

3.2 Provincial Policy and Planning Context

The site is situated within the Maquassi Hills Local Municipality (MHLM), which is located in the Dr Kenneth Kaunda District Municipality (DKKDM). The following plans and policies are applicable:

3.2.1 Dr Kenneth Kaunda District Municipality Integrated Development Plan (IDP) (2013/2014)

The main focus of the DKKDM IDP 2013/2014 that corresponds to the development of the proposed solar energy facility are as follows:

- » Accelerating growth and development
- » Economic growth and development is the prerequisite for the achievement of other policy objectives such as poverty eradication and equitable development.
- » Government infrastructure investment – beyond basic service delivery – will be in areas of high development potential or economic growth. Deliver services and channel resources in the most effective, efficient and sustainable way
- » Growth of opportunities and areas of low density vs high accessibility specifically be targeted. Spatial configuration where high levels of poverty overlap with high levels of economic concentrations provides excellent opportunities to maximise the impact per unit of investment when growth is shared.

The IDP aims at promoting local economic growth and social development in order to provide a better life for the communities. The proposed development will contribute in assisting the District Municipality in building a sustainable economy through the field of energy.

3.2.2 Dr Kenneth Kaunda District Municipality Integrated Development Plan (IDP) (2012-2014)

The vision of the DKKDM is to be a catalyst for Economic Development in the DKKDM region of North West Province, benefiting all communities in the DKKDM's designated area of jurisdiction. The mission of the DM is to strive to effectively implement existing, partner and new projects, attract investment for business development within the DKKDM region, encourage and support business' participation in spatial development initiatives as well as strengthen or regenerate lagging business sectors (sector development).

The goal of the DM is to assist municipalities with the implementation of key local economic development projects, by championing investment in or supporting business development for selected high impact projects to stimulate economic growth, job creation and economic diversification in the DKKDM region. Development priorities and objectives include:

- Local Economic development
- Investment and trade facilitation
- Project facilitation (Provide business appraisals on viable and non-viable projects, source local and international investment/trade partners etc.)
- Economic research activities
- Corporate governance responsibilities

The proposed development will contribute to employment creation and economic growth, which in turn will have a positive multiplier effect on the local area through income expenditure which therefore supports the DKKDM IDP 2012-2016 vision, mission and goals.

3.2.3 Maquassi Hills Draft Integrated Development Plan (2014-2016)

The purpose of the IDP amongst other things, is to consolidate the available, limited and scarce resources so that they are directed to develop the under developed areas and ensure that at least basic services are delivered throughout the municipality. The MHLM vision is to be a leading category B Municipality, providing quality and sustainable basic services to the community, in a cost-effective manner that supports growth and development within the municipality. The strategic objectives for the municipality are as follows:

- Municipal transformation and institutional development
- Provision of basic services and infrastructure development
- Local economic development
- Municipal financial viability
- Good governance and public participation

The proposed development is located within ward 5 of the MHLM. The IDP provides a list of priorities for ward 5 as follows:

- Rebuilding of Tar Roads (Proper Roads) Pavement
- Maintenance of Infrastructure
- Refuse is not Collected regularly (Generally Poor Services)
- Streets not maintained at all
- Signage for Street Names and Traffic Signs in very Poor State
- Pavement and Open Areas must be maintained
- MHLM is not Green, efforts must be taken to Green the Town
- Pest Control (Ants Plague in Town)
- Property Rates to be Reduced
- Inconsistent Water Readings

- » Prepaid Electricity
- » Services required in Extension 15

The overarching direction of the MHLM IDP articulates a vision for economic growth and development, provision of basic services (service delivery improvement) and infrastructure development. The proposed development will contribute to economic growth and development in the region which will be in line with the MHLM IDP.

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

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

- » National Environmental Management Act (Act No 107 of 1998).
- » EIA Regulations, published under Chapter 5 of the NEMA (GNR543, GNR544, GNR545, and GNR546 in Government Gazette 33306 of 18 June 2010).
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010).
  - * Public Participation in the EIA Process (DEA, 2010).
- » International guidelines – the Equator Principles

Several other acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the **Table 3.1. Table 3.2** provides the relevant South African environmental legislation applicable to the project in terms of environmental quality.

Table 3.1: Relevant legislative permitting requirements applicable to the proposed Wolmaransstad 75MW solar energy facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GN R543, R544, R545 and R546 of 18 June 2010, a Scoping and EIA Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority North West Department of Economic Development, Environment and Tourism (DEDET) - commenting authority	The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA). This EIA Report will be submitted to the competent and commenting authority in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs	Noise impacts are expected to be associated with the construction

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
		North West Department of Economic Development, Environment and Tourism (DEDET) Local Authorities	phase of the project and are not likely to present a significant intrusion to the local community. Therefore there is no requirement for a noise permit in terms of the legislation. On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a	Department of Water Affairs Provincial Department of Water Affairs	A water use license (WUL) is required to be obtained if wetlands or drainage lines are impacted on, or if infrastructure lies within 500m of wetland features or the regulated area of a watercourse (being the riparian zone or the 1:100yr floodline whichever is greatest). Should water be extracted from

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	watercourse - Section 21i.		groundwater/ a borehole on site for use within the facility, a water use license will be required in terms of Section 21(a) and 21 (b) of the National Water Act.
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained. A Section 53 application will be submitted the relevant DMR office.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) and National Dust Control Regulations of November 2013. Measures to control noise (S34) - no regulations promulgated yet.	Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation. However, National, provincial and local ambient air quality standards (S9 - 10 & S11) to be considered.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			Measures in respect of dust control (S32) and the National Dust Control Regulations of November 2013. 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.
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and palaeontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers any 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	South African Heritage Resources Agency	An HIA and PIA has been undertaken as part of the EIA Process to identify heritage sites (refer to Appendix I). Should a heritage resource be impacted upon, a permit may be required from SAHRA.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	sites as part of tourism attraction (S44).		
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), 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.	Department of Environmental Affairs	Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. An ecological study has been undertaken as part of the EIA Phase. As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered. This report is contained in Appendix E.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	Department of Agriculture	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas. There are none for this project.
National Forests Act (Act No. 84 of 1998)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected 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'.	National Department of Forestry	A licence is required for the removal of protected trees. Protected trees have been identified on the site and will be affected by the proposed project. A permit for the removal or relocation of the trees will be required to be obtained from DAFF.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, this Act will find

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.		application during the construction and operational phase of the project.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product; and Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic. S(2-4) provide general principles for land development and conflict resolution.	Local Municipality	The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are	National Department of Water and Environmental Affairs (hazardous waste) North West Department of Economic Development, Environment and Tourism (DEDET) - (general waste)	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. General waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP (refer to Appendix K). The DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste will also need to be considered. The volumes of solid waste to be generated and stored on the site during construction and operation of the facility will not require a

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	intact and not corroded or in any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.		waste license (provided these remain below the prescribed thresholds). The contractor's camp will result in sewage and grey water handling. Sewage is regarded as hazardous waste in terms of this Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the country	Department of Agriculture	Subdivision of land may be required in terms of S24 and S17 of the Act.
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
Provincial Legislation			
Transvaal Nature Conservation Ordinance, No. 12 of 1983 Note: The North West Biodiversity Conservation Bill was published for comments under Notice Nr. 394, Provincial Gazette 6719, dated 23 December 2009	» Lists plant and animal species as protected	North West Department of Economic Development, Environment and Tourism	A collection/destruction permit must be obtained from DEDET for the removal of any protected plant species found on site. Additionally, a permit for the disturbance or destruction of indigenous species must be applied for.

APPROACH TO UNDERTAKING THE EIA PHASE CHAPTER 4

The EIA process for the proposed Wolmaransstad 75MW Solar Energy Facility facility is regulated by the EIA Regulations of June 2010 (as amended), which involves the identification of and assessment of direct, indirect, and cumulative environmental impacts (both positive and negative) associated with a proposed project. The EIA process forms part of the feasibility studies for a project, and comprises a Scoping Phase and EIA Phase which culminates in the submission of an EIA Report together with an Environmental Management Programme (EMPr) to the competent authority for decision-making.

The EIA process has been undertaken in accordance with the EIA Regulations in terms of Sections 24 and 24D of NEMA, as read with the EIA Regulations of GNR544; GNR545; and GNR546 of Section 24(5) of the National Environmental Management Act (NEMA Act No. 107 of 1998).

4.1. Scoping Phase

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

Scoping results influencing the project scope: The proposed Wolmaransstad 75MW Solar Energy Facility will make use of photovoltaic (PV) technology and will have a contracted capacity of up to 75MW.

In addition, the following results of the Scoping study were factored into the EIA phase and the development of the facility layout plan:

- » Informal grazing is practised across the majority of the site and the land has not been cultivated in the last several decades.
- » Apart from a small pan at the boundary of the site, no surface water features were identified at Scoping, which meant that no areas of the site needed to be excluded at a conceptual level on this basis.
- » On the western periphery of the site, it was identified that intact sections of the Vulnerable Klerksdorp Thornveld vegetation could be present.

No environmental fatal flaws were identified to be associated with the broader site through this process. The final Scoping Report was accepted by the DEA in December 2014.

4.2. Environmental Impact Assessment Phase

The EIA Phase for the proposed Wolmaransstad 75MW Solar Energy Facility aims to achieve the following:

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

The EIA Report addresses potential direct, indirect, and cumulative[5] impacts (both positive and negative) associated with all phases of the project including design, construction, operation and decommissioning. In this regard the EIA Report aims to provide the relevant authorities with sufficient information to make an informed decision regarding the proposed project.

4.2.1. Tasks completed during the EIA Phase

The EIA Phase for the proposed Wolmaransstad 75MW Solar Energy Facility has been undertaken in accordance with the EIA Regulations published in GN 33306 of 18 June 2010, in terms of NEMA. Key tasks undertaken within the EIA phase included:

» Consultation with relevant decision-making and regulating authorities (at National, Provincial and Local levels).
» Undertaking a public participation process throughout the EIA process in accordance with Regulation 54 of GN R543 of 2010 in order to identify any additional issues and concerns associated with the proposed project.

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

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

4.2.2 Authority Consultation

The National DEA is the competent authority for this application. A record of all authority consultation undertaken is included within this EIA report. Consultation with the regulating authorities (i.e. DEA and DEDET) has continued throughout the EIA process.

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

» Submission of a final EIA Report to DEA following a public review period for the draft EIA.
» If required, an opportunity for DEA and DEDET representatives to visit and inspect the proposed project site.
» Notification and Consultation with Organs of State that may have jurisdiction over the project, including:
  * Provincial and local government departments (including South African Heritage Resources Agency, Department of Water Affairs, South African National Roads Agency Limited, Department of Agriculture, etc.).
  * Government Structures (refer to Table 4.1).

A record of the authority consultation in the EIA process is included within **Appendix B**.

4.2.3 Public Involvement and Consultation

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

» Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&APs.

» Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
» Comments received from stakeholders and I&APs were recorded and incorporated into the EIA process.

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 for stakeholders and I&APs to be involved in the EIA Phase of the process have been provided, as follows:

» Focus group meetings and a public meeting (pre-arranged and stakeholders invited to attend - for example with directly affected and surrounding landowners).
» Telephonic consultation sessions (consultation with various parties from the EIA project team, including the project participation consultant, lead EIA consultant as well as specialist consultants).
» Written, faxed or e-mail correspondence.
» The Draft EIA Report was released for a 40-day public review period from 3 March 2015 – 15 April 2015: The comments received from I&APs were captured within a Comments and Response Report, which is included within the EIA Report, for submission to the authorities for decision-making.

In terms of the requirement of Chapter 6 of the EIA Regulations of June 2010, the following public participation tasks are required to be undertaken:

» Distribution of Letters of Notification to I&APs to inform them of commencement with the EIA phase.
» Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of—
    (i) the site where the activity to which the application relates is or is to be undertaken; and
    (ii) any alternative site mentioned in the application;
» Giving written notice to:
    (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
    (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iii) Owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
    (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;

(v) the municipality which has jurisdiction in the area;
(vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
(vii) any other party as required by the competent authority.

» Placing an advertisement in:
(i) one local newspaper; and
(ii) in at least one provincial newspaper.
» Open and maintain a register/ database of interested and affected parties and organs of state.
» Release of a Draft EIA Report for Public Review for a 40-day period.
» Hosting of a Public Meeting and Focus Group Meetings by the EAP to discuss and share information on the project.
» Preparation of a Comments and Responses Report which document all the comments received and responses from the project team.
» Apart from the 40 day commenting period on the Draft EIR, in order to give effect to Regulation 56(2), registered Interested and Affected parties were given access to, and an opportunity to comment on the final report in writing before submitting the final environmental impact assessment report to the DEA.

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

» **Placement of Site Notices**
Site notices have been placed on-site and at relevant public places and proof of this is included in Appendix D.

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

Table 4.1: Key stakeholder groups identified during the EIA Process

Stakeholder Group	Department
National and Provincial Authorities	» North West Department of Economic Development, Environment and Tourism » Department of Transport and Public Works » Department of Water Affairs » South African Heritage Resources Agency » Department of Agriculture, Forestry and Fisheries » South African National Roads Agency » Department of Energy

Stakeholder Group	Department
	» Civil Aviation Authority » Square Kilometre Array (SKA) Project
Municipalities	» Maquassi Hills Local Municipality » Dr Kenneth Kaunda District Municipality
Public stakeholders	» Landowners, surrounding landowners, occupiers of land, farmer's unions.
Parastatals & service providers	» Eskom Transmission and Distribution » North West Provincial Heritage Resources Authority
NGOs/Business forums	» Wildlife Environment Society of South Africa » BirdLife South Africa

All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C). While I&APs were encouraged to register their interest in the project from the onset of the process undertaken by Savannah Environmental, the identification and registration of I&APs has been on-going for the duration of the EIA phase of the process.

» **Newspaper Advertisements**
Newspaper advertisements were placed to inform the public of the availability of the draft EIA Report for comment in the following publications:
* Overvaal (March 2015)

Appendix D includes proof of newspaper advertisements which were placed during the EIA Phase.

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

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

Meetings were held with I&APs and stakeholders during the EIA phase. Records of all consultation undertaken are included in **Appendix D**.

4.2.4 Identification and Recording of Issues and Concerns

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into a Comments and Response Reports. The Comments and Response Report includes responses from members of the EIA project team and/or the project proponent.

No issues of concern were provided by I&APs during the public comment period or at the public meeting held. The proposed facility was generally well received by attendants of the public meeting.

4.2.5 Assessment of Issues Identified through the Scoping Process

Issues which require investigation within the EIA Phase, as well as the specialists involved in the assessment of these impacts are indicated in Table 4.2 below.

Table 4.2: Specialist studies undertaken within the EIA Phase

Specialist study	Specialist	Refer Appendix
Ecological Impact Assessment	Simon Todd (Ecologist)	Appendix E
Soils and Agricultural Potential Assessment	Johann Lanz (Soil Scientist and Consultant)	Appendix F
Visual Impact Assessment	Mandy van der Westhuizen of NuLeaf	Appendix G
Social Impact Assessment	Candice Hunter of Savannah Environmental and Neville Bews of Neville Bews and Associates	Appendix H
Heritage Impact Assessment	Jaco van der Walt (Archaeological Contracts and Heritage Consulting (HCAC))	Appendix I
Palaeontology specialist report	Dr John Almond of Natura Viva	Appendix J

Specialist studies considered direct, indirect, cumulative, and residual environmental impacts associated with the development of the proposed Wolmaransstad 75MW Solar Energy Facility. Issues were assessed in terms of the following criteria:

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

- Long term (> 15 years) - assigned a score of 4
- Permanent - assigned a score of 5

» The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
- 0 is small and will have no effect on the environment
- 2 is minor and will not result in an impact on processes
- 4 is low and will cause a slight impact on processes
- 6 is moderate and will result in processes continuing but in a modified way
- 8 is high (processes are altered to the extent that they temporarily cease)
- 10 is very high and results in complete destruction of patterns and permanent cessation of processes

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

» The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high

» The **status**, which is described as either positive, negative or neutral

» The degree to which the impact can be reversed

» The degree to which the impact may cause irreplaceable loss of resources

» The degree to which the impact can be mitigated

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

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

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

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

» **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area)

» **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated)
» **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area)

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

4.2.6 Assumptions and Limitations

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

» All information provided by the developer and I&APs to the environmental team was correct and valid at the time it was provided.
» It is assumed that the development site identified by the developer represents a technically suitable site for the establishment of the proposed Wolmaransstad 75MW Solar Energy Facility.
» It is assumed correct that the proposed connection to the National Grid is correct in terms of viability and need.
» Studies assume that any potential impacts on the environment associated with the proposed development will be avoided, mitigated, or offset.
» This report and its investigations are project-specific, and consequently the environmental team did not evaluate any other power generation alternatives.

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

DESCRIPTION OF THE RECEIVING ENVIRONMENT CHAPTER 5

This section of the EIA Report provides a description of the environment of the greater farm portion as well as the specific site within the greater farm portion that may be affected by the proposed Wolmaransstad 75MW Solar Energy Facility project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as site investigations, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist reports contained within **Appendices E - J**.

5.1 Regional description

The proposed project site is situated on the Remainder of Portion 2 of the Farm Wolmaransstad and Townlands 184 to the west of Wolmaransstad (SG Code: TOHO00000000018400002) which is under the ownership of the Maquassi Hills Local Municipality. The centre coordinate of the site is 27 10' 27.80'' S ; 25° 57' 44.12'' E.

Topography: The topography within the study area consists of slightly irregular undulating plains and hills. Elevation ranges from 1445 m above mean sea level (amsl) in the high lying hills in the north and north east to 1335 m amsl along the lower lying areas and drainage lines in the south of the study area. The site itself is located in elevated topography that forms part of a local watershed.

Land cover: Wolmaransstad is the only town within the broader region, but homesteads and small agricultural settlements occur throughout, corresponding with agricultural land use areas. The region is primarily characterised by the occurrence of agricultural fields, grasslands and bushlands. Only a small portion in the south eastern section of the site is identified as agricultural fields with the majority of the site comprising of grasslands and bushlands (refer to Figure 5.1).

Land use: Current land use across the entire farm is characterised primarily by the presence of energy distribution infrastructure (substation and various power lines). Informal grazing takes place on site, however this practice is not managed as the land is municipally owned. The eastern sections of the farm consist primarily of naturalised or recovered croplands which is traversed by a 22kV overhead power line. The western sections of the farm are in a largely natural state with a higher concentration of indigenous trees. The southern section of the farm is characterised by the occurrence of numerous un-rehabilitated borrow pits

or excavations, as well as a higher concentration of gravel roads as compared to the rest of the farm.

Neighbouring land use: The site is bordered by privately owned as well as municipal owned land. While the project site is situated outside of the Wolmaransstad urban area, it shares a boundary with an industrial area situated at the convergence of the R504 and R505 to the south-east of the project site. Land use activities to the south, west and north are predominantly agricultural in nature being mostly naturalised or recovered areas where crop farming was historically undertaken. There are three farm houses bordering the project site, two to the north and one to the east. Most of the urban activities are concentrated in Wolmaransstad further to the east. An airfield is also situated to the east of the project site.

Access: The project site is bordered by the R504 to the south and the R505 to the east which both provide easy access onto the project site via existing gravel roads. The N12 National Road is situated within 2.5km from the project site.

Grid connectivity: The Goat DS 132/88kV Substation is situated in the southern section of the site and the presence of overhead power lines in southerly, westerly and easterly directions represent existing linear disturbances on the farm. The following overhead power lines connect to the substation from a northerly, southerly, easterly and westerly direction:

» Goat DS - Wolmaransstad Municipality 1 88kV power line
» Goat DS - Schweizer Reneker Municipality 1 88kV power line
» Goat DS - Klipfontein Rural 1 88kV power line
» Goat DS - Mimosa Rural power line
» Goat DS - Leeufontein Rural power line
» Goat DS - TEE 1 132kV power line

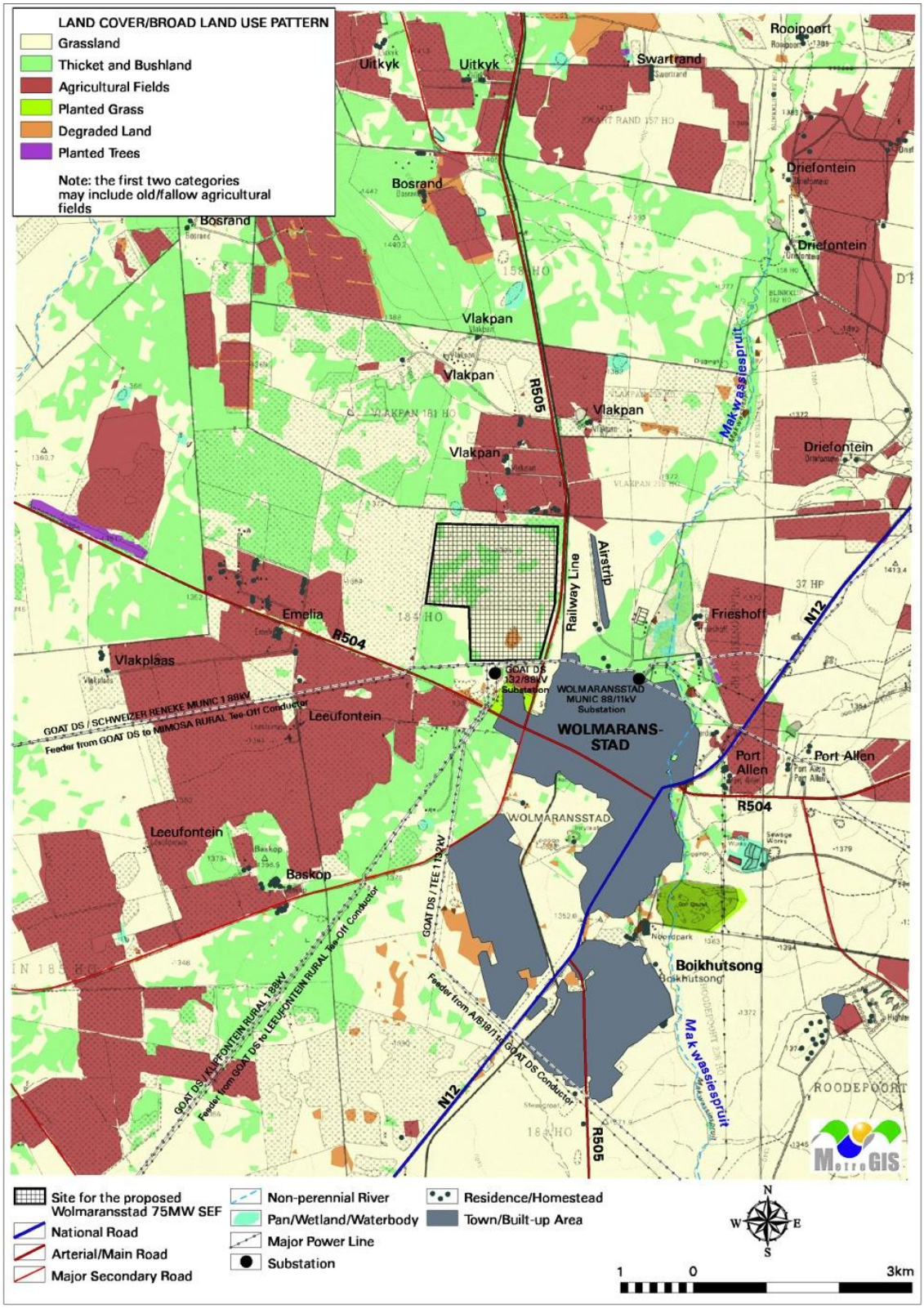

Figure 5.1: Land cover and land use map of the study area

5.2 Climate

Wolmaransstad normally receives about 391mm of rain per year, with most rainfall occurring mainly during mid-summer. Wolmaransstad receives the lowest rainfall (0mm) in June and the highest (73mm) in January. The average midday temperatures for Wolmaransstad range from 17.6°C in June to 30°C in January.

5.3 Geology and palaeontological potential

The Ventersdorp Supergroup represents a major episode of igneous extrusion that is associated with fracturing of the Kaapvaal Craton some 2.7 billion years ago. The basal lava pile termed the Klipriviersberg Group - mainly basaltic lavas welling up in fissure eruptions, totalling up to two kilometres thick and 100 000 km^2 in extent - accumulated over a comparatively short period of some six million years. The overlying Platberg Group comprises a range of felsic to mafic volcanic rocks, including lavas and pyroclastics, such as the porphyritic felsites and pyroclastic flows of the Makwassie Formation. The Rietgat Formation at the top of the Platberg Group consists of intercalated volcanic rocks (basic to intermediate lavas, pyroclastics), shales and greywackes as well as chemical sediments (cherts, stromatolitic calcarenites).

Although the Rietgat Formation is known for important Archaean stromatolite occurrences, the Rietgat rocks represented in the study area are volcanic in origin as is the case with the other Ventersdorp Supergroup rocks in the study area, and are therefore not fossiliferous. The areas near Wolmaransstad are generally of low palaeontological sensitivity.

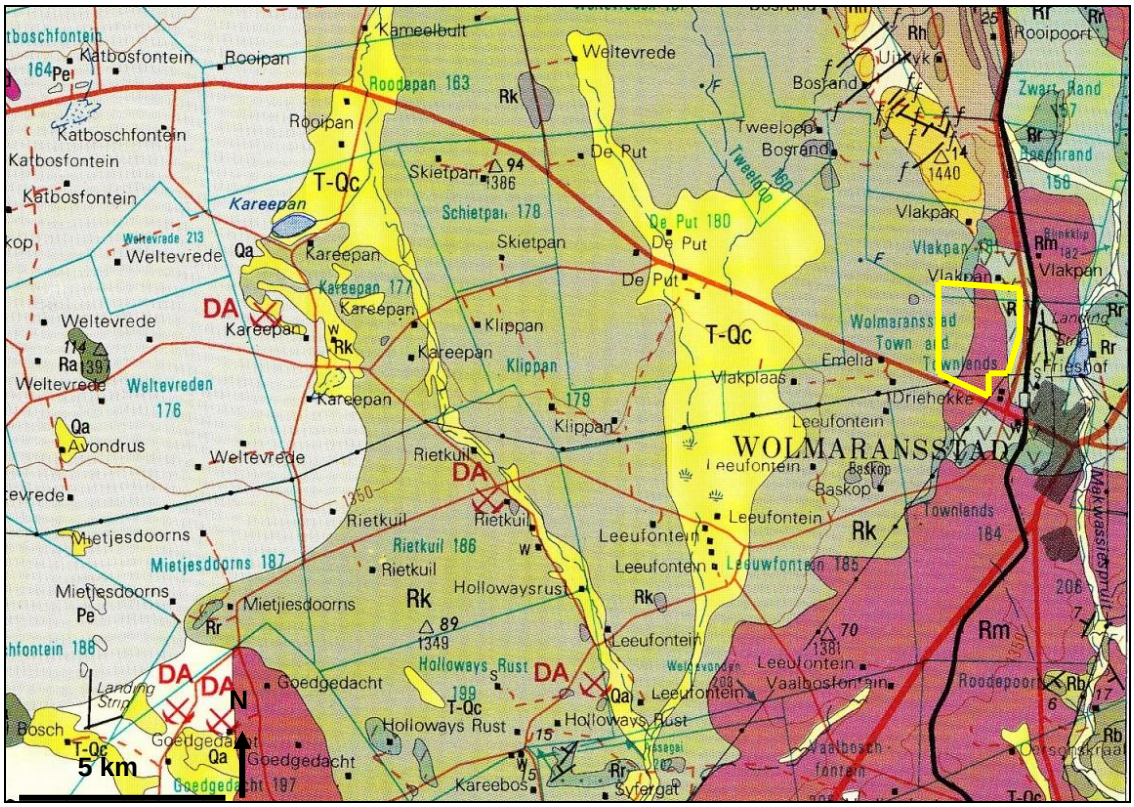

Figure 5.2: Extract from 1:250 000 geological map (Council for Geoscience) indicating the project site (yellow polygon)

5.4 Soils and agricultural capability

The site is in an upland terrain position within a Highveld plateau with minimal relief. It is at an elevation of 1,380 meters and the slope across the site is approximately 2%. There is a single land type across the site and surrounding area, namely Bc19. This land type is dominated by moderately deep, red sandy soils with plinthic subsoils, but shallower soils on underlying rock also occur.

Land capability is the combination of soil suitability and climate factors. The site has a land capability classification, on the 8 category scale, as: Class 4 – marginal potential arable land. Land on the site is classified as having a low susceptibility to erosion.

As an indication of agricultural potential on the site, the land is classified on AGIS as having a potential maize yield (50 percentile) of between 0.6 and 1.4 tons per hectare. The natural grazing capacity of the site is given as 8-13 hectares per large stock unit.

The major limitations to agriculture are the aridity and lack of access to water, as well as the shallow soils that occur in places across the site.

5.5 Regional floristic description

5.5.1 Broad scale vegetation patterns and conservation status

According to the national vegetation map (Mucina & Rutherford 2006), the entire farm falls within the Klerksdorp Thornveld vegetation type (refer to Figure 4.7). This vegetation type is 3928km^2 in extent and belongs to the Grassland Biome and occurs in two regions, the first in the Wolmaransstad, Ottosdal and Hartebeestfontein region and the other from the Botsolano Game Park north of Mafikeng to the vicinity of Madibogo in the south. Mucina and Rutherford describe the vegetation type as consisting of plains or slightly undulating plains with open to dense *Acacia karoo* bush clumps in dry grassland. However, this description does not fit the site especially well, which can rather be characterised as a savannah-type landscape with scattered *Acacia erioloba*, *Acacia caffra*, *Acacia hebeclada*, *Ziziyphus mucronata* and *Searsia lancea* trees with an understory of perennial grasses and low forbs. The Klerksdorp Thornveld vegetation type occurs on a variety of soils associated mainly with the Fb and Bc land types.

No endemic species are known from this vegetation type. Approximately 70.8% of Klerksdorp Thornveld is considered intact according to Mucina & Rutherford (2006), with cultivation and urban sprawl being the primary causes of transformation. Despite the relatively high level of transformation Klerksdorp Thornveld is not considered threatened under the National List of Threated Ecosystems (2011), despite being listed as Vulnerable by Mucina & Rutherford.

Listed and protected plant species: According to the SANBI SIBIS database, five listed plant species are known from the area and include *Boophone disticha* (Declining), *Brachystelma incanum* (Vulnerable), *Nerine gracilis* (Near Threatened), *Acacia erioloba* (Declining) and *Pelargonium sidoides* (Declining).

Critical Biodiversity Areas: The site falls within the planning domain of the North-West Province Biodiversity Conservation Assessment (Skowno & Desmet 2008), which maps Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) within the North West Province. The following is of relevance (refer to Figure 5.3):

- A Tier 2 terrestrial CBA aimed at protecting the intact remnants of Klerksdorp Thornveld from further transformation overlaps with virtually the entire site, as is characteristic of most outlying areas around Wolmaransstad.
- The western third of the site also falls within a Tier 1 Aquatic CBA as part of a sub-quaternary priority catchment (Quaternary Catchment C25E). These are catchments which have a low level of transformation and are therefore considered important for the maintenance of aquatic ecological

processes. Erosion and similar impacts which affect hydrological processes are especially undesirable in such areas.

The western section of the project site is situated in Quaternary Catchment C25E while the eastern section of the project site is situated in Quaternary Catchment C25D. Although this catchment is considered a CBA under the North West CBA layer, it is important to note that this area is not considered a priority catchment under the NFEPA, this suggests that potential impacts would have significance at a local level rather than at a broader level.

Conservation areas: The site is not situated on or in close proximity to conservation areas or areas defined in terms of the National Protected Area Expansion Strategy 2010 (NPAES), the nearest of which is situated approximately 5km to the west of Wolmaransstad.

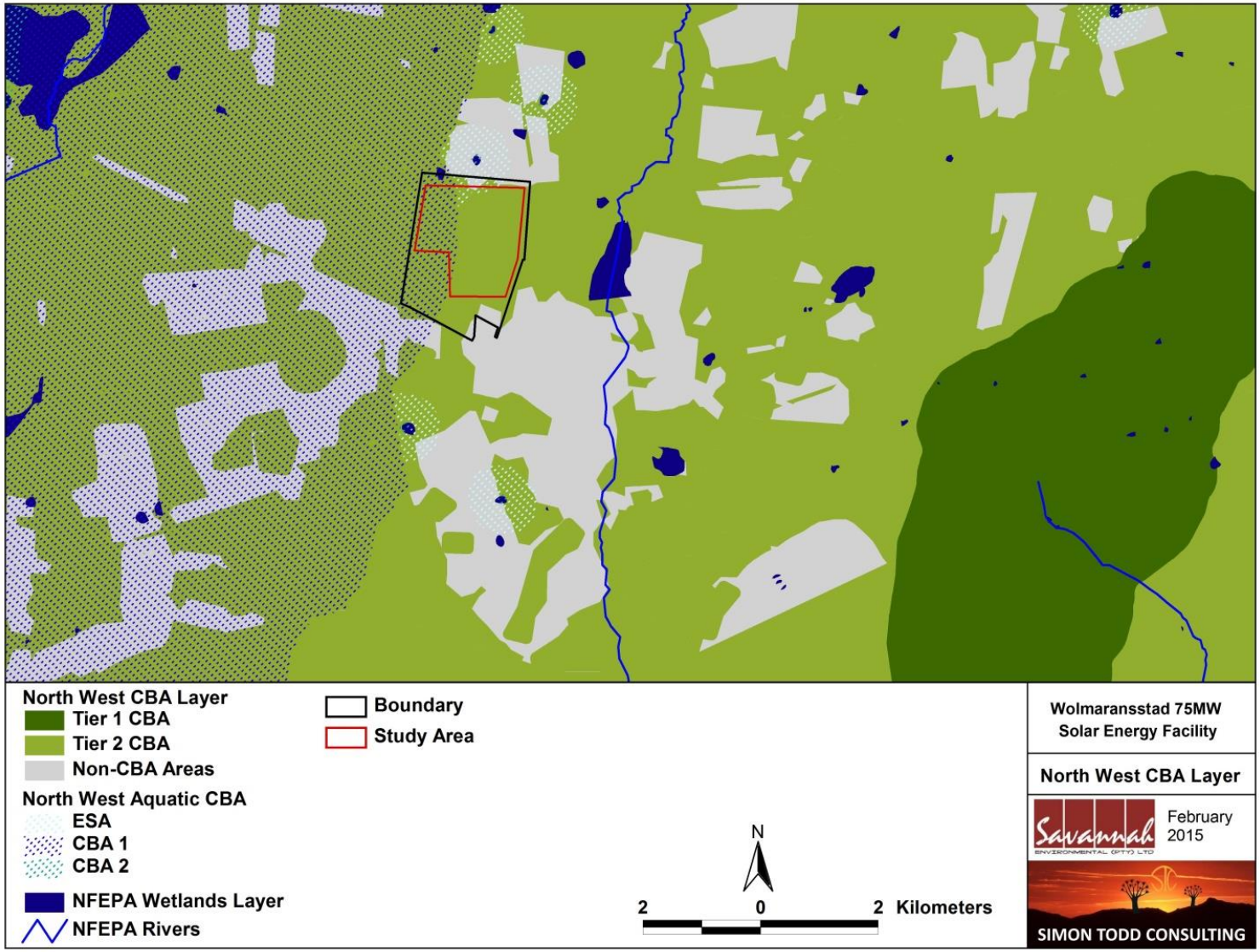

Figure 5.3: The Critical Biodiversity Areas map relative to the proposed Wolmaransstad 75MW Solar Energy Facility site

5.5.2 Fine scale vegetation patterns

A number of different habitats were identified at the site during the site visits undertaken by the ecologist including the following (refer to Figure 5.4):

- » Old lands / transformed grasslands;
- » Intact grasslands / savannah;
- » Open woodlands;
- » Dense woodlands;
- » Pans; and
- » Disturbed and degraded areas.

Old lands / transformed grasslands: Within the proposed development areas, the majority of the site consists of previously transformed grassland. These areas are however not obviously transformed and have not been ploughed in some years, with the result that the vegetation cover has recovered well leaving little to differentiate these areas from previously undisturbed areas. However, there are few geophytes in these areas and the grass layer has also been homogenised. Although tree cover in this area is lower than within previously undisturbed areas, there are still a relatively large numbers of trees present, probably because many of these were not cleared when the site was ploughed. These are mostly *Acacia karoo* with some areas of *Acacia erioloba* woodland. The abundance of *Acacia erioloba* at the site is relatively high and at least within the old lands, it is clear that this species is increasing as most trees are relatively young and have probably recruited after the site was transformed.

Intact grasslands: Typical and dominant species in transformed grassland habitat as well as the adjacent intact grassland includes grasses such as *Eragrostis lehmanniana* var. *lehmanniana*, *Eragrostis superba*, *Anthephora pubescens*, *Aristida congesta* subsp. *barbicollis*, *Stipagrostis uniplumis* var. *neesii, Cynodon dactylon*, *Heteropogon contortus*, *Themeda triandra* and *Pogonarthria squarrosa*; shrubs such as *Acacia hebeclada*, *Felicia muricata*, *Anthospermum rigidum*, *Asparagus burchellii*, *Hermannia tomentosa*, *Pentzia globosa* and *Helichrysum dregeanum*. Within the intact grassland common geophytes include *Bulbine asphodeloides*, *Bulbine abyssinica*, *Hypoxis hemerocallidea* and *Boophone disticha* as well as the tuberous *Pterodiscus speciosus*.

Dense woodlands: The western margin of the proposed development area lies within an area that does not appear to have been transformed in the past and contains a relatively high density of trees. Typical and dominant species include *Acacia karoo*, *Acacia erioloba* with occasional *Searsia lancea*, *Acacia caffra*, *Acacia hebeclada* and *Grewia flava*. Due to the high density of woody species, this area is ascribed to have a relatively higher sensitivity than the rest of the site.


Pans: There is also a small wetland feature along the north western boundary of the site, but this is currently outside of the study area and would not be affected by the development.

Disturbed and degraded areas: There is also a borrow pit within the proposed development footprint, that was identified as a potential wetland during the scoping phase. However, this area is not considered sensitive and a lot of material for road construction has been removed from this area which measures almost 3ha in extent. As it is lower than the surrounding landscape, it would probably need to be partly filled again or at least engineered to reduce the slope of the edges of the pit before construction.


Within the more disturbed parts of the site which are mostly to the southwest of the substation and outside of the current development area, there is a variety of alien species present including *Cylindropuntia imbricata*, *Opuntia humifusa*, *Opuntia ficus-indica*, *Agave americana*, *Melia azedarach*, *Parkinsonia aculeata*, *Tagetes minuta* and *Solanum elaeagnifolium*. The presence of these species at the site suggests that disturbance at the site for construction activities would be likely to encourage the invasion of these species given the ready seed source in close proximity to the site.

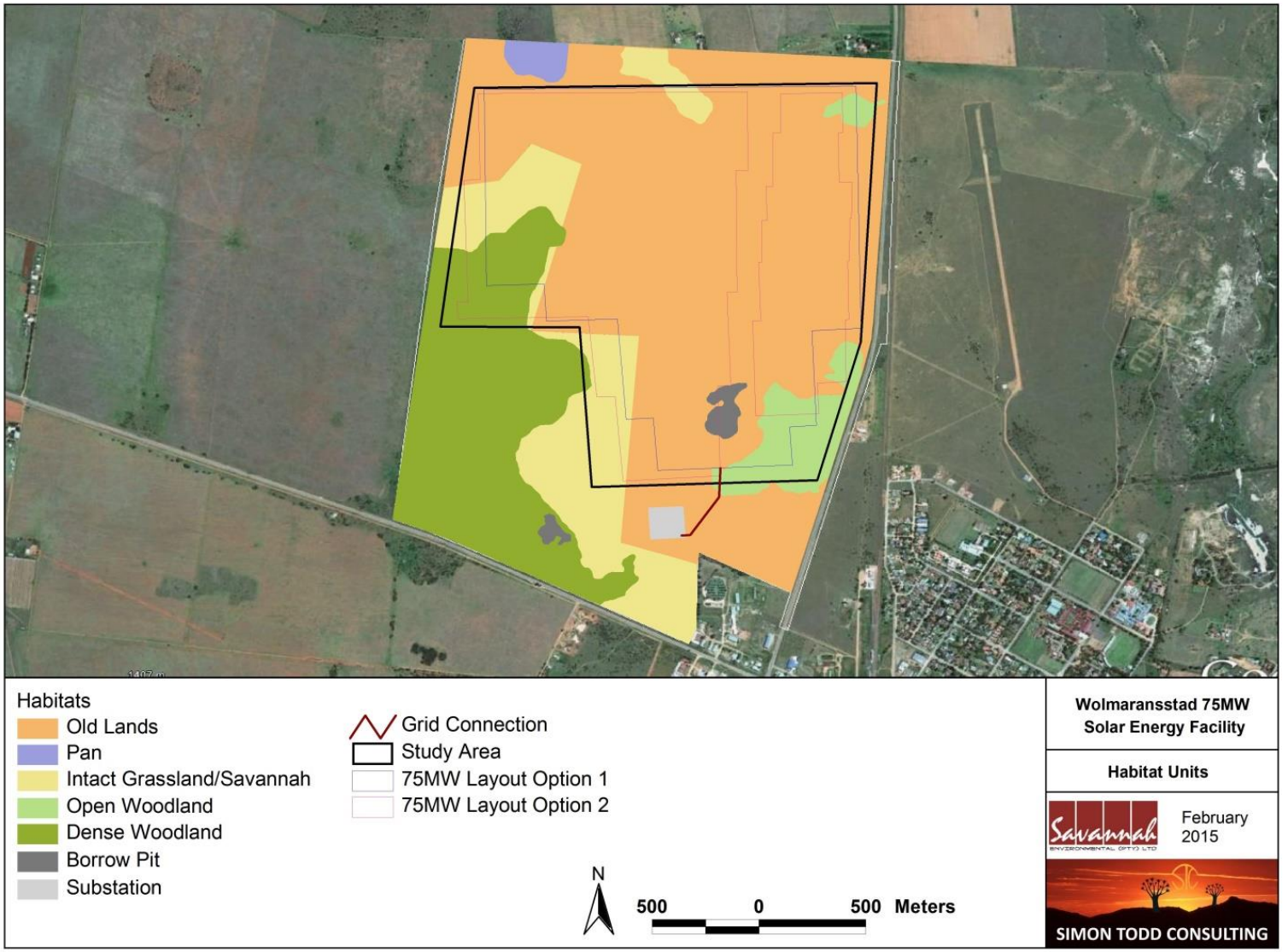

Figure 5.4: Habitat units as identified during the site visit within the proposed Wolmaransstad 75MW Solar Energy Facility study area.

5.6 Faunal communities

5.6.1 Mammals

Although the potential diversity of mammals at the Wolmaransstad PV Facility site is high with as many as 54 terrestrial mammals and 9 bats present, there are several factors which will reduce the actual number of species present at the site. This includes the proximity of the site to Wolmaransstad, the transformed nature of a large proportion of the site and the relatively limited range of habitats present. Species observed at the site include South African Ground Squirrel, African Mole Rat, Steenbok, Cape Porcupine, Aardvark and Scrub Hare.

Listed mammals which may occur in the area include the White-tailed Mouse *Mystromys albicaudatus* (Endangered), Brown Hyaena *Hyaena brunnea* (Near Threatened), Black-footed Cat *Felis nigripes* (Vulnerable), Honey badger *Mellivora capensis* (IUCN LC, SA RDB EN), South African hedgehog *Atelerix frontalis* (SA RDB NT) and Ground Pangolin *Smutsia temminckii* (VU).

5.6.2 Reptiles

As with mammals, the reptile diversity in the area is relatively high with as many as 45 reptiles present. However, no listed species have been recorded from the area. Habitat diversity within the site is relatively low and restricted to open grassland and savannah. There are no rocky outcrops within the site and no drainage lines or wetlands within the affected area. As a result, species present within the site are likely to be those associated with open ground or low levels of tree cover.

5.6.3 Amphibians

A total of 14 amphibians are known from the area, the majority of which are widespread relatively common species. There are no narrow endemic species known from the area. The only listed species known from the area is the Giant Bullfrog *Pyxicephalus adspersus* which is listed as Near Threatened. There are however no wetlands or pans within the affected area that would be suitable habitat for this species. As a result, an impact on this species is not likely.

5.6.4 Avifauna

According to the SABAP1 database 197 species have been recorded from the quarter degree square 2725 BB. This QDS has not been well sampled during SABAP2 and the older SABAP1 database is used in preference. From the combined list, 8 IUCN-listed are known from the area, of which three are likely to utilise or pass through the site at least on an occasion basis (Table 2). Species which are

observed with a high frequency in the area include the Greater and Lesser Flamingo and the Lesser Kestrel. As there are no pans at the site which would attract flamingos, the Lesser Kestrel is the only species that is probably a regular visitor to the area.

5.7 Surface water

There are no perennial or non-perennial drainage lines on the project site and no surface water resources will be impacted by the proposed project. Stormwater moves as sheet flow across the site after rainfall events.

There is a ~3ha borrow pit within the proposed development footprint, that was previously identified as a potential wetland during the scoping phase. However, this area is not considered sensitive and a lot of material for road construction has been removed. A pan is located on the northern boundary of the study area, approximately 100m from the northern boundary of the PV array footprint. This pan will not be affected by construction activities and a buffer of 100m has been delineated around the pan.

5.8 Heritage Resources

Wolmaransstad is located close to the Makwassie River. The name Makwassie is a San word and is derived from the vast number of aromatic wild spearmint bushes that grew alongside the river. Fourteen kilometres south of Wolmaransstad lay the village of Makwassie. It was the site of one of the first mission stations in the North-West Province, established by two Wesleyan missionaries, Thomas Hodgson and Samuel Broadbent in 1822.

The Voortrekkers settled in the Wolmaransstad district in the 1840's. From 1845 onward they gradually moved westward from Potchefstroom to settle in the present Wolmaransstad district. This stage of settlement was completed around 1870 when all the farms available in the district had been occupied.

Wolmaransstad was predominantly established to serve an agricultural community which produced maize. Later ground-nuts were also cultivated. A branch of the South-Western Transvaal Agricultural Co-operative was established at Makwassie in the 1920s. It was an offshoot of the original Wolmaransstad Kooperative Landbou Vereeniging established in 1909. Most of the African population in the Wolmaransstad region in the twentieth century were tenants living on white farms. Few lived under powerful traditional leaders, and many became sharecroppers on white owned farms.

Heritage finds: The project site is disturbed by earthworks presumably for sand mining and the remaining area was extensively ploughed in the past and the contours are clearly visible on satellite imagery. Several stone cairns occur throughout the project area and are attributed to clearing of the agricultural fields in order to plough the area (cut marks are visible on the stones). Some of these cairns were mapped to indicate their distribution and frequency however it is assumed that more occur in the study area. One cluster of approximately 10 stone cairns occurs on the north western periphery of the abandoned quarry that could possibly be informal graves.

5.9 Palaeontological potential

Although the Rietgat Formation is known for important Archaean stromatolite occurrences, the Rietgat rocks represented in the study area are volcanic in origin as is the case with the other Ventersdorp Supergroup rocks in the study area, and are therefore not fossiliferous. The areas near Wolmaransstad are generally of low palaeontological sensitivity.

5.10 Visual Quality of the Study Area

The visual quality of the region is generally high. Large tracts of intact bushland characterise most of the visual environment, and the settlements, where these occur, are quaint and neat. This lends a distinct sense of place to the area, but the landscape is not unique.

Sensitive visual receptors include residents on the outskirts of Wolmaransstad as well as a number of homesteads such as Vlakpan, Frieshoff and Emelia. Other sensitive visual receptors include users of the R504 and the R505. Other visual receptors in close proximity include the residents of Wolmaransstad, although parts of the town are low-lying relative to the facility site.

5.11 Socio-Economic Environment

Wolmaransstad Town Area is a relatively isolated, small and undeveloped town; however it is the largest settlement in the Maquassi Hills municipality, an urban area which includes the CBD with institutions such as schools, commercial and business centre, and includes the Tswelelang Township. The Maquassi Hills Local Municipality has been a struggling over the years with challenges such as poor revenue collection and financial management, sanitation backlogs, lack of project management, poor service delivery and infrastructure.

5.11.1 Economy

The following economic sectors that contributed the most to the DKKDM Gross Domestic Product (GDP) in 2007:

- Mining - 19.6%
- Trade - 17.3%
- Finance - 16.2%
- Government - 13.8%

Agriculture only contributed 2.3% towards GDP in the District.

The Economically Active Population in the LM is 61.8%. The high proportion of potentially economically active persons implies that there is a larger human resource base for development projects to involve the local population. The unemployment rate within the LM is high at 33.4% compared to the national (25.2%) and provincial (26.2%) unemployment rate.

5.11.2Social aspects

Population: According to Statistics South Africa (Census 2011), the population of the DKKDM (based on 2010 boundaries) is 695 933, which increased from 599 670 in 2001. The population is unevenly distributed among the four Local Municipalities and the average annual growth rate of the district is 1.49%. The MHLM has a population of 77 794 people and a population density of 17/km^2.

Age composition and gender differentiation: The dependency ratio indicates the amount of individuals that are below the age of 15 and over the age of 64, that are dependent on the Economically Active Population (EAP) (Individuals that are aged 15-64 that are either employed or actively seeking employment). 61.8% of the MHLM comprise the Economically Active Population (EAP) while 33% of the MHLM population are dependent on the EAP.

The working age demographic (age 15-65) in the MHLM made up, 61.8% of the population. The high proportion of potentially economically active persons implies that there is a larger human resource base for development projects to involve the local population. However, the youth still represents a large proportion of the population, which means that focus still needs to be placed on youth development.

Education levels: Education plays a critical role in the development of communities and impacts greatly on economies. The type of education and training received by individuals equally determines the occupation or career they would eventually pursue. It provides a set of basic skills for development, creativity and innovative abilities. The level of education influences growth and economic productivity of a region. There is a positive correlation between a higher level of education and the level of development and standard of living.

The North West Municipal Report Census 2011 indicates that majority of the population aged 20 years and older have completed matric at a provincial, district and local level. A small percentage of the population have higher education. However a significant number of the Maquassi Hills LM population have no schooling meaning that the majority of the population have a low-skill level and would either need job employment in low-skill sectors, or better education opportunities in order to improve the skills level of the area, and therefore income levels.

Education alone cannot eradicate poverty; rather, education coupled with greater job opportunities in the economy will be the roadmap out of poverty (Stats SA, 2014).

Annual household income levels: The average household incomes of the LM are as follows:

- 77.3% of households are classified as low income earners.
- 20.6% of households are classified as middle income earners;
- 2.2% of households are classified as high income earners.

The majority of the population is dependent on forms of assistance either from government and or non-government organisations (MHLM IDP 2014-2016). The high poverty level has social consequences such as not being able to pay for basic needs and services. However skill levels are less likely to improve unless education levels improve which will lead to more skilled people which will in turn lead to the opportunity to earn higher income levels. This means that there should be less focus on the quantity of job creations and more focus on the quality of jobs created.

5.11.3Infrastructure and services

According to Census 2011, the following is relevant in terms of access to basic services:

- 74.4% of households within the LM (versus 84.2% of households in the DM) have flush toilets connected to a sewage system,
- 52.6% of households within the LM (versus 75.3% of households at a district level) have weekly refuse removal,
- 32.2% of households at a LM level and 47.9% at a district level have piped water inside the dwelling, and
- 82.8% of households at the LM level and 88.6% at the DM level have access to electricity.

ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED FACILITY CHAPTER 6

This chapter serves to assess the significance of the positive and negative direct and indirect environmental impacts (cumulative considered in Chapter 7) expected to be associated with the development of the proposed Wolmaransstad 75MW Solar Energy Facility. This assessment is done for all of the facility's components which will comprise:

» Photovoltaic (PV) panels of between 4m – 6m in height (fixed or tracking technology) with a contracted capacity of up to 75MW
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels
» Cabling between the project components, to be lain in trenches ~ 1-2m deep
» Power inverters between the PV arrays (±4.5m^2)
» Overhead power line to evacuate the power into the Eskom grid via the existing Goat DS 132/88kV Substation
» Main and internal access roads (up to 7m wide)
» Water storage facility/ reservoir
» Office, workshop area for maintenance and storage
» Temporary laydown area
» Perimeter fencing

The development of the proposed project will comprise of the following phases:

» *Pre-Construction and Construction* – will include pre-construction surveys; site preparation; establishment of the access road, electricity generation infrastructure, construction camp, temporary and permanent laydown areas, transportation of components/construction equipment to site; and undertaking site rehabilitation and establishment and implementation of a stormwater management plan. This will occur over a period of 18-24 months.
» *Operation* – will include operation of the facility and the generation of electricity. The operational phase is expected to extend in excess of 20 years.
» *Decommissioning* – depending on the economic viability of the plant, the length of the operational phase may be extended. Alternatively decommissioning will include site preparation; disassembling of the components of the facility; clearance of the site and rehabilitation. Note that impacts associated with decommissioning are expected to be similar to construction. Therefore, these impacts are not considered separately within this chapter.

6.1. Methodology for the Assessment of Impacts

A broader site of 463 hectares was identified by the project developer for the purpose of establishing the proposed Wolmaransstad 75MW Solar Energy Facility. However, the developmental footprint for the 75MW project will cover an extent of approximately 270 hectares. A preliminary facility layout was developed by taking cognisance of the environmental sensitivities and technical preferences identified during the scoping phase and refined based on surveys conducted during the EIA phase. This 270 hectares is likely to suffer disturbance, particularly during the construction phase, as the establishment and operation of a PV plant may result in whole-scale disturbance to significant portions of the affected site where infrastructure is located.

The assessment of potential issues has involved key input from specialist consultants, the project developer, key stakeholders, and interested and affected parties (I&APs). The Comments and Response Report included within Appendix E lists these issues and the responses given by the EAP during the Scoping Phase. Meetings with adjacent landowners and the municipality were also held during the EIA Phase.

In order to assess the potential impacts associated with the proposed facility, it was necessary to quantify the extent of the permanently and temporarily affected areas. This includes the area required for the photovoltaic panels and associated infrastructure and substation, and equates to ~58.3% of the entire farm portion (i.e. (270ha/463ha) x100).

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

The sections which follow provide a summary of the findings of the assessment undertaken for potential impacts associated with the construction and operation of the proposed solar energy facility on the identified site. Issues were assessed in terms of the criteria detailed in Chapter 4 (Section 4.2.5). The nature of the potential impact is discussed; and the significance is calculated with and without the implementation of mitigation measures. Recommendations are made regarding mitigation/enhancement and management measures for potentially significant impacts and the possibility of residual and cumulative impacts are noted.

6.2.1 Potential Impacts on Ecology

Critical Biodiversity Area: A Tier 2 terrestrial CBA aimed at protecting the intact remnants of Klerksdorp Thornveld from further transformation covers virtually the entire site, as is characteristic of most outlying areas around Wolmaransstad. The western third of the site also falls within a Tier 1 Aquatic CBA as part of a sub-quaternary priority catchment (Quaternary Catchment C25E). These are catchments which have a low level of transformation and are therefore considered important for the maintenance of aquatic ecological processes. Erosion and similar impacts which affect hydrological processes are especially undesirable in such areas.

Although the transformation of intact habitat within the CBA is undesirable, the impact of the current development is less than it could be due firstly to the fact that a large proportion of the site has been transformed in the past and is not actually intact habitat. However, for the purposes of most fauna, they would not differentiate intact from previously disturbed areas due to the age of the transformation and the extent of recovery of the vegetation. Secondly, the site is in close proximity to the urban fringe of Wolmaransstad and so the potential impact of the development on landscape connectivity would be lower than if the site was more remotely located.

Mammals: Although it is likely that most of the listed species identified are present in the wider area, many of these are shy species that probably avoid the proximity of Wolmaransstad. For most fauna present, the primary impact of the development would be habitat loss. Given the proximity of the development to the urban fringe, it is likely that impacts on habitat fragmentation would be relatively low for most fauna.

Reptiles: As with mammals, the use of the intact areas is likely to be higher than the use of the previously disturbed areas. Due to the relatively homogenous nature of the site, there are no specific features or habitats at the site which are considered especially sensitive for reptiles. The development would result in habitat loss for some species within the development area. It is however also likely that some species would be able to persist or increase within the development area as they would make use of the panels and support structures for shelter and habitat.

Amphibians: As there is no perennial water in the vicinity of the site, the amphibian community at the site is likely to be composed largely of species which are independent of water such as rain and sand frogs. The development would result in some habitat loss for such species, but this would not be likely to have any broader implications. Given the likely low overall abundance of amphibians at the site, it is not likely that impacts on amphibians would be highly significant.

Avifauna: Given the relatively limited extent of the proposed development area and the wide distribution of the listed species, the development is not likely to result in significant habitat loss for the listed species which may occur at the site. As many of the listed species are vulnerable to collisions with power lines, the grid connection would potentially generate a significant impact on listed avifauna. However in practice, the grid connection would be less than 400m long and as such, it is highly unlikely that this would generate a significant additional impact on avifauna.

Sensitivity mapping: As mapped and evident in Figure 6.1, the majority of the proposed development area consists of previously transformed veld of moderate to low sensitivity. There are some localised areas present which contain a high abundance of woody species such as *Acacia erioloba* which are consequently considered more sensitive. The western margin of the proposed PV development areas impinge to some degree on an area of high tree density, which is considered highly sensitive. Given the spatial requirement of the PV area and the available space at the site, there is little avoidance that can be implemented to reduce the impact to this area. The preferred layout alternative, Option 1 (requiring the realignment of a 22kV power line) would be preferable in this regard, as it would result in less overall loss of woody species. The major impacts associated with the development would be the loss of individuals of protected species, especially *Acacia erioloba*, some habitat loss for fauna and the potential disruption of landscape connectivity for fauna.

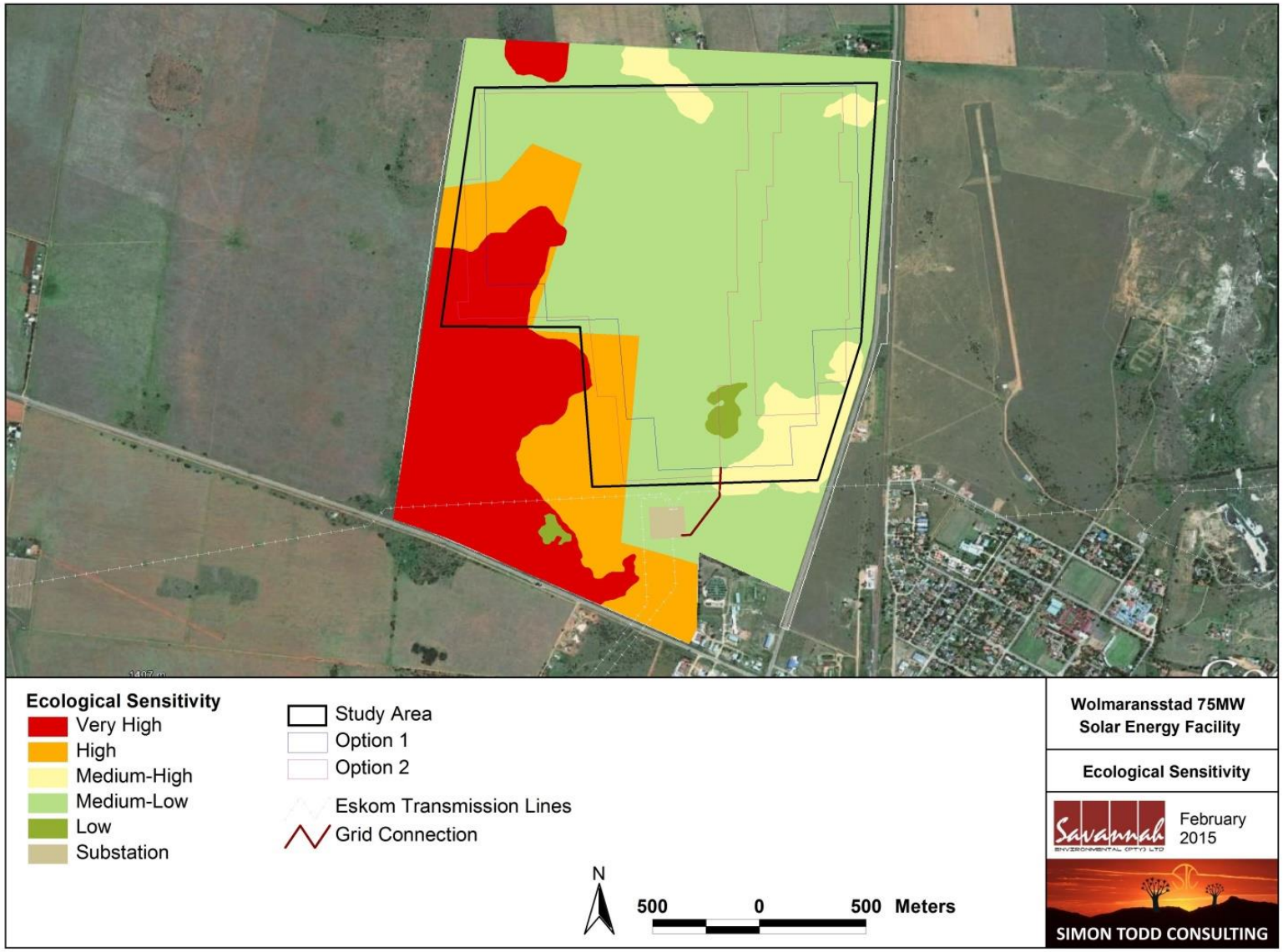

Figure 6.1: Ecology sensitivity map for the Wolmaransstad 75MW Solar Energy Facility project site

The tables to follow apply to all activities associated with the construction and operational phase of the proposed project, describing the nature of the identified ecological impacts within the project site. In summary, the following potential ecological impacts have been identified, and is expected to vary slightly between the two layout alternatives considered:

- Impacts on vegetation and protected plant species would occur due to vegetation clearing associated with the construction of the facility.
- Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.
- Alien plants are likely to invade the site as a result of disturbance created during construction
- The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility.
- The operation and presence of the facility may lead to negative impacts on avifauna as a result of electrocution or collisions with the associated power transmission infrastructure.
- Increased erosion risk as a result of soil disturbance and loss of vegetation cover as well as increased runoff generated by the panels and access roads.

a) Impacts on vegetation and protected plant species would occur due to vegetation clearing associated with the construction of the facility.

	Layout Option 1		**Layout Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (2)	Local (2)	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (3)	Long-term (4)	Long-term (3)
Magnitude	Medium (6)	Medium-Low (4)	Medium (7)	Medium (5)
Probability	Highly Probable (4)	Highly Probable (4)	Highly Probable (4)	Highly Probable (4)
Significance	Medium (48)	Medium (36)	Medium (52)	Medium (40)
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Low	Low	Low
Irreplaceable loss of resources	Low	Low	Low	Low
Can impacts be mitigated?	Species such as *Acacia erioloba* cannot be translocated and their density at the site is such that they cannot be avoided, therefore			

	an impact is inevitable and cannot be entirely mitigated. Biodiversity offsets are likely to involve replanting of trees in other areas of the site in accordance with biodiversity permits to be applied for.
Mitigation	» Avoid temporary activities in sensitive areas such as intact areas of Klerksdorp Thornveld » Vegetation clearing to commence only after walk through has been conducted and necessary permits obtained. » Vegetation clearing to be kept to a minimum. No unnecessary vegetation to be cleared. » All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed. » Temporary lay-down areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity. These areas should be rehabilitated after use.
Cumulative Impacts	The development would contribute to cumulative impacts on listed plant species as well as some loss of currently intact Klerksdorp Thornveld.
Residual Impacts	Some loss of vegetation is inevitable and cannot be avoided

b) Disturbance, transformation and loss of habitat will have a negative effect on resident fauna during construction.

	Layout Option 1		**Layout Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)	Short-term (2)	Short-term (2)
Magnitude	Medium (5)	Medium-Low (3)	Medium-high (5)	Medium (3)
Probability	Highly Probable (4)	Highly Probable (4)	Highly Probable (4)	Highly Probable (4)
Significance	Medium (32)	Low (24)	Medium (32)	Medium (24)
Status	Negative	Negative	Negative	Negative
Reversibility	Medium	Medium	Medium	Medium
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Large amounts of noise and disturbance at the site during construction is largely unavoidable and cannot be effectively mitigated.			

Mitigation	» Site access should be controlled and no unauthorized persons should be allowed onto the site. » Any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site. » Fires should not be allowed on site. » No fuelwood collection should be allowed on-site. » No dogs should be allowed on site. » If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All construction vehicles should adhere to a low speed limit to avoid collisions with susceptible species such as snakes and tortoises. » Faunal sweeps within habitats such as bush clumps should take place before clearing and any fauna located should form part of a search and rescue and relocated to safety.
Cumulative Impacts	During the construction phase the activity would contribute to cumulative fauna disturbance and disruption in the area.
Residual Impacts	Some habitat loss for fauna is an inevitable consequence of the development and cannot be fully mitigated. Noise and disturbance are typical of construction activities and cannot be avoided to a significant degree. The impact is however transient and confined to the construction period.

c) Alien plants are likely to invade the site as a result of disturbance created during construction

	Option 1		**Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Medium-term (3)	Long-term (4)	Medium-term (3)
Magnitude	Medium (4)	Low (2)	Medium (4)	Low (2)
Probability	Highly Probable (4)	Improbable (3)	Highly Probable (4)	Improbable (3)

Significance	Medium (36)	Low (18)	Medium (36)	Low (18)
Status	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes			
Mitigation	» Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. » Regular monitoring for alien plants within the development footprint. » Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.			
Cumulative Impacts	Alien invasion would contribute to cumulative habitat degradation in the area, but if alien species are controlled then, then cumulative impact from alien species would not be significant.			
Residual Impacts	If alien species at the site are controlled, then there will be very little residual impact			

d) The operation and presence of the facility may lead to disturbance or persecution of fauna within or adjacent to the facility.

	Option 1		**Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Medium (5)	Low (2)	Medium (5)	Low (2)
Probability	Probable (3)	Improbable (3)	Probable (3)	Improbable (3)
Significance	Medium (30)	Low (21)	Medium (30)	Low (21)
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	Moderate	Moderate	Moderate
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Some aspects such as those relating to human activity can be mitigated, but habitat loss cannot be mitigated.			
Mitigation	» No unauthorized persons should be allowed onto the site.			

	» Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location. » The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. » If the site must be lit at night for security purposes, this should be done with low-UV type lights (such as most LEDs), which do not attract insects. » All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. » All vehicles accessing the site should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises. » If the facility is to be fenced, then no electrified strands should be placed within 30cm of the ground as come species such as tortoises and pangolins are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.
Cumulative Impacts	The development would contribute to cumulative habitat loss for fauna, but the contribution would be very small and is not considered significant.
Residual Impacts	Some habitat loss is an inevitable consequence of the development and cannot be fully mitigated.

e) The operation and presence of the facility may lead to negative impacts on avifauna as a result of electrocution or collisions with the associated power transmission infrastructure.

	Option 1		**Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (2)	Low (3)	Low (2)
Probability	Probable (3)	Improbable (2)	Probable (3)	Improbable (2)
Significance	Low (24)	Low (14)	Low (24)	Low (14)
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	High	Moderate	High

Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes, to a large extent, but bird flight diverters are not always effective			
Mitigation	» Ensure that all new lines are marked with bird flight diverters along their entire length, but particularly in areas where larger birds are likely to pass such as near drainage lines, dams or pans and hills. » All new power line infrastructure should be bird-friendly in configuration and adequately insulated (Lehman et al. 2007). These activities should be supervised by someone with experience in this field. » Any electrocution and collision events that occur should be recorded, including the species affected and the date. If repeated collisions occur within the same area, then further mitigation and avoidance measures may need to be implemented.			
Cumulative Impacts	The development would contribute to cumulative avifaunal impacts in the area, but the contribution would be very small and is not considered significant.			
Residual Impacts	Some habitat loss for avifauna is an inevitable consequence of the development and cannot be fully mitigated.			

f) Increased erosion risk as a result of soil disturbance and loss of vegetation cover as well as increased runoff generated by the panels and access roads.

	Option 1		**Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long-term (4)	Medium-term (3)	Long-term (4)	Medium-term (3)
Magnitude	Medium (5)	Low (3)	Medium (5)	Low (3)
Probability	Probable (3)	Probable (3)	Probable (3)	Probable (3)
Significance	Medium (30)	Low (21)	Medium (30)	Low (21)
Status	Negative	Negative	Negative	Negative
Reversibility	Moderate	High	Moderate	High
Irreplaceable loss of resources	No	No	No	No
Can impacts be mitigated?	Yes			
Mitigation	» All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any			

	energy in the water which may pose an erosion risk. » Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance. » All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques. » All cleared areas should be revegetated with indigenous perennial grasses
Cumulative Impacts	Large amounts of soil and silt leaving the construction site will impact local riparian and wetland ecosystems.
Residual Impacts	If erosion at the site is controlled, then there will be no residual impact

g) Development within CBAs may negatively impact biodiversity and the ecological functioning of the CBA

	Option 1		**Option 2**	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Regional (2)	Local (1)	Regional (2)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Medium (4)	Low (2)	Medium (5)	Low (3)
Probability	Probable (4)	Improbable (3)	Probable (4)	Probable (4)
Significance	Medium (40)	Low (21)	Medium (44)	Medium (32)
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Low	Low	Low
Irreplaceable loss of resources	Likely	Likely	Likely	Likely
Can impacts be mitigated?	The loss or transformation of currently intact vegetation cannot be avoided given the location of the two development options partly or entirely within natural vegetation.			
Mitigation	• The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. • An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.			
Cumulative Impacts	The development would contribute to habitat loss within the CBA and ultimately the loss of landscape connectivity and ecosystem function.			
Residual Impacts	The presence of the facility results in a large proportion of the			

	impact and this will persist for as long as the facility is present and for some time thereafter as the full biodiversity value is unlikely to be restored.

Comparative Assessment of Alternatives

The site visit revealed that the majority of the proposed development area is located within an area that has been ploughed in the past. This was however some time ago and there has been significant recovery of the grass and tree layer within this area. The western margin of the affected area lies within relatively dense undisturbed savannah woodland which is considered relatively sensitive. There are however few options for avoiding impact to this area under the current project description. The preferred layout alternative, Option 1 would be preferable in this regard as it would result in less overall loss of woody species.

Implications for Project Implementation

» Along the western boundary of the development area, there is an area of intact savannah with a high density of woody species, especially *Acacia karoo*, *Acacia erioloba*, *Searsia lancea* and *Acacia caffra*. This area is ascribed to have a high sensitivity, but it is not likely that it can be completely avoided while maintaining the desired output of the facility.
» The final design and layout plan should aim to locate the facility outside of highly sensitive areas as far as possible.
» In order to limit the impact on the high sensitive areas, the implementation of layout option 1 (contiguous PV array) is preferred, thereby requiring the re-alignment of the existing 22kV power line.
» It is estimated that the development would result in the loss of approximately 100 *Acacia erioloba* trees, which is not considered highly significant in the local context, as this is a small proportion of the local population, which is likely to number several thousand trees.
» Species such as *Acacia erioloba* cannot be translocated. A permit application for the removal of the trees will be required to be made to the Department of Agriculture, Forestry and Fisheries indicating the number of trees to be impacted (as informed by an ecologist site walk through).
» It is anticipated that the DAFF permit will specify the number of trees to be planted as an offset or mitigation measure.

6.2.2 Potential Impacts on Soils and Agricultural Potential

The entire farm does not therefore appear to have been cultivated within at least the last 10 years and natural vegetation has occurred over the majority of the

previously cultivated areas. There is no agricultural infrastructure on the farm apart from fencing and stock watering points.

a) Loss of agricultural land use

The significance of agricultural impacts is influenced by the fact that there are major limitations to agriculture including the aridity of the study area, lack of access to water, as well as the shallow soils that occur in places across the site. No agriculturally sensitive areas occur within the proposed development footprint.

Construction, operation and decommissioning: This impact is caused by direct occupation of land by footprint of energy facility infrastructure and having the effect of taking affected portions of land out of agricultural production.

	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)
Magnitude	Small (1)	Small (1)
Probability	Definite (5)	Definite (5)
Significance	30 (Medium)	30 (Medium)
Status	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Cumulative impacts: The overall loss of agricultural land in the region due to other developments – medium significance.		
Residual impacts: No mitigation possible so same as impacts without mitigation		

b) Generation of alternative land use income

Construction, operation and decommissioning: This impact is caused by the alternative land use of energy facility rental on low productivity agricultural land in combination with continued farming on the rest of the farm and having the effect of providing landowners (in this case the local municipality) with increased an alternative revenue stream (in the form of a lease).

	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)

Magnitude	Minor (3)	Minor (3)
Probability	Highly probable (4)	Highly probable (4)
Significance	32 (Medium)	32 (Medium)
Status	Positive	Positive
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Cumulative impacts: None		
Residual impacts: None		

c) Soil erosion

Construction, operation and decommissioning:

This impact is caused by the alteration of run-off characteristics due to hard surfaces and access roads and having the effect of loss and deterioration of soil resources. There is however a low risk of erosion due to the flat topography of the site as well as the dominant clay soil forms on the project site.

	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Minor (3)
Probability	Probable (3)	Very improbable (1)
Significance	27 (low)	8 (Low)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: Implement an effective system of run-off control, where it is required, that collects and disseminates run-off water from hardened surfaces and prevents potential down slope erosion. This should be in place and maintained during all phases of the development.		
Cumulative impacts: None		
Residual impacts: Low		

d) Loss of topsoil

Construction phase: This impact is caused by poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.) and having the effect of loss of soil fertility on disturbed areas after rehabilitation.

	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Long term (4)	Long term (4)
Magnitude	Minor (3)	Minor (2)
Probability	Probable (3)	Very improbable (1)
Significance	24 (Low)	7 (Low)
Status	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: 1. Strip and stockpile topsoil from all areas where soil will be disturbed. 2. After cessation of disturbance, re-spread topsoil over the surface. 3. Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land, or where they can be effectively covered with topsoil.		
Cumulative impacts: None		
Residual impacts: None		

e) Veld degradation

Degradation of veld and vegetation surrounding construction activities caused by trampling due to vehicle passage, and deposition of dust.

	Without mitigation	**With mitigation**
Extent	Low (1) - Site	Low (1) - Site
Duration	Short (2)	Short (2)
Magnitude	Minor (2)	Small (1)
Probability	Probable (3)	Improbable (2)
Significance	15 (Low)	8 (Low)
Status	Negative	Negative
Reversibility	Medium	Medium

Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: 1. Minimize road footprint beyond construction site and control vehicle access on roads only. 2. Control dust as per standard construction site practice.		
Cumulative impacts: None		
Residual impacts: Low		

Comparative Assessment of Alternatives

Two layout alternatives which involve 1) the realignment of an existing 22kV power line for one contiguous PV array and 2) Splitting of the PV array around the 22kV power line; occupy roughly the same footprint on the site. Both are considered to be acceptable from an agricultural / soil perspective.

Implications for Project Implementation

- Overall there will be a low impact on agricultural resources.
- The proposed facility is situated on municipal owned land and therefore will not obstruct the objectives of Section 1 of the Subdivision of Agricultural Land Act (SALA) Act 70 of 1970, which defines agricultural land as "*any land, except land that falls within the jurisdiction of a local authority…*". By this definition the project is not subject to the provisions of SALA as the site is under the ownership of the Maquassi Hills Local Municipality.
- There are no known borehole or water abstraction points previously used for agricultural purposes in the study area from which to abstract water for construction / operational use.

6.2.3 Assessment of Potential Heritage and Palaeontological Impacts

Heritage: No heritage features were confirmed to be located on the project site. Several stone cairns are indicative of past agricultural practices. Some of the cairns could potentially be indicative of the occurrence of graves, especially at one position mapped within the proposed PV array footprint identified during the heritage survey (refer to Figure 6.2).

Palaeontology: The overlying Caenozoic superficial sediments are considered to be of low to very low palaeontolgical sensitivity and therefore no assessment of the potential palaeontological impact has been undertaken.

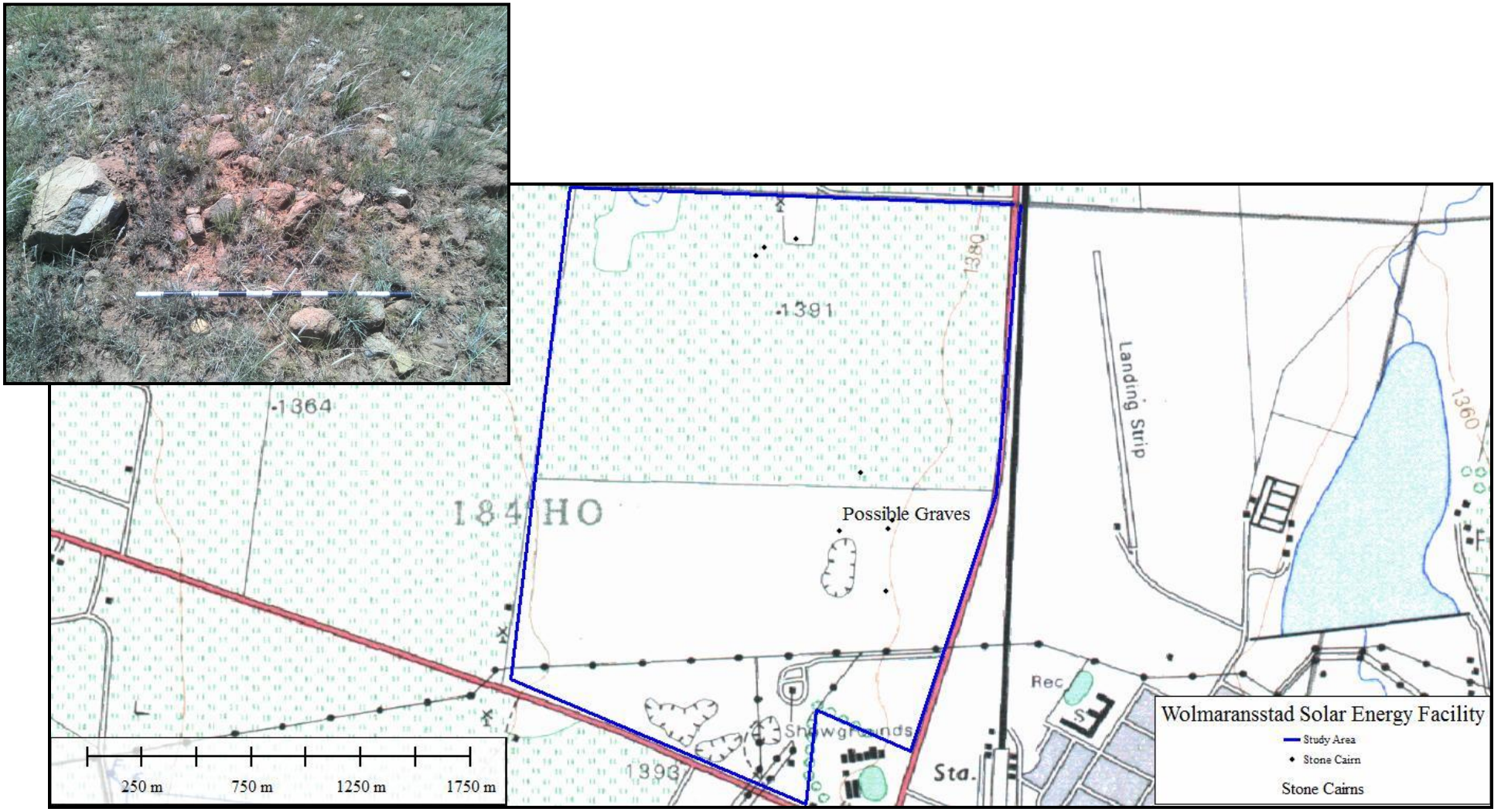

Figure 6.2: Distribution of stone cairns in the project study area and position of possible grave at stone cairn located in project site (indicated by picture).

a) Loss of heritage resources

Construction: During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological material or objects which have been identified. The following table applies to the stone cairns, one of which is potentially indicative of an informal grave.

	Without mitigation	**With mitigation**
Extent	Low (1)	Low (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Moderate (6)	Small (1)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (21)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation: If the cairns cannot be confirmed to be graves a chance find procedure must be implemented during construction of the PV facility.		
Cumulative impacts: Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive.		
Residual Impacts: N/A		

Comparative Assessment of Alternatives

There is no significance in the potential impacts associated with the two layout alternatives as the stone cairns (and potential grave) occur on both layouts and cannot be avoided by either layout. Therefore, there is no preference between the alternative layouts.

Implications for Project Implementation

A chance find procedure must be put in place during the construction period to mitigate any accidental finds. This procedure applies to the developer's permanent employees, its subsidiaries, contractors and subcontractors, and service providers. The aim of this procedure is to establish monitoring and reporting procedures to ensure compliance with this policy and its associated

procedures. The procedure is detailed in the specialist heritage report and the project EMPr.

6.2.4 Assessment of Potential Visual Impacts

The greater study area for the visual assessment encompasses a geographical area of approximately 180km^2 and includes a minimum 8km buffer zone from the proposed development site. The site being considered for the proposed renewable energy facility covers an area of approximately 270 hectares in extent.

The analysis has been undertaken from a number of random vantage points within the proposed development areas in order to determine the general visual exposure (visibility) of the area under investigation. A height of 6m was used in order to illustrate the anticipated visual exposure of the PV panels (i.e. the approximate maximum height of the proposed PV panels).

It must be noted that the effect of vegetation cover on the visual exposure of the proposed facility, is simulated by adding the natural thicket and bushland to the digital terrain model. These natural vegetation types (where intact) are expected to reduce the visual exposure of the facility to a large extent. The viewshed analyses includes the effect of the town and built-up areas of Wolmaransstad, but does not include the effects of vegetation cover or existing structures on the exposure of the proposed facilities, therefore signifying a worst-case scenario.

Within 2km: The visual impact index map indicates a core zone of moderate visual impact within 2km of the proposed facility. Small patches of land located on the south outskirts of this zone will be screened from potential visual impact.

Sensitive visual receptors within this zone include residents on the outskirts of Wolmaransstad and homesteads within the study area. These receptors are likely to experience high visual impact. The following homesteads are likely to be affected:

- Vlakpan to the north of the site
- Frieshoff to the east of the site
- Emelia to the west of the site

Other sensitive visual receptors within this zone comprise mainly of road users on the R505 and R504. These receptors are also likely to experience high visual impact.

Between 2 – 4km: Visual impact is likely to be low between 2km and 4km of the proposed facility. Screened areas within this zone are located mainly to the north east, south and south east of the site.

Sensitive visual receptors within this zone comprise mainly of road users of the N12, R505 and R504 as well as the homesteads to the north, west and south east of the site. The following homesteads are likely to be affected:

- Vlakpan to the north of the site
- Frieshoff to the east of the site
- Port Allen to the south east of the site
- Emelia to the west of the site

These receptors are likely to experience moderate visual impact.

Between 4 - 8km: Between 4km and 8km of the proposed facility, potential visual impact is very low, with screened areas expected mostly in the north, south and south east.

Sensitive visual receptors at this distance include users of roads (i.e. N12, R505 and R504) as well as residents of homesteads. The following homesteads are likely to be affected:

- Uitkyk to the north of the site
- Driefontein and Rooipoort to the north east of the site
- Vlakplaas to the south west of the site

Visual impacts on these sensitive receptors are likely to be low.

Remaining impacts beyond 8km of the proposed facility are expected to negligible on the whole, with very low impacts along roads and at homesteads.

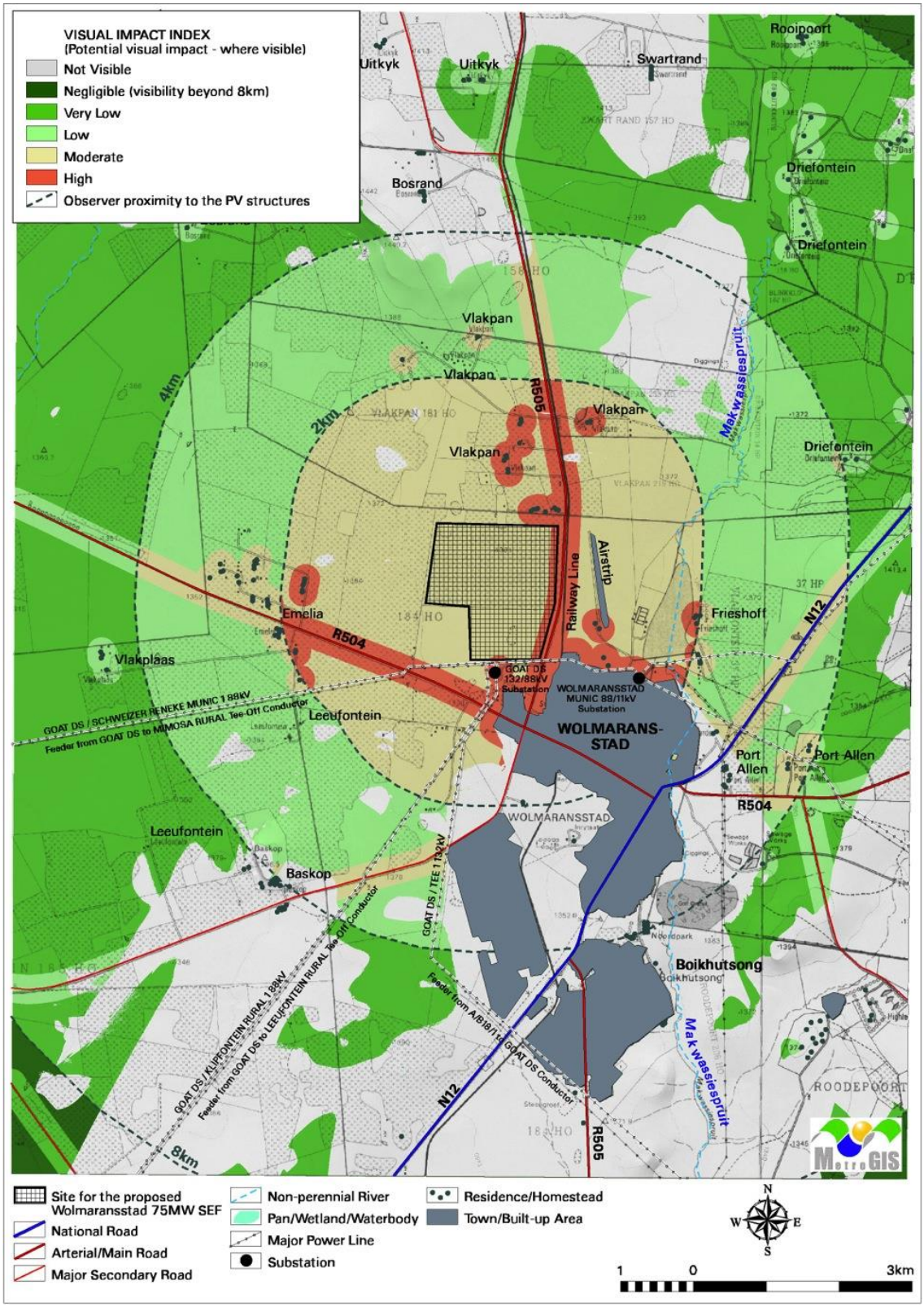

Figure 6.3: Visual impact index of the proposed Wolmaransstad 75MW Solar Energy Facility

The anticipated visual impacts are listed below and the assessment thereof included in the tables thereafter.

- » Visual impact on sensitive visual receptors in close proximity to the proposed infrastructure.
- » Visual impact on sensitive visual receptors within the region
- » Visual impact of associated on-site infrastructure on sensitive receptors in close proximity to the proposed facility.
- » Visual impact of construction on sensitive visual receptors in close proximity to the proposed infrastructure
- » Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed infrastructure.
- » Visual impact on tourist access routes within the region
- » Visual impact of the proposed facility on the visual quality of the landscape and sense of place of the region (secondary impact).

a) Visual impact on sensitive visual receptors in close proximity to the proposed infrastructure.

	No mitigation	***Mitigation considered***
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	High **(8)**	High **(8)**
Probability	Definite **(5)**	Probable **(3)**
Significance	High **(70)**	Moderate **(42)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

b) Visual impact on sensitive visual receptors within the region

	No mitigation	***Mitigation considered***
Extent	Regional **(3)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	High **(4)**	Improbable **(2)**
Significance	Moderate **(52)**	Low **(26)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

c) Visual impact of associated on-site infrastructure on sensitive receptors in close proximity to the proposed facility.

	No mitigation	***Mitigation considered***
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	High **(4)**	Probable **(3)**
Significance	Moderate **(48)**	Moderate **(36)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

d) Visual impact of construction on sensitive visual receptors in close proximity to the proposed infrastructure

	No mitigation	***Mitigation considered***
Extent	Local **(2)**	Local **(2)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	High **(8)**	High **(8)**
Probability	High **(4)**	Improbable **(2)**
Significance	Moderate **(48)**	Low **(24)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

e) Visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed infrastructure.

	No mitigation	***Mitigation considered***
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(36)**	Low **(24)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

f) Visual impact on tourist access routes within the region

	No mitigation	***Mitigation considered***
Extent	Regional **(3)**	Regional **(3)**

Duration	Long term **(4)**	Long term **(4)**
Magnitude	Moderate **(6)**	Moderate **(6)**
Probability	Probable **(3)**	Improbable **(2)**
Significance	Moderate **(39)**	Low **(26)**
Status (positive or negative)	Negative	Negative
Reversibility	Recoverable **(3)**	Recoverable **(3)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

g) Visual impact of the proposed facility on the visual quality of the landscape and sense of place of the region.

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

h) Mitigation / Management

Mitigation / Management (all visual impacts tabled above):

- » Retain/re-establish and maintain natural vegetation in all areas outside of the development footprint.
- » Maintain a vegetated buffer along all boundaries of the site.
- » Plan ancillary infrastructure (i.e. substation and workshop) in such a way and in such a location that clearing of vegetation is minimised. Consolidate existing infrastructure as much as possible, and make use of already disturbed areas rather than pristine sites wherever possible.
- » Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible, and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems.
- » Access roads, which are not required post-construction, should be ripped and rehabilitated.
- » Where sensitive visual receptors are likely to affected, such as residents along the un-screened northern periphery of Wolmaransstad, it is recommended that the developer enter into negotiations regarding the potential screening of visual impacts at the receptor site. This may entail the planting of vegetation, trees or

even the construction of built screens. Ultimately, visual screening is most effective when placed at the receptor itself.

Mitigation of visual impacts associated with the construction phase, albeit temporary, entails proper planning, management and rehabilitation of all construction sites. Construction should be managed according to the following principles:

- » Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
- » Reduce the construction period through careful logistical planning and productive implementation of resources.
- » Plan the placement of lay-down areas and any potential temporary construction camps along the corridor in order to minimise vegetation clearing.
- » Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- » Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- » Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- » Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- » Ensure that all infrastructure and the site and general surrounds are maintained and kept neat.
- » Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- » Monitor all rehabilitated areas for at least a year for rehabilitation failure and implement remedial action as required. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.

Mitigation of other lighting impacts includes the pro-active design, planning and specification lighting for the facility. The correct specification and placement of lighting and light fixtures will go far to contain rather than spread the light. Additional measures include the following:

- » Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
- » Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
- » Making use of minimum lumen or wattage in fixtures;
- » Making use of down-lighters, or shielded fixtures;
- » Making use of Low Pressure Sodium lighting or other types of low impact lighting.
- » Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
- » During Operations, monitor the general appearance of the facility as a whole as well as all rehabilitated areas. Implement remedial action where required.
- » The maintenance of the PV Panels and ancillary structures and infrastructure will

ensure that the facility does not degrade, thus aggravating visual impact.

» After decommissioning, all infrastructure should be removed and all disturbed areas appropriately rehabilitated. Monitor rehabilitated areas post-decommissioning and implement remedial actions and consult an ecologist regarding rehabilitation specifications if necessary.

Comparative Assessment of Alternatives:

Both of the layouts are situated within the proposed footprint area and are similar in position and configuration. Due to the 22kV power line traversing the project site from north to south, layout alternative 1 will be a contiguous PV array while layout alternative 2 will be split into two sections There will be no distinct difference between the PV array layout alternatives, suffice to say that a 22kV power line will be required to be realigned within 20m and adjacent to the road reserve of the R505 as part of layout alternative 1. Both of these alternative layouts are considered to be acceptable from a visual perspective if the above mitigation measures are put in place.

Implications for Project Implementation

Overall the anticipated visual impacts of the proposed PV facility are anticipated to be moderate to low. Some mitigation may be required at the northern perimeter to screen the nearest visual receptors (homesteads) located there. However, no concern regarding the potential visual impacts of the facility have been expressed by the relevant landowners during the public consultation process.

6.2.5 Assessment of Potential Social Impacts

Impacts associated with the construction phase of a project are usually of a short duration (approximately 18-24 months), temporary in nature, but could have long-term effects on the surrounding social environment if not managed appropriately.

a) Direct employment and skills development

The construction of the proposed project will require a workforce and therefore direct employment will be generated. The proposed solar energy facility will create employment opportunities for the local community. The nearest town to the proposed site is Wolmaransstad. There is a large economically active population in search for employment opportunities. This is therefore a positive social impact. Although the exact number of employment opportunities has not been determined at this stage, it is estimated that during the construction phase (in the region of 18-24 months) approximately ~300-500 jobs will be generated for the 75MW Solar Energy Facility. However this number is likely to vary

depending on the final designs of the proposed project. In terms of skills requirements, it is common that highly skilled or skilled labour such as engineers, technical staff and project managers will constitute about 33% of the work force; semi-skilled staff would typically be required to operate machinery and this will constitute about 22% of employees; while low skilled construction and security staff will constitute about 45% of the work force. It is likely that an EPC contractor will be appointed by the developer who will hire the necessary subcontractors with expertise in civil work, electrical work and mechanical assembly.

The MHLM is characterised by high levels of unemployment and poverty. The level of education in the MHLM is poor which is linked to limited skills base. This is combined with a high level of unemployment at 33.4%. There will be significant job opportunities available for low skilled (construction, security and maintenance workers) and semi-skilled workers, which can be sourced from the local area. Necessary training will also be provided to employees with the proposed development.

Construction Phase		
Nature: The creation of employment opportunities and skills development opportunities during the construction phase for the country and local economy		
	Without enhancement	**With enhancement**
Extent	Local- Regional (2)	Local- Regional (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Highly probable (4)
Significance	**Low (24)**	**Medium (40)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources	N/A	
Can impacts be enhanced	Yes	
Enhancement measures: In order to enhance the local employment and business opportunities associated with the construction phase the following measures should be implemented: » It is recommended that local employment policy is adopted to maximise the opportunities made available to the local labour force. Bluewave Capital should make it a requirement for contractors to implement a 'locals first' policy for employees that live in close proximity to the proposed site especially for semi and low-skilled job categories. » It is recommended to set realistic local recruitment targets for the construction phase » Training and skills development programmes should be initiated prior to the commencement of the construction phase		
Cumulative impacts Opportunity to upgrade and improve skills levels in the area		

Residual impacts
Improved pool of skills and experience in the local area

The impact is therefore assessed to be positive; local and district in extent; temporary in duration; moderate in intensity and highly probable. The impact is assessed to be of medium significance to the decision making process.

b) Economic multiplier effects

There are likely to be economic multiplier effects from the use of local goods and services which includes, but is not limited to, construction materials and equipment and workforce essentials such as food, clothing, safety equipment, and other goods. The site is located approximately 1km west from the small town of Wolmaransstad. Off-site accommodation would also be required for those construction staff not located in the area, and there is adequate accommodation available in the nearest town. Transport to the site from town would also be required providing an additional spend that would indirectly contribute to the local economy.

The total wage bill for the construction for the 75MW phase is estimated to be in the region of R13 million (2013 rand values). The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

Direct impacts would include the creation of new jobs for construction workers and the associated income generated by the solar project that would have a positive impact on the MHLM. Indirect impacts would occur as a result of the new economic development, and would include new jobs at businesses that support the expanded workforce or provide project materials, and associated income.

Construction Phase		
Nature: Significance of the impact from the economic multiplier effects from the use of local goods and services		
	Without enhancement	**With enhancement**
Extent	Local- regional (3)	Local- Regional (3)
Duration	Short term (2)	Short term (2)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	**Low (21)**	**Medium (36)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources	N/A	
Can impacts be enhanced	Yes	

Enhancement » It is recommended that a local procurement policy is adopted by the developer to maximise the benefit to the local economy. » Bluewave Capital should develop a database of local companies, specifically Historically Disadvantaged (HD) which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies etc.) prior to the commencement of the tender process for construction contractors; these companies should be notified of the tender process and invited to bid for project-related work where applicable » It is a requirement to source as much goods and services as possible from the local area; engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible
Cumulative impacts Opportunity for local capital expenditure, potential for the local service sector
Residual impacts Improved local service sector, growth in local business

The impact is therefore assessed to be positive; local and regional in extent; temporary in duration; low intensity; and highly probable. The impact is assessed to be of medium significance to the decision-making process.

c) Safety and security impacts

The perceived loss of security during the construction phase of the proposed project due to the influx of workers and/ or outsiders to the area (as influxes of newcomers or jobseekers are usually associated with an increase in crime), may have indirect effects, such as increased safety and security issues for neighbouring properties and damage to property, increase risk of veld fire, stock theft, crime and so forth. The perception exists that construction related activities (influx of jobseekers, and construction workers and so forth) is a contributor to increased criminal activities in an area. Safety and security impacts are a reality in South Africa which needs to be addressed through appropriate mitigation measures. Majority of the adjacent farm owners utilise their farms for cattle farming, game farming and other agricultural activities. Adjacent farm owners were interviewed and many of them indicated that stock theft is a problem in the area. Farm owners are thus concerned that this type of criminal activity would increase during the construction phase, which poses a potential risk to surrounding areas.

An increase of traffic from the rise in construction vehicles is a safety concern for other road users and local communities in the area. The main road that construction vehicles would use for a period of approximately 24months would be the R504 and the R505 (adjacent farm owners indicated that speeding on these roads is currently a problem) and therefore the movement of construction related

activities, crossing over the R504/R504 does have the potential to increase the risk for road users.

Construction Phase		
Nature: Temporary increase in safety and security concerns associated with the influx of people during the construction phase		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (30)**	**Low (16)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes, compensation paid for losses attributable to construction workers	
Irreplaceable loss of resources	No	
Can impacts be mitigated	Yes	

Mitigation

» Safety at and around the construction site should be ensured by fencing off the construction area to avoid unauthorised access and employing security personnel
» Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce and influx of people
» Working hours should be kept between 6am and 6pm as per the ECA during the construction phase, agreed with surrounding landowners and occupiers
» The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction period
» Security personnel should be on site on a permanent basis
» No unauthorised entry to the site is to be allowed; access control and a method of identification of site personnel are required at all times
» Security lighting should be implemented
» The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas
» Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.
» A comprehensive employee induction programme would cover land access protocols, fire management and road safety. This must be addressed in the construction EMP as the best practice.
» All vehicles must be road worthy and drivers must be qualified and made aware of the potential road safety issues and follow the speed limits.
» Provide adequate signage along the main road to warn motorists of the construction activities taking place

Cumulative impacts

Possible increase in crime levels with subsequent possible economic losses and increased traffic

Residual impacts

None anticipated

The impact is assessed to be negative; local in extent; temporary in duration; low intensity and improbable with mitigation measures. The impact is assessed to be of low significance to the decision making process.

d) Pressure on economic and social infrastructure impacts from an in migration of people

The in-migration of people to the area as either non-local workforce of construction workers and/or jobseekers could result in pressure on economic and social infrastructure due to in migration of construction workers and jobseekers and pressure on the local population (rise in social conflicts). Influx of people into the area, especially by job seekers, could further lead to a temporary increase in the level of crime, cause social disruption and put pressure on basic services. Such influx could result in an increased pressure on social infrastructure such as municipal services, accommodation, health facilities, transport facilities, basic services and so forth. Adverse impacts could occur if a large in-migrant workforce, culturally different from the local indigenous group, is brought in during construction. This influx of migrant workers could also strain the existing community infrastructure and social services. The LM availability of basic services to meet the current needs of the local population is strained due to a lack of infrastructure required. This places tremendous strain on the environment and the local municipality.

This impact may have a negative effect on MHLM as basic services and infrastructure is already strained and is a major challenge of the LM. However, the project is relatively small in extent, so the degree to which societies are disrupted largely depends on the level of local employment achievable and in the case of this project a significant portion of the workforce is expected to be sourced locally (from Wolmaransstad) and the overall number of outsiders would not be significant to cause great disruption to the area.

Construction Phase		
Nature: Added pressure on economic and social infrastructure during construction as a result of in migration of people		
	Without mitigation	**With mitigation**
Extent	Local-regional (3)	Local- regional (3)
Duration	Short-term (2)	Short-term (2)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Low (27)**	**Low (18)**
Status (positive or negative)	Negative	Negative
Reversibility	No	

Irreplaceable loss of resources	No
Can impacts be mitigated	Yes
Mitigation » Where possible, the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction employment opportunities, especially for semi and low-skilled job categories. » A comprehensive employee induction programme should provide a code of conduct for employees that would align with community values.	
Cumulative impacts Additional pressure on infrastructure due to additional people in the area » Possible increase in criminal activities and economic losses in area for property owners	
Residual impacts Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure	

The impact is assessed to be negative; local in extent; temporary in duration; low intensity; and improbable with mitigation measures. The impact is assessed to be of low significance to the decision-making process.

e) Nuisance Impacts (noise, dust, wear & tear on roads)

Impacts associated with construction related activities include noise, dust and disruption or damage to adjacent properties is a potential issue. Experience from other Solar Energy Facilities projects indicate that site clearing does increase the risk of dust and noise being generated, which can in turn impact on adjacent properties. The potential impacts can be addressed by implementing effective mitigation measures. The movement of heavy construction vehicles and construction activities have the potential to create noise. The primary sources of noise during construction would be from the construction equipment and other sources of noise include vehicle traffic. Generation of dust would come from construction activities. Short-term increases in the use of local roads would occur during the construction period. Heavy equipment would most likely remain at the site for the construction period. Shipments of materials are unlikely to affect primary or secondary road networks through an increase in wear and tear on the access roads. The noise, dust and increased use of the local roads are expected to be negative but are short term impacts.

Construction Phase		
Nature: Nuisance impacts in terms of temporary increase in noise and dust, or the wear and tear on access roads to the site		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short-term (2)	Short-term (2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)

Significance	**Medium (44)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	Yes	
Irreplaceable loss of resources	No	
Can impacts be mitigated	Yes	

Mitigation

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

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

Cumulative impacts

If damage to roads is not repaired then this will affect other road users and result in higher maintenance costs for vehicles of road users

Residual impacts

Only damage to roads that are not fixed could affect road users

The impact is assessed to be negative; local in extent; temporary in duration; moderate intensity; and probable. The impact is assessed to be of low significance to the decision-making process.

f) Direct employment and skills development

The operation phase of the Project will require a workforce and therefore direct employment will be generated. Although the exact number of construction workers is not confirmed at this stage, it is estimated that approximately 50 jobs will be generated. Given that solar energy facilities are relatively new in South Africa, a number of highly skilled personnel may need to be recruited from outside the Local Municipal area. The employees would include skilled engineers (specialised in both electrical and mechanical engineering) as well as less skilled services such as safety and security, cleaning crew and engineering assistants. Routine activities would include operation of the solar facility to produce power, and regular monitoring and maintenance activities to ensure safe and consistent operation. Maintenance will be carried out throughout the lifetime of the Solar Energy Facility. Typical activities during maintenance include washing solar panels routinely (in the evening) and vegetation control and maintenance. Employment opportunities will be generated during the operation phase from the local community.

Operational Phase		
Nature: The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy		
	Without enhancement	With enhancement
Extent	Local- regional (3)	Local- Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Low (27)**
Status (positive or negative)	Positive	Positive
Reversibility	N/A	
Irreplaceable loss of resources	N/A	
Can impacts be enhanced	Yes	
Enhancement » It is recommended that a local employment policy is adopted by the developer to maximise the project opportunities being made available to the local community » The developer should establish vocational training programs for the local employees to promote the development of skills		
Cumulative impacts Opportunity to upgrade and improve skills levels in the area		
Residual impacts Improved pool of skills and experience in the local area		

The impact is assessed to be positive; local to regional in extent; long-term; minor intensity and probable. The impact is assessed to be of low significance to the decision-making process.

g) Development of clean, renewable energy infrastructure

Energy production has been and still is one of the main pivots of the social and economic development of South Africa. South Africa currently relies on coal-generated energy to meet its energy needs. Almost 72% of South Africa's primary energy is from coal, over half used to generate electricity and a quarter used for synfuels production. South Africa's carbon emissions are higher than those of most developed countries partly because of the energy-intensive sectors which rely heavily on low quality coal. Use of low quality coals is the main contributor of GHG emission. The energy-intensive sectors of the economy emit carbon emissions that are higher than those of most developed economies. The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions. The generation of renewable energy will contribute to South Africa's electricity market. The advancement of renewable energy is a priority for South Africa. The government considers the use of renewable energy as a contribution to sustainable development (White Paper on Renewable Energy). As most of the sources are indigenous and naturally available, its use will strengthen energy

security as it will not be subjected to disruption by international crisis. Furthermore, recent policy highlights the desirability of clean; green energy and solar generated energy will play a significant role in reaching these quotas (Energy Research Centre UCT, 2004). Given South Africa's reliance on Eskom as a power utility, the benefits associated with an Independent Power Producer based on renewable energy are regarded as an important contribution.

Increasing the contribution of the renewable energy sector to the local economy may contribute to the diversification of the local economy and provide greater economic stability. It is acknowledged that the economy of the MHLM is dominated by the manufacturing and agricultural sector as the main contributor. The growth in the solar energy sector could introduce skills and development into the area. The development of a Solar Energy Facility could therefore add to the stability of the economy, and even though this project is small scale in comparison to the overall potential of the sector, it could contribute to the local economy. The overall contribution to South Africa's total energy requirements of the proposed Solar Energy Facility is small; however, the 75MW facility will help contribute to offset the total carbon emissions associated with energy generation in South Africa.

Operational Phase		
Nature: Development of clean, renewable energy infrastructure		
	Without enhancement	**With enhancement**
Extent	Local- Regional- National (4)	Local- Regional- National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	**Medium (48)**	**Medium (48)**
Status (positive or negative)	Positive	Positive
Reversibility	Yes	
Irreplaceable loss of resources	Yes (impact of climate change)	
Can impacts be enhanced	No	
Enhancement None anticipated		
Cumulative impacts Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming		
Residual impacts Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming		

The impact is assessed to be positive; local to national in extent; long term; low intensity; and highly probable. The impact is assessed to be of medium positive significance to the decision-making process.

Implications for Project Implementation

Social benefit: The MHLM is characterised by high levels of unemployment and poverty. The level of education in the MHLM is poor which is linked to limited skills base from which to source labour for construction. A high level of unemployment at 33.4% prevails and the construction of the facility will serve to employ locals from within the local municipality.

Crime: During the public participation process, issues concerning crime in the general area were stated and the potential impact this might have on the PV facility were indicated. It will be incumbent upon the developer to fence the facility and provide security to ensure the integrity of the facility and also to limit the impact of crime on adjacent landowners.

Fire management: It was a recommendation of the public involvement process that the developer/owner join the fire management association in Wolmaransstad due to the potential risk of veld fires in the area, and the impact this might have on the facility.

Comparative Assessment of Alternatives

Both alternative layout plans are preferred from a social perspective as there is little to differentiate them in terms of mitigating social impacts during construction and operation.

6.4 Assessment of the Do Nothing Alternative

The impacts of pursuing the No-go Option are both positive and negative as follows:

» The benefits would be that there is no change in status quo in terms of the negative impacts described above during all project phases which would be experienced by neighbours, society and the landscape – namely through disruption, noise, visual, road safety, and tourism impacts. The impact is therefore neutral.
» There would be an opportunity loss in terms of contributing to the renewable energy targets nationally. The impact is therefore negative.
» There would also be an opportunity loss in terms of job creation, skills development and associated economic multipliers for the local economy.

Based on the potential impacts associated with the proposed project as assessed in the previous section, overall the impacts are anticipated to be low to moderate with no high negative impacts remaining with the implementation of mitigation measures. In this light, the No-Development option would represent a lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a High negative social cost. Foregoing the proposed Wolmaransstad 75MW Solar Energy Facility would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities in the Local Municipality would be forfeited.

6.5 Summary of impacts

After the application of mitigation measures there are no negative impacts of high significance expected to be associated with the proposed Wolmaransstad 75MW Solar Energy facility provided that the recommended mitigation measures are implemented. The following is of relevance:

» Areas of high ecological sensitivity will be avoided by the facility and associated infrastructure as far as possible, however there will be some overlap with high sensitive areas.
» The project will occupy agricultural land which has previously farmed (greater than 10 years) and where agricultural practices are currently limited to informal grazing.
» No heritage sites have been identified however chance find procedures are required to be implemented at certain identified areas during construction for the occurrence of informal graves.
» The impact on palaeontological resources is anticipated to be very low.
» The potential impact on the visual environment is low-medium.
» The overall social impact will be positive.

ASSESSMENT OF POTENTIAL CUMULATIVE IMPACTS CHAPTER 7

Cumulative impacts in relation to an activity are defined in the Environmental Impact Assessment Regulations (Government Notice R543) as meaning "the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area".

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

The Department of Energy has, under the REIPPP Programme released requests for proposals to contribute towards Government's renewable energy target to stimulate the industry in South Africa. The bid selection process will consider the suggested tariff as well as socio-economic development opportunities provided by the project and the bidder.

There is a legislated requirement to assess cumulative impacts associated with a proposed development. This chapter looks at whether the proposed project's potential impacts become more significant when considered in combination with the other known or proposed solar facility projects within the area.

7.1 Assessment of Potential Cumulative Impacts

A cumulative impact, in relation to an activity, refers to the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area[6].

Significant cumulative negative impacts that could occur due to the development of other solar energy facilities and associated infrastructure in proximity to each other may include impacts such as:

» Loss of vegetation and impacts on ecology
» Soil and agricultural potential impacts
» Heritage impacts

[6] Definition as provided by DEA in the EIA Regulations.

» Visual impacts
» Social impacts

7.1 Cumulative impacts of renewable energy facilities in the region

The cumulative impacts associated with the proposed Wolmaransstad 75MW Solar Energy Facility have been viewed from two perspectives within this context:

» Cumulative impacts associated with construction and operation of the 75MW project added to the authorised Wolmaransstad Municipality Solar Energy Facility (5MW) project proposed to be developed on the same farm portion and which will participate in terms of the DME's small scale REIPP Programme.
» Cumulative impacts associated with other relevant approved or existing 75MW solar developments within a 30 km radius of the proposed facility.

Small-scale renewable energy projects: An Environmental Authorisation for the Wolmaransstad Municipality Solar Energy Facility (5MW) project was issued by the DEA in December 2014 (DEA Ref: 14/12/16/3/3/1/1089). This PV facility is proposed to occupy approximately 19ha of land and will be located in close proximity to the Goat DS Substation in a disturbed area where land transformation due to previous soil borrowing/mining has occurred.

Large-scale renewable energy projects: Many areas in South Africa are investigated by IPP's for solar energy facilities where favourable resource and grid conditions are present. According to the baseline data mapped for the Strategic Environmental Assessment for the rollout of wind and solar PV energy in South Africa (DEA and CSIR, 2013), there are no other commercial large-scale approved or pending solar energy facilities within close proximity to Wolmaransstad. The nearest facility is the Kabi Vaalkop Solar III project situated approximately 75 km from the project site, outside of Klerksdorp, within the City of Motlasana Local Municipality. The cumulative environmental impacts due to the construction of similar facilities near Wolmaransstad is considered to be low, due to the absence of similarly scaled facilities.

7.2.1 Ecological Processes

Cumulative negative impacts on ecology relate to disturbance and habitat loss which may occur during construction. The development would contribute a small amount to the cumulative loss of the Klerksdorp Thornveld vegetation type. The significance of this impact from a cumulative perspective is expected to be low, based on the moderate to low sensitivity of the areas considered for the siting of the PV facilities (5MW and 75MW), also taking into consideration the loss of some protected trees in the western section which may be affected by both project footprints. The impact of additional PV facilities in the immediate vicinity of the

Wolmaransstad 75MW Solar Energy Facility could begin to impact on ecological processes without proper mitigation.

a) The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets

	Option 1		Option 2	
	Without Mitigation	**With Mitigation**	**Without Mitigation**	**With Mitigation**
Extent	Regional (2)	Local (1)	Regional (2)	Local (1)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Low (3)	Low (2)	Medium (4)	Low (3)
Probability	Probable (3)	Probable (3)	Highly Probable (4)	Probable (3)
Significance	Medium (27)	Low (21)	Medium (40)	Low (24)
Status	Negative	Negative	Negative	Negative
Reversibility	Low	Low	Low	Low
Irreplaceable loss of resources	Yes	Likely	Yes	Likely
Can impacts be mitigated?	The loss or transformation of currently intact vegetation cannot be avoided given the location of the two development options partly within natural vegetation.			
Mitigation	» The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. » An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.			
Cumulative Impacts	The development would contribute a small amount to the cumulative loss of the Klerksdorp Thornveld vegetation type.			
Residual Impacts	The loss of intact vegetation would persist for at least the lifetime of the facility and probably longer as the full biodiversity value is unlikely to be restored.			

7.2.2 Cumulative soil and agricultural impacts

The cumulative agricultural impact is considered to be low due to the limited agricultural potential in the region, and the limited number of similar projects proposed.

7.2.3 Cumulative Heritage Impacts

Archaeological sites are non-renewable and impact on any archaeological context or material will be permanent and destructive. No cumulative heritage impacts are anticipated due to the broad-scale disturbance of land on the farm and within this region through agricultural practices.

7.2.4 Visual impacts

The cumulative impacts associated with solar energy facilities are largely linked to the visual impact on the areas sense of place and landscape character. Some visual impact has already occurred as a result of the existing substation and power lines already on site. It is therefore expected that the visual impact associated with the proposed project will further contribute to the visual impact currently present within the area.

Although the proposed project is in line with current development and land use planning trends in the region, it will certainly contribute to the increased cumulative visual impact of solar infrastructure within a rural and largely natural context.

7.2.5 Socio-economic impacts

Cumulative impacts have been considered as part of this social impact assessment and identified where relevant. The potential impact of the proposed Wolmaransstad 75MW Solar Energy Facility on the areas sense of place is likely to be low to medium. The potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications.

The proposed Wolmaransstad 75MW Solar Energy Facility has the potential to result in significant positive cumulative impacts; specifically the establishment of a number of Solar Energy Facilities in the vicinity of the North West Province will create a number of socio-economic opportunities for the Province, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. Benefits to the local, regional and national economy through employment and procurement of services could be substantial should many of the renewable energy facilities proceed. This benefit will increase significantly should critical mass be reached that allows local companies to develop the necessary skills to support construction and maintenance activities and that allows for components of the renewable energy facilities to be manufactured in South Africa. Furthermore at municipal level, the cumulative impact could be positive and could incentivise operation and maintenance companies to centralise

and expand their activities towards education and training and more closely to the projects.

CONCLUSIONS AND RECOMMENDATIONS CHAPTER 8

This chapter concludes the EIA Report by providing a summary of the conclusions of the assessment of the proposed site for the development of the proposed Wolmaransstad 75MW Solar Energy Facility. In so doing, it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project.

Bluewave Capital SA (Pty) Ltd (hereafter referred to as Bluewave) a Solar Developer, is proposing the establishment of a commercial solar electricity generating facility and associated infrastructure situated north-west of the town of Wolmaransstad, within the North West Province. The proposed project will have a maximum contracted capacity of up to 75 megawatts (MW) and will comprise of the following infrastructure:

» Photovoltaic (PV) panels of between 4m – 6m in height (fixed or tracking technology) with a contracted capacity of up to 75MW
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels
» Cabling between the project components, to be lain in trenches ~ 1-2m deep
» Power inverters between the PV arrays (±4.5m^2)
» Overhead power line to evacuate the power into the Eskom grid via the existing Goat DS 132/88kV Substation or the Wolmaransstad Municipality 88/11kV Substation
» Main and internal access roads (up to 7m wide)
» Water storage facility/ reservoir
» Office, workshop area for maintenance and storage
» Temporary laydown area
» Perimeter fencing

During the public participation process conducted for the Scoping study, the proposed project was generally well received from the recipient community, interested and affected parties as well as stakeholders.

8.1. Evaluation of the Solar Energy Facility and Associated Infrastructure

The preceding chapters of this report together with the specialist studies contained within Appendices E - J provide a detailed assessment of the potential impacts that may result from the proposed project.

From the assessment of potential impacts undertaken within this EIA, it is concluded that there are no environmental fatal flaws associated with the proposed site identified for the development of the Wolmaransstad 75MW Solar Energy Facility. Potential environmental impacts and some areas of high sensitivity were, however, identified. In summary, the most significant environmental impacts associated with the project, as identified through the EIA, include:

» Potential impacts on flora and fauna
» Potential impact on listed floral species
» Potential impacts on the local soils, land capability and agricultural potential of the site
» Potential visual impacts
» Potential heritage impacts
» Potential social and economic impacts
» Potential cumulative impacts

8.1.1. Impacts on Ecology

The proposed project site is located largely within an area that has been disturbed in the past. However, there has not been any cultivation at the site probably for several decades with the result that there has been extensive recovery of the vegetation and some woody vegetation has also recolonized parts of these areas. Development within these areas would be likely to generate moderate to low impacts on vegetation and fauna.

Along the western boundary of the study area, there is an area of intact savannah, with a high density of woody species, especially *Acacia karoo*, *Acacia erioloba*, *Searsia lancea* and *Acacia caffra*. This area is considered to be of high sensitivity, but a portion thereof cannot be avoided in order to maintain the desired output of the facility. It is estimated that the proposed project would result in the loss of approximately 100 *Acacia erioloba* trees, which is not considered highly significant in the local context as this is a small proportion of the local population and the loss of individuals from the development footprint would not compromise the viability of the local population which is likely to number several thousand trees.

Although there are several listed fauna species which may occur at the site, none of these have a highly restricted distribution and it is not likely that any of these would be significantly impacted by the development. Similarly, the development would potentially impact a number of listed avifauna which occur in the area, but as the grid connection for the development would be less than 400m long, collision risk would be very low and the primary impact on avifauna would therefore be a small amount of habitat loss for species which utilise open grassland and savannah.

The site is also located within a CBA, which is a potential concern as the development would potentially compromise the ecological functioning of the CBA and impact landscape connectivity. This impact is however to some extent moderated by the fact that a large proportion of the site has been transformed in the past and the proximity of the site to the urban fringe of Wolmaransstad which would decrease the overall ecological value of the site.

Overall, with the application of avoidance and mitigation measures, it is likely that the impacts of the development would be largely local in nature and there are no impacts associated with the development which would be of broader concern.

8.1.2. Impact on Soils, Land Capability and Agricultural Potential

There has not been any cultivation at the site for several decades with the result that there has been extensive recovery of the vegetation on the site. The site of the proposed solar energy facility has limited agricultural potential, as the farm has a land capability classification of marginal potential arable land (class 4). No agriculturally sensitive areas occur within the proposed development footprint. The major limitations to agriculture are the aridity and lack of access to water, as well as the shallow soils that occur in places across the site.

8.1.3. Visual Impacts

From a visual perspective it was concluded that the position of the proposed PV facility (at a height of up to 6m) would have moderate impact within 2km of the facility, with visual receptors (farmsteads to the north, R505 and R504) directly adjacent to the project site expected to experience a high visual impact. Receptors further than 2km from the project site are likely to experience a low visual impact with the town of Wolmaransstad falling within this zone.

8.1.4. Impacts on Heritage Resources

No heritage features were confirmed to be located on the project site. Several stone cairns are indicative of past agricultural practices. Some of the cairns could potentially indicate the occurrence of graves, especially at one position identified within the proposed PV array footprint. Chance find procedures are required to be implemented during construction in the vicinity of cairns. Overall the impact on the archaeological environment is considered to be low.

8.1.5. Social and Economic Impacts

The proposed Wolmaransstad 75MW Solar Energy Facility is unlikely to result in permanent negative social impacts. In terms of potential social impacts arising

from the project, the social impact assessment has found that there is no obvious reason for the competent authority to reject the application on social grounds. From a social perspective it is concluded that the project could be developed subject to the implementation of the recommended mitigation measures and management actions contained in the report. The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

8.2 Comparison of Alternatives

Layout alternatives: Two layout alternatives within the assessment area were considered, which was in turn informed by the land capability assessment undertaken during the Scoping phase and optimized to respond to denser wooded areas ascribed to have a high ecological sensitivity. The whole south western section of the project site was excluded for the siting of the facility on the basis of ecological sensitivity.

From an ecological perspective, two layouts options were considered. The contiguous PV array requiring the realignment of a power line traversing the project site from north to south (option 1) was considered to be the most suitable alternative, as it would result in less overall loss of woody species over a portion of high sensitivity. However, due to the similarities between layout option 1 and option 2, and the marginal increase in the loss of listed species expected, both alternative layout plans are considered to be ecologically acceptable.

Technology alternatives: Two solar energy technology alternatives were considered for the proposed project, and included:

» Fixed Mounted PV systems having a height of up to 4m (static/fixed-tilt panels)
» Tracking PV systems (with solar panels that rotate around a defined axis to follow the sun's movement) having a height of up to 6m (for tracking).

There are no impacts of unacceptably high significance associated with either layout or technology assessed for the proposed Wolmaransstad 75MW Solar Energy Facility.

8.3 Environmental Costs of the Project versus Benefits of the Project

Environmental (natural environment, economic and social) costs can be expected to arise from the project proceeding. This could include:

» Loss of biodiversity, flora, fauna and soils due to the clearing of land for the construction and utilisation of land for the PV project (which is limited to the

development footprint of approximate 270 hectares). The loss of biodiversity has been minimised by the careful location of the development to avoid key areas supporting biodiversity including high and medium sensitive areas.
» Visual impacts associated with the PV panels
» Change in land-use and loss of agricultural land on the development footprint.

These costs are expected to occur at a local level.

Benefits of the project include the following:

» The project is poised to bring about important economic benefit at the local and regional scale through job creation, procurement of materials and provision of services and other associated downstream economic development. These will transpire during the preconstruction/ construction and operational phases.
» The project serves to diversify the economy and electricity generation mix of South Africa by addition of solar energy to the mix.
» South Africa's per capita greenhouse gas emissions being amongst the highest in the world due to reliance on fossil fuels, the proposed project will contribute to South Africa achieving goals for implementation of non-renewable energy and 'green' energy. Greenhouse gas emission load is estimated to reduce by 0.86% for a 500MW coal-fired power station compared to a similar MW PV project, on a like for like basis.

The benefits of the project are expected to occur at a national, regional and local level. These benefits partially offset the localised environmental costs of the project.

8.4. Overall Conclusion (Impact Statement)

The technical viability of establishing the Wolmaransstad 75MW Solar Energy Facility with a generating capacity of up to 75MW near to Wolmaransstad has been established by Bluewave Capital SA. The positive implications of establishing the PV facility include the following:
» One of the first commercial renewable energy facilities in the Wolmaransstad area aiding in bolstering energy security in the region.
» The potential to harness and utilise solar energy resources within the North West Province.
» The project would assist the South African government in reaching their set targets for renewable energy.
» The project would assist the South African government in the implementation of its green growth strategy and job creation targets.
» The National electricity grid in the North West Province would benefit from the additional generated power.

» Promotion of clean, renewable energy in South Africa
» Creation of local employment, business opportunities and skills development for the area.

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that there are **no environmental fatal flaws** that should prevent the proposed project from proceeding, provided that the recommended mitigation and management measures are implemented. The significance levels of the majority of identified negative impacts have been reduced by implementing the mitigation measures recommended by the specialist team during the EIA process, and this specifically included the consideration of the facility layout in relation to sensitivities identified. The avoidance of areas of sensitivity is illustrated by the facility layout drawing included as Figure 8.1. The significance levels of the majority of identified negative impacts can be reduced by implementing the recommended mitigation measures. The project is therefore considered to meet the requirements of sustainable development. Environmental specifications for the management of potential impacts are detailed within the draft Environmental Management Programme (EMPr) which is included within Appendix K.

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

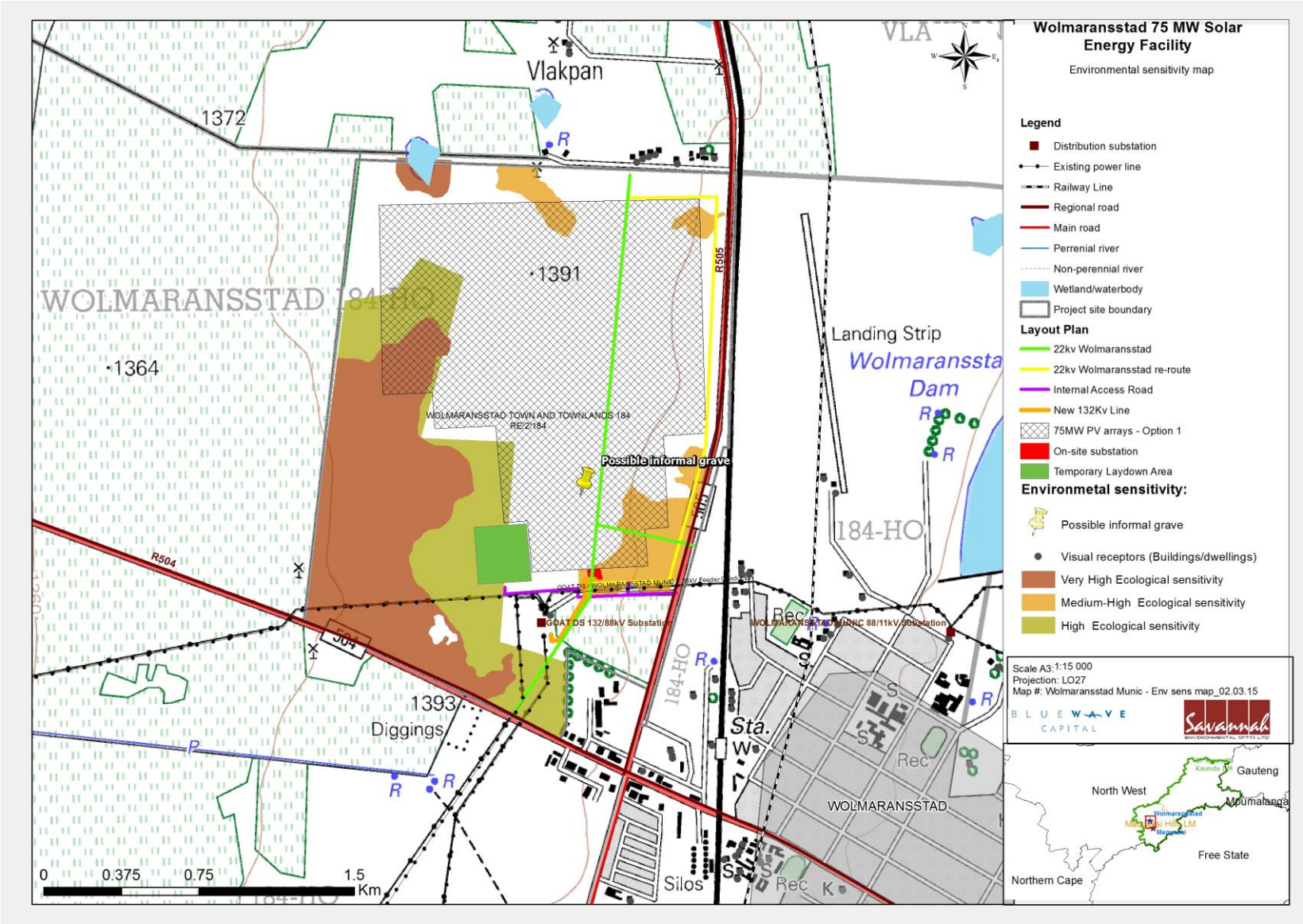

Figure 8.1: Composite sensitivity map and layout plan for the proposed Wolmaransstad 75MW Solar Energy Facility (preferred alternative). Refer to Appendix A for A3 maps of both layout alternatives.

8.5. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted as a result of the construction and operation of the Wolmaransstad 75MW Solar Energy Facility and associated infrastructure, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the identified impacts can be mitigated to an acceptable level. In terms of this conclusion, the EIA project team support the decision for environmental authorisation.

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

» Areas of very high ecological sensitivity determined through the EIA must be avoided as far as possible at the detail design stage.
» Following the final design of the facility, a final layout must be submitted to DEA for review and approval prior to commencing with construction.
» Alternative layout option 1 is the preferred alternative. Should there be a technical reason why layout option 1 cannot be developed, layout option 2 is also considered to be acceptable as it will result in a nominal increase in the number of listed species affected.
» Currently it is anticipated that approximately 100 *Acacia erioloba* trees and other listed species could be affected by the proposed development. A site walk through should be undertaken by an ecologist to determine the position and number of listed species that will be affected by the facility footprint.
» An application must be made to the Department of Agriculture, Forestry and Fisheries and provincial conservation authority for the permitting of the removal or relocation of listed plants and trees.
» While no heritage sites were identified on the site, chance find procedures must be implemented to mitigate the potential discovery of informal graves.
» Should substantial archaeological or paleontological (fossils) remains be exposed during construction, the ECO should safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.
» The draft Environmental Management Programme (EMPr) as contained within Appendix K of this report should form part of the contract with the Contractors appointed to construct and maintain the proposed facility, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the proposed project is considered key in achieving the appropriate environmental management standards as detailed for this project. This EMPr should be viewed as a dynamic document that should be updated throughout the life cycle of the facility, as appropriate.

- All relevant practical and reasonable mitigation measures detailed within this report and the specialist reports contained within Appendices E to J must be implemented.
- An independent Environmental Control Officer (ECO) should be appointed to monitor compliance with the specifications of the EMPr for the duration of the construction period.
- A detailed stormwater management plan must be developed and implemented for the facility following final design.
- Site rehabilitation of temporary laydown and construction areas to be undertaken immediately after construction.
- Should the facility be decommissioned, the development footprint must be rehabilitated.
- Alien invasive vegetation is required to be managed or removed (as required) during construction, operations, decommissioning and post-closure of the facility.

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