

# FINAL SCOPING REPORT

For the Proposed Bokamoso Photovoltaic Solar Energy Facility near Leeudoringstad, Registration Division HP,  
North West Province.



DEA Reference: 14/12/16/3/3/2/559

Prepared by



**ENVIRONAMICS**

PO Box 6484, Baillie Park, 2526. Tel: 018 – 299 1523, Fax 086 762 8336  
e-mail: Carli.Steenkamp@nwu.ac.za

## PROJECT DETAIL

DEA Reference No. : 14/12/16/3/3/2/559

Project Title : Proposed Bokamoso Photovoltaic Solar Energy Facility near Leeudoringstad, North West Province

Authors : Ms. Carli Steenkamp & Ms. Marelie Griesel

Client : Bokamoso Energy (Pty) Ltd.

Report Status : Final Scoping Report

Submission date : 2 September 2013

**When used as a reference this report should be cited as:** Environamics (2013) Final Scoping Report: Proposed Bokamoso Photovoltaic Solar facility and associated infrastructure near Leeudoringstad, North West Province.

### COPYRIGHT RESERVED

This technical report has been produced for Bokamoso Energy (Pty) Ltd. The intellectual property contained in this report remains vested in Environamics and Bokamoso Energy (Pty) Ltd. No part of the report may be reproduced in any manner without written permission from Environamics or Bokamoso Energy (Pty) Ltd.

## TABLE OF CONTENTS

PROJECT DETAILS.....	i
TABLE OF CONTENTS.....	ii
APPENDICES.....	v
GLOSSARY OF TERMS AND ACRONYMS.....	v
CONTEXT FOR THE PROPOSED DEVELOPMENT.....	vi
EXECUTIVE SUMMARY.....	vii
<b>1. INTRODUCTION.....</b>	<b>1</b>
1.1 Legal mandate and purpose of the report.....	1
1.2 Details of the environmental assessment practitioner (EAP).....	2
1.3 Status of the EIA process.....	3
1.4 Structure of the report.....	6
<b>2. ACTIVITY DESCRIPTION AND ALTERNATIVES.....</b>	<b>8</b>
2.1 Project location and description.....	8
2.2 Photovoltaic technology.....	9
2.3 Layout description.....	9
2.4 Services provision.....	10
2.5 Consideration of alternatives.....	10
2.5.1 No-go alternative.....	11
2.5.2 Location alternatives.....	11
2.5.3 Activity alternatives.....	11
2.5.4 Technical alternatives.....	12
2.5.5 Design and layout alternatives.....	12
2.5.6 Technological alternatives.....	12
<b>3. DESCRIPTION OF THE ENVIRONMENT.....</b>	<b>15</b>
3.1 Site description.....	15
3.1.1 Land uses on and adjacent the site.....	15
3.2 Description of the biophysical environment.....	15
3.2.1 Geology and soils.....	15
3.2.2 Vegetation and landscape features.....	15
3.2.3 Climate.....	16
3.2.4 Visual landscape.....	16
3.3 Description of the socio-economic environment.....	16
3.3.1 Socio-economic conditions.....	16
3.3.2 Cultural and heritage aspects.....	16

<b>4.</b>	<b>LEGISLATIVE AND POLICY CONTEXT.....</b>	<b>18</b>
4.1	Introduction.....	18
4.2	Legislative context.....	19
4.3	Policy context.....	22
4.4	Other legislation.....	26
4.5	Relevant guidance.....	26
4.6	Conclusion.....	26
<b>5.</b>	<b>DESCRIPTION OF ENVIRONMENTAL ISSUES.....</b>	<b>27</b>
5.1	Scoping methodology.....	27
5.2	Checklist analysis.....	27
5.3	Matrix analysis.....	29
	5.3.1 Physical environment.....	31
	5.3.2 Social/Economic environment.....	31
5.4	Conceptual framework.....	31
	5.4.1 Impacts during the construction phase.....	32
	5.4.2 Impacts during operational phase.....	33
5.5	Key issues identified.....	34
	5.5.1 Impacts during construction.....	34
	5.5.2 Impacts during the operational phase.....	34
	5.5.3 Impact during the decommission phase.....	34
<b>6.</b>	<b>PUBLIC PARTICIPATION AND CONSULTATION.....</b>	<b>35</b>
6.1	Public participation process.....	35
6.2	Consultation process.....	37
6.3	Registered IAPs.....	37
6.4	Issues raised by IAPs and consultation bodies.....	37
<b>7.</b>	<b>THE NEED AND DESIREABILITY OF THE ACTIVITY.....</b>	<b>39</b>
7.1	The need for the proposed development.....	39
7.2	The desirability of the proposed development.....	39
<b>8.</b>	<b>PLAN OF STUDY FOR EIA.....</b>	<b>42</b>
8.1	Approach to EIA.....	42
8.2	Public participation process.....	46
8.3	Method of environmental assessment.....	46
	8.3.1 Impact rating system.....	46
<b>9.</b>	<b>CONCLUSION.....</b>	<b>50</b>
<b>10.</b>	<b>REFERENCES.....</b>	<b>51</b>

## LIST OF DIAGRAMS

Diagram 1: Conceptual model of impacts during construction phase

Diagram 2: Conceptual model of impacts during operational phase

## LIST OF TABLES

Table 1.1: Estimated timeframe for completion of the 'scoping and EIA process'

Table 1.2: Structure of the report

Table 2.1: General site information

Table 4.1: Legislative context for the construction of photovoltaic solar plants

Table 4.2: Policy context for the construction of photovoltaic solar plants

Table 5.1: Environmental checklist

Table 5.2: Matrix analysis

Table 6.1: Issues raised by key consultation bodies

Table 8.1: Summary of tasks and methods as part of the EIA process

Table 8.2: The rating system

## LIST OF FIGURES

Figure 1: Locality Map

Figure 2: Regional Map

Figure 3: Land capability classification

## PLATES

Plate 1: The site (taken towards the southwest)

Plate 2: The site (taken towards the west-southwest)

Plate 3: The site (taken towards the west)

Plate 4: The site (taken towards the west-northwest)

Plate 5: The site (taken towards the northwest)

Plate 6: The site (taken towards the north-northwest)

Plate 7: The site (taken towards the north)

Plate 8: The site (taken towards the north-northeast)

Plate 9: The site (taken towards the northeast)

Plate 10: The site (taken towards the east-northeast)

Plate 11: The site (taken towards the east)

Plate 12: The site (taken towards the east-southeast)

Plate 13: The site (taken towards the south-southeast)

Plate 14: The site (taken towards the south)

Plate 15: The site (taken towards the south-southwest)

Plate 16: Transmission lines east of the site

Plate 17: Site's access road

## APPENDICES

Appendix A: Bios of environmental assessment practitioner

Appendix B: Press advertisement

Appendix C: On site notice

Appendix D: List of I&APs

Appendix E: Proof of correspondence

Appendix F: Written comments received

## GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
DEA	Department of Environmental Affairs
DoE	Department of Energy
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation.
I&AP	Interested and affected party.
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act no 36 of 1998.
PPP	Public Participation Process
PV	Photovoltaic
REFIT	Renewable Energy Feed-In Tariff
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework

## CONTEXT FOR THE PROPOSED PROJECT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Energy's (DoE) long-term strategic planning and research process.

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DoE (Integrated Resource Plan 2010-2030). In terms of the Integrated Resource Plan (IRP), approximately 8.4GW of the renewable energy capacity planned to be installed will be generated from PV technologies over the next twenty years.

To contribute towards this target and to stimulate the renewable energy industry in South Africa, the need to establish an appropriate market mechanism was identified, and the Renewable Energy IPP Procurement (REIPPP) process was announced in August 2012, with the intention of DoE to purchase 3,750MW of renewable energy from IPPs to be delivered to the national grid by end of 2016 under a 20 year Power Purchase Agreement to be signed with Eskom. The establishment of the REIPPP process in South Africa provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector in the country, the region and internationally, and promote competitiveness for renewable energy with conventional energies in the medium- and long-term.

In response to the above, Bokamoso Energy (Pty) Ltd. is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located near Leeudoringstad in the North West Province (refer to Figure 1 for the locality map).

## EXECUTIVE SUMMARY

The Matlosana Local Municipality's Integrated Development Plan (IDP, 2012/13) reveals the following relevant key priority areas for the municipality: municipal financial viability; growing unemployment; generally declining economic and social infrastructure; service backlogs; and lack of a proper Land Use Management System. The following key threats are also identified: uneven distribution of the benefits of economic growth; environmental degradation; high unemployment and poverty levels; large housing backlogs; lack of capital to provide and maintain services infrastructure. The IDP encourages sustainable development and seeks economic approaches that benefit the local environment and quality of life, rather than undermining it. Sustainable development provides a framework within which communities can use resources efficiently, create efficient infrastructure, protect and enhance their quality of life, and create new businesses to strengthen their economies (IDP 2012/13).

In response to the above Bokamoso Energy intends to develop a 75MW photovoltaic solar facility and associated infrastructure on a portion of the farm Matjesspruit 145, Registration Division HP, North West situated within the Matlosana Local Municipality area of jurisdiction. The town of Leeudoringstad is located approximately 19 km south west of the proposed development (refer to Figure 1 and 2 for the locality and regional map). The total footprint of the project will approximately be 130 hectares (including supporting infrastructure on site). The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, geology and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The Environmental Impact Assessment (EIA) Regulations, 2010 (Regulation 543) determine that an environmental authorisation is required for certain listed activities, which might have detrimental effects on the environment. The following activities have been identified with special reference to the proposed development and are listed in the EIA Regulations:

- Activity 10(i) (Regulation 544): *"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."*
- Activity 1 (Regulation 545): *"The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."*
- Activity 15 (Regulation 545): *"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."*
- Activity 14(a)(i) (Regulation 546): *"The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation- (a) North West Province (i) All areas outside urban areas."*

Being listed under Listing Notice 1, 2, and 3 (Regulation 544, 545, and 546) implies that the development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 26-35.



Environamics has been appointed as the independent consultant to undertake the EIA on Bokamoso Energy's behalf.

Regulation 28 of the EIA Regulations requires that a scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping. The potential positive and negative impacts associated with the proposed development have been identified. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant negative impacts relate to the potential impacts on the soil (soil compaction and chemical soil pollution) and the water features located on the site. The construction phase will however also provide temporary employment and other economic benefits for the duration of the construction phase.

Impacts during the operational phase:

During the operational phase the study area will serve as an electricity generation facility and the negative impacts are generally associated with the potential increase in storm water runoff, soil erosion, and leakage of hazardous material, the increased consumption of water, visual intrusion, and security risks. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have direct positive impacts through the provision of permanent employment opportunities for its duration, the generation of additional electricity and the generation of income to the local community.

Impacts during the decommissioning phase:

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will result in the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created in the process. The generation of waste that will also require certain management measures.

Cumulative impacts:

Cumulative impacts could arise if other similar projects are constructed in the area. The Environmental Impact Assessment (EIA) Report will include a detailed assessment of the potential cumulative impacts associated with the proposed development.

Regulation 31 of the EIA Regulations determine that an EIA report be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. The EIA report will evaluate and rate each identified impact, and identify mitigation measures which may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 35.

# 1. INTRODUCTION

---

This section aims to introduce the Scoping Report and specifically to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (a) details of –
    - (i) the EAP who prepared the report; and
    - (ii) the expertise of the EAP to carry out scoping procedures.

## 1.1 Legal mandate and purpose of the report

Regulations No. 543, 544 and 545 (of 18 June 2010) promulgated in terms of Section 24(5), 24(M) and 44 of the National Environmental Management Act, (107 of 1998) determine that an Environmental Impact Assessment (EIA) process should be followed for certain listed activities, which might have a detrimental effect on the environment. According to the DEAT 2006 general guidelines the main objectives of the Regulations are: *“... to establish the procedures that must be followed in consideration, investigation, and assessment and reporting of the activities that have been identified. The purpose of these procedures is to provide the competent authority with adequate information to make decisions which ensure that activities which may impact negatively on the environment to an acceptable degree are not authorized, and that activities which are authorized are undertaken in such a manner that the environmental impacts are managed to acceptable levels.”*

The EIA Regulations No. 544, 545 and 546 outline the activities for which EIA should apply. The following activities with special reference to the proposed development are listed in the EIA Regulations:

- Regulation 544 under 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.”*
- Regulation 545 under Activity 1: *“The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”*
- Regulation 545 under 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.”*
- Regulation 546 under Activity 14(a)(i): *“The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation- (a) North West Province (i) All areas outside urban areas.”*

Being listed under Listing Notice 1, 2, and 3 (Regulation 544, 545, and 546) implies that the proposed development is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 26-35.

According to the DEAT 2006 'General Guide to the EIA Regulations' the purpose of scoping is defined as, "... to determine the 'scope' of the EIA that will be conducted in respect of the activity for which authorization is being applied for." The main outcomes of the scoping report will be to highlight key issues, potential environmental impacts and reasonable alternatives. The Scoping phase is also meant to define the nature and extent of specialist studies required in the EIA stage. The objectives of the scoping study are summarized as follows:

- Identify potential environmental impacts of the proposed development;
- Examine the sustainability of the proposed development in terms of the biophysical, ecological, socio-economic environment;
- Identify environmental issues that require further investigation;
- Identify Interested and Affected Parties (I&APs), inform them of the proposed development and identify any key concerns to be considered in decision making;
- Provide relevant governmental and non-governmental authorities and agencies with the necessary information to make informed decisions regarding the proposed development at the scoping level;
- Consider alternatives, which could be in terms of: site selection, layout, construction materials, processes, engineering solutions and designs and sustainability best practice; and
- Outline the methodology employed to date and proposed activities to be undertaken during the Environmental Impact Assessment (EIA) stage.

This report is the Final Scoping Report to be submitted to the Department of Environmental Affairs. According to Regulation 543 all registered I&APs and relevant State Departments must be allowed the opportunity to review the draft and final scoping reports. The Final scoping report will be made available to registered I&APs and all relevant State Departments. They will be requested to provide written comments on the final scoping report within 21 days of receiving the notification. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Draft EIR.

## 1.2 Details of the environmental assessment practitioner (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the EIA and prepare all required reports. All correspondence to the EAP can be directed to:

Contact person: Carli Steenkamp  
Postal Address: P O Box 6484, Baillie Park, 2526  
Telephone: 018 -299 1523 (w) 086 762 8336 (f)  
Electronic Mail: [Carli.Steenkamp@nwu.ac.za](mailto:Carli.Steenkamp@nwu.ac.za)

Regulation 17 determines that an independent and suitably qualified EAP should conduct the EIA. In terms of the independent status of the EAP a declaration was submitted as part of the application form. The expertise of the EAP responsible for conducting the EIA is summarized in a curriculum vitae included as Appendix A to this report.

### 1.3 Status of the EIA process

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 26 to 35 of Regulation 543. Table 1.1 provides a summary of the status of the EIA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted on 15 Mei 2013 to discuss the proposed development and assess the site.
- A fully completed application form was submitted to the National Department of Environmental Affairs (DEA) on 31 Mei 2013 and the Department registered the application on the 3 July 2013.
- The Draft Scoping Report was submitted to the DEA on 24 July 2013.
- The Draft Scoping Report was made available to registered I&APs and relevant State Departments on 23 July 2013 and they were requested to provide their comments on the report within 40 days of the notification (2 September 2013).

It is envisaged that the Final Scoping will be accepted by the Department by 16 October 2013 and that the Draft EIA Report will be submitted during October 2013. The EIA process should be completed within approximately nine months of submission of this report, i.e. by May/June 2014 – see Table 1.

Table 1.1: Project schedule

Tasks to be performed	May 13				June 13				July 13				Aug 13				Sept 13				Oct 13				Nov 13							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
<b>REGISTRATION PHASE</b>																																
Submit application form				X																												
Pre application meeting	X																															
Site visit			X				X																X									
<b>SCOPING PHASE</b>																																
<b>Public participation</b>																																
- Press advertisement				X																												
- On site advertisement			X																													
- Complete PP report											X																					
<b>Consultation</b>																																
- As required by Regulations				X																												
- Local authority				X																												
<b>Draft Scoping Report</b>											X																					
<b>Final Scoping report</b>																																
- Circulate																																
- Submission																			X													
- Approval																																
<b>Plan of Study for EIA report</b>																																
- Submission																			X													
- Approval																																



## 1.4 Structure of the report

This report is structured in accordance with the prescribed contents stipulated in Regulation 28 of R543. It consists of nine sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.2.

Table 1.2: Structure of the report

Requirements for the contents of a scoping report as specified in the Regulations		Section in report	Pages
<b>29(1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –</b>			
(a)	details of -	1	1-7
	(i) the EAP who prepared the report; and ii) the expertise of the EAP to carry out scoping procedures.		
(b)	a description of the proposed activity;	2	8-14
(c)	a description of any feasible and reasonable alternatives that have been identified;		
(d)	a description of the property on which the activity is to be undertaken and the location of the activity on the property;		
(e)	a description of the environment that may be affected by the activity and the manner in which the activity may be affected by the environment.	3	15-17
(f)	an identification of all legislation and guidelines that have been considered in the preparation of the scoping report;	4	18-26
(g)	a description of environmental issues and potential impacts, including cumulative impacts, that have been identified;	5	27-34
(h)	details of the public participation process conducted in terms of regulation 27(a), including –	6	35-38
	(i) the steps that were taken to notify potentially interested and affected parties of the application;		
	(ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given;		
	(iii) a list of all persons or organisations that were identified and registered in terms of regulation 55 as interested and affected parties in relation to the application; and		
	(iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;		
(k)	Copies of any representations, and comments received in connection with the application or the scoping report from interested and affected parties;		
(l)	Copies of minutes of any meetings held by the EAP with interested and affected parties and other role players which record the view of the participants;		
(m)	Any response by the EAP to those representations and comments and views;		

(i)	a description of the need and desirability of the proposed activity;	7	39-41
(j)	A description of the identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	N.A.	-
(n)	a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include –	8	42-49
	(i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;		
	(ii) an indication of the stages at which the competent authority will be consulted;		
	(iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and		
	(iv) particulars of the public participation process that will be conducted during the environmental impact assessment process;		
(o)	any specific information required by the competent authority; and	N.A.	-
(p)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	N.A.	-
	<b>(2) In addition, a scoping report must take into account any guidelines applicable to the kind of activity which is the subject of the application.</b>	N.A.	-
	<b>(3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act.</b>	N.A.	-



## 2. ACTIVITY DESCRIPTION AND ALTERNATIVES

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (b) a description of the proposed activity;
  - (c) a description of any feasible and reasonable alternatives that have been identified; and
  - (c) a description of the property on which the activity is to be undertaken and the location of the activity on the property.

### 2.1 Project location and description

The activity entails the development of a photovoltaic solar facility and associated infrastructure on a portion of the farm Matjesspruit 145, Registration Division HP, North West situated within the Matlosana Local Municipality area of jurisdiction. The proposed development is located in the North West Province, in the northern central interior of South Africa (refer to Appendix A, Figure 2 for the regional map). The town of Leeudoringstad is located approximately 19 km south west of the proposed development (refer to Appendix A, Figure 1 for the locality map).

The project entails the generation of approximately 75MW electrical power through photovoltaic (PV) panels. The total footprint of the project will approximately be 130 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Bokamoso Energy (Pty) Ltd. from the property owner, which is the JJ van Wyk Boerdery Trust, for the life span of the project (minimum of 20 years).

**Table 2.1:** General site information

Description of affected farm portion	A portion of the farm Matjesspruit 145, Registration Division HP, North West
21 Digit Surveyor General codes	T0HP00000000014500000
Title Deed	T057069/2003
Photographs of the site	Refer to the Plates
Type of technology	Photovoltaic solar facility with crystalline silicon panels
Structure Height	Approximately 3.5 meters
Surface area to be covered	Less than 130 hectares
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
Laydown area dimensions	Less than 130 hectares
Generation capacity	75MW
Expected production	130 GWh per annum

## 2.2 Photovoltaic technology

The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic (PV) effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e. semiconductors) which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce 75MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
- Wiring to Central Inverters - Sections of the PV array would be wired to central inverters sized from 500kW to 1MW. The inverter's role is to convert direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. A 33/132kV onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. The extent of the substation will approximately be 50mx50m, while the fencing of the substation will be 100mx100m. It is expected that generation from the facility will tie in with the Harrisburg-Leeubos 132kV power line.
- Supporting Infrastructure - A control facility with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 400m<sup>2</sup> or less. Other supporting infrastructure includes voltage and current regulators and protection circuitry.
- Roads - Ready access already exist from the regional road (R502). However an internal site road network to provide access to the solar field and associated infrastructure will be required. All site roads will require a width of approximately 4m.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.

## 2.3 Layout description

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes will be considered. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads

and associated infrastructure (buildings, power inverters, substation, transmission lines and perimeter fences). Due to the nature of the site being used for grazing (refer to the Plates), limited features of conservation significance exist.

## **2.4 Services provision**

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from groundwater sources. The Department of Water Affairs has been asked to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply. A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has been appointed as a preferred bidder by the Department of Energy.

The estimated maximum amount of water required during construction is 200m<sup>3</sup> per month during the 12 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 3 000m<sup>3</sup> per annum. The majority of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 liters of water for cleaning, the total amount of 350 000 panels will require 700 000 liters per wash. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September). This totals approximately 2,800,000 liters per annum for washing, and allows 200,000 liters per annum (or 548 liter per day) for toilet use, drinking water, etc.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs would be considered by the developer. Furthermore indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

Portable chemical toilets will be utilized, that will be serviced privately or by the local municipality. Consequently the plant will not connect to the municipal sewage infrastructure but will make use of the sewerage plant. The municipal landfill site will be used (either Leeudoringstad's or Orkney's) for the disposal of waste. The construction and hazardous waste will be removed to landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to the municipal landfill site by a private contractor or by local municipality. The Local Municipality will need to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years).

## **2.5 Consideration of alternatives**

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. The following sections explore each type of alternative in relation to the proposed activity.

### 2.5.1 No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed development not proceed, the site will remain unchanged and will continue to be used for low density cattle grazing (refer to plates for photographs of the site). However, the potential opportunity costs in terms of the supporting social and economic development in the area would be lost.

### 2.5.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Bokamoso Energy in the Leeudoringstad area to potentially establish solar facilities. From a local perspective, the farm Matjesspruit 145 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, geology and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The proposed development falls within an area used for grazing and the site is therefore considered to have limited environmental sensitivity as a result. The National Department of Agriculture (2006) classified land capability into two broad categories, namely land suited to cultivation (Classes I – IV) and land with limited use, generally not suited to cultivation (Classes V – VIII). The site falls within Class VI and therefore the agricultural potential of the site is limited and it is unlikely that the change in land use will impact significantly on agricultural production (refer to figure 3 for an illustration of the land capability classification).

Alternative locations on the farm Matjesspruit 145 may be considered should it be required as a result of specialist studies.

### 2.5.3 Activity alternatives

The scoping process also needs to consider if the development of a photovoltaic solar facility would be the most appropriate land use for the particular site.

Photovoltaic (PV) solar facility – Bokamoso Energy is establishing a portfolio of solar PV projects throughout South Africa but focussing on the Northern Cape and North West Province. Bokamoso Energy is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Leeudoringstad area. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all of the components can be recycled.

Wind energy facility - Due to the local climatic conditions a wind energy facility is not considered suitable as the area does not have the required wind resource. Furthermore the applicant has opted for the generation of electricity via solar power rather than the use of wind turbines. This alternative is therefore regarded as not feasible and will not be evaluated further in this report.

Concentrated Solar Power (CSP) technology - CSP technology requires large volumes of water and this is a major constraint for this type of technology in the proposed project area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. Therefore, this alternative will not be considered further in this report.

#### 2.5.4 Technical alternatives

It is expected that electricity generated from the facility will tie in with the Harrisburg-Leeubos 132kV power line. The transmission line will be constructed within 32m wide servitude and will traverse the farm Matjesspruit 145. The 132kV overhead transmission line is the only preferred alternative for the applicant due to the following reasons:

Overhead Transmission Lines - Overhead lines are less costly to construct than underground lines. Therefore, the preference with overhead lines is mainly on the grounds of cost. Overhead lines allow high voltage operations and the surrounding air provides the necessary electrical insulation to earth. Further, the surrounding air cools the conductors that produce heat due to lost energy (Swingler et al, 2006).

The overall weather conditions in the North West Province are less likely to cause damage and faults on the proposed overhead transmission power line. Nonetheless, if a fault occurs, it can be found quickly by visual means using a manual line patrol. Repair to overhead lines is relatively simple in most cases and the line can usually be put back into service within a few days. In terms of potential impacts caused by overhead transmission lines include visual intrusion and threats to sensitive habitat (where applicable).

Underground Transmission Lines - Underground cables have generally been used where it is impossible to use overhead lines for example because of space constraints. Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also very difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines.

#### 2.5.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer. The layout plan will be submitted as part of the EIA Report.

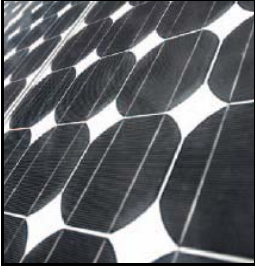
#### 2.5.6 Technology alternatives

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

##### Crystalline (high efficiency technology at higher cost):

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the

global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



- Monocrystalline Silicon - Monocrystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Monocrystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



- Multicrystalline Silicon - Multicrystalline (also called polycrystalline) panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than monocrystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than monocrystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

Thin film (low-cost technology with lower efficiency):

Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:



- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.



- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications, and is considered a developing PV technology (First Solar, 2011).

The technology that proved most feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels. Although it is more expensive than thin films it is approximately 10 times more efficient, is non-reflective and has a higher durability than thin-film systems. The active material in thin films tends to be less stable than crystalline causing degradation over time and the lower cost to manufacture some of the module technologies is partially offset by the higher area-related system costs (costs for mounting and the land required) due to their lower conversion efficiency. Furthermore thin film modules have higher visibility and reflections.

### 3. DESCRIPTION OF THE ENVIRONMENT

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (e) a description of the environment that may be affected by the activity and the manner in which the activity may be affected by the environment.

#### 3.1 Site description

The site description deals with land uses on site as well as land uses adjacent the development area (see Plates).

##### 3.1.1 Land uses on and adjacent the site

The site survey revealed that land uses in the immediate vicinity of the proposed development are essentially comprised of grazing (cattle) and rural residential. Currently the dominant land uses in the area essentially consist of grazing (cattle) – refer to plates 1-17 for photographs of the development area.

#### 3.2 Description of the biophysical environment

The biophysical environment is described with specific reference to geology and soils, vegetation and landscape features, climate and the visual landscape. However, due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view.

##### 3.2.1 Geology and soils

According to Mucina and Rutherford (2006) the site is underlain with Aeolian and colluvial sand overlying sandstone, mudstone and shale of the Karoo Supergroup (mostly the Ecca Group) as well as older Ventersdorp Supergroup andesite and basement gneiss in the north. Soil forms are mostly Avalon, Westleigh and Clovelly.

##### 3.2.2 Vegetation and landscape features

In terms of vegetation type the site falls within the Vaal-Vet Sandy Grassland vegetation type (Mucina and Rutherford, 2006). Vaal-Vet Sandy Grassland vegetation covers areas of the North-West and Free State Provinces. The region is characterised by plains-dominated landscape with some scattered, slightly irregular undulating plains and hills. The conservation status of this vegetation type is described by Mucina and Rutherford (2006) as 'Endangered' due to cultivation and grazing pressure.

The vegetation consists of mainly low-tussock grasslands with an abundant karroid element. Dominance of *Themeda triandra* is an important feature of this vegetation unit. Locally low cover of



*T. triandra* and the associated increase in *Elionurus muticus*, *Cymbopogon pospischilii* and *Aristida congesta* is attributed to heavy grazing and/or erratic rainfall.

### **3.2.3 Climate**

The Leeudoringstad area is situated in an area with a warm-temperate, summer-rainfall climate with an overall MAP of 530mm. Severe frost (37 days per year on average) occurs in winter. The mean annual temperature is 16.4°C, with temperatures ranging from the high thirties in summer and minus zero in winter months.

### **3.2.4 Visual landscape**

The visual impact of photovoltaic facility depends on the complex relationship between the visual environment (landscape), the development (object), and the observer/receptor (e.g. farmer). The establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low, electrical infrastructure such as power lines are already located in close proximity to the site and the polycrystalline panels considered for this development are non-reflective. However due to the extent of the proposed development (130 hectares) a visual impact study will be conducted to determine to what extent the proposed development will be visible to observers and whether the landscape provides any significant visual absorption capacity.

## **3.3 Description of the socio-economic environment**

### **3.3.1 Socio-economic conditions**

According to the 2012/13 Matlosana Local Municipality's IDP review the municipal area comprises a total area of 3 162km<sup>2</sup> and is located in the South-eastern part of the North-West Province. The municipal area covers the central part of the of the Southern District municipal area and is bordered by Tlokwe (Potchefstroom) municipal area in the east, Maquassi Hills municipal area in the west, Ventersdorp Local Municipality in the north-east and the Free State Province in the south.

The Matlosana population is currently estimated at 412 050, of which 88.2 % lives in urban areas and 11.8 % in rural areas. Functional literacy of people aged 20 and older that completed grade 7 or higher, black (63.7%), white (98.9%), coloured (86.6%) and asian (91.1%), with a total of (71.0%). The poverty and unemployment rate for the City of Matlosana was as follow in 2004: poverty rate (56.6%), unemployment rate (42.0%) with the number of people unemployed at 85 168.

The City of Matlosana makes the following sectoral contribution within the Southern District Municipality: Agriculture (27%), Mining (64%), Manufacturing (39%), Trade (61%), Services (55%), Construction (75%) and Transport (49%) (IDP, 2012/13).

### **3.3.2 Cultural and heritage aspects**

Special attention was given to the identification of possible cultural or heritage resources on site. The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development. However a Heritage Impact Assessment will be conducted to

ensure that there would be no impact on cultural or historical features as a result of the proposed development. From a heritage point of view the following condition will apply:

- To address any subsurface cultural or heritage resources it needs to be clearly stated in the construction environmental management programme, submitted with the EIA report, that the South African Heritage Resources Agency (SAHRA) will be informed immediately should any artefacts be exposed during construction. Training of contractors on heritage issues will also form part of the contractors brief.

## 4. LEGISLATIVE AND POLICY CONTEXT

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (f) an identification of all legislation and guidelines that have been considered in the preparation of the scoping report.

### 4.1 Introduction

Environmental decision making with regards to photovoltaic solar plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Environmental Affairs (DEA) as well as comments from local and district authorities. Moreover it is significant to note that they also inform strategic decision making reflected in IDPs and SDFs. Therefore to ensure streamlining of environmental authorisations it is imperative for the proposed development to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies are briefly summarised:

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998)
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- North West Province Growth and Development Strategy (2004-2014)
- Dr. Kenneth Kaunda District Municipality Integrated Development Plan (IDP) 2012-2016
- City of Matlosana Local Municipality Integrated Development Plan (IDP) 2012/2013
- Klerksdorp Spatial Development Framework (SDF) 2009

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 4.1 and 4.2 to provide a reference framework for the implications for the proposed development.

## 4.2 Legislative context

**Table 4.1:** Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa (Act No. 108 of 1996)	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that “everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people’s environmental right and places government under a legal duty to act as a responsible custodian of the country’s environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.
The National Environmental Management Act (Act No. 107 of 1998)	National and Provincial Department of Environmental Affairs	1998	<p>NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice.</p> <p>The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 543, 544, 545, and 546 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities, which might have a detrimental effect on the environment. This EIA was triggered by activity 10 listed in Regulation R544, activities 1 and 15 listed in Regulation R545, and Activity 14(a)(i) listed in Regulation R546, which requires a ‘scoping and environmental impact assessment process.’</p>

The National Energy Act (Act No. 34 of 2008)	Department of Minerals and Energy	2008	One of the objectives of the National Energy 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 Water Act (Act No. 36 of 1998)	Department of Water Affairs (DWA)	1998	<p>Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources.</p> <p>As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use.</p>
National Environmental Management: Waste Act (Act No. 59 of 2008)	Department of Environmental Affairs (DEA)	2008	<p>NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.</p> <p>Regulations No. R718 (of 3 July 2009) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determine that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity.</p>

National Environment Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs (DEA)	2004	<p>The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.</p> <p>Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities.</p>
The National Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999	<p>The Act aims to introduce an integrated and interactive system for the management of the heritage resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.</p> <p>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected.</p>
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	<p>The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.</p>

### 4.3 Policy context

**Table 4.2:** Policy context for the construction of photovoltaic solar plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The White Paper on the Energy Policy of the Republic of South Africa	Department of Minerals and Energy	1998	<p>The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives:</p> <ul style="list-style-type: none"> <li>• Increasing access to affordable energy services</li> <li>• Improving energy governance</li> <li>• Stimulating economic development</li> <li>• Managing energy-related environmental and health impacts</li> <li>• Securing supply through diversity</li> <li>• Energy policy priorities</li> </ul> <p>The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.</p> <p>The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:</p> <ul style="list-style-type: none"> <li>• Minimal environmental impacts in operation in comparison with traditional supply technologies; and</li> <li>• Generally lower running costs, and high labour intensities.</li> </ul> <p>Disadvantages include:</p> <ul style="list-style-type: none"> <li>• Higher capital costs in some cases;</li> <li>• Lower energy densities; and</li> <li>• Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.</li> </ul>

The White Paper on Renewable Energy	Department of Minerals and Energy	2003	<p>This White Paper on Renewable Energy supplements the <i>White Paper on Energy Policy</i>, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.</p> <p>The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: <i>10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)</i> (Executive Summary, ix).</p>
Integrated Resource Plan (IRP) for South Africa	Department of Minerals and Energy	2010-2030	<p>The current iteration of the Integrated Resource Plan (IRP) for South Africa, after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options, which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6GW; 6,3GW of coal; 11,4GW of renewables; and 11,0GW of other generation sources.</p> <p>A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected renewables; and the adjustment of investment costs for nuclear units (a possible increase of 40%).</p> <p>Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:</p>



			<ul style="list-style-type: none"> <li>• The installation of renewables were brought forward in order to accelerate a local industry;</li> <li>• To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6GW was included in the IRP;</li> <li>• The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and</li> <li>• Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.</li> </ul> <p>The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10GW committed coal), the plan includes 9,6GW of nuclear; 6,3GW of coal; 17,8GW of renewables; and 8,9GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW.</p>
North West Province Growth and Development Strategy	North West Provincial Government	2004 - 2014	<p>The Strategy (PGDS) provides a framework for integrated and sustainable growth and economic development for the province and its people over the next ten years. It addresses the formulation of a common vision, goals and objectives of what should be achieved and how the provincial government and its social partners should achieve its objectives.</p> <p>The PGDS notes that the NWP is a medium-size province, covering ~10% of the total national surface area, accounting for ~8% of the national population, and contributing ~7% to the national economy. With the exception of the mining sector (~23.5% of provincial GDP in 2002), private sector activity in the NWP is very modest. Other development challenges include low population densities; inadequate infrastructure, and enormous service delivery backlogs; a predominantly poor population with high levels of illiteracy and dependency; great inequalities between rich and poor, and disparities between urban and rural; and the HIV/Aids pandemic.</p> <p>Both the primary immediate and long term objectives of the PGDS are therefore to address poverty and unemployment, while simultaneously improving the low level of expertise and skills. Additional objectives include promoting equal and fair access to opportunities and assets; enhancing competitiveness, profitability and SMME development; and ensuring sustainable development.</p>

Dr. Kenneth Kaunda District Municipality Integrated Development Plan (IDP)	Dr. Kenneth Kaunda District Municipality	2012 - 2016	<p>The Strategic Planning Workshop of the DR Kenneth Kaunda District Municipality mapped out the strategic direction the municipality was taking. The following are the key (general) strategic goals and objectives adopted:</p> <ul style="list-style-type: none"> <li>• To promote physical infrastructure development and services</li> <li>• To promote socio-economic development</li> <li>• To provide environmental health services</li> <li>• To ensure disaster risk management</li> <li>• To promote integrated transport services</li> <li>• To promote community safety</li> <li>• To ensure internal municipal excellence</li> </ul> <p>These goals are in support of the 5 year strategic agenda for local government and in cognisance of the strategic imperatives facing the district (IDP, 2012/16:72).</p>
City of Matlosana Integrated Development Plan (IDP) Review	City of Matlosana Local Municipality	2012/ 2013	<p>The Matlosana Local Municipality's Integrated Development Plan (IDP, 2012/13) reveals the following relevant key priority areas for the municipality: municipal financial viability; growing unemployment; generally declining economic and social infrastructure; service backlogs; and lack of a proper Land Use Management System. The following key threats are also identified: uneven distribution of the benefits of economic growth; environmental degradation; high unemployment and poverty levels; large housing backlogs; lack of capital to provide and maintain services infrastructure. The IDP encourages sustainable development and seeks economic approaches that benefit the local environment and quality of life, rather than undermining it. Sustainable development provides a framework within which communities can use resources efficiently, create efficient infrastructure, protect and enhance their quality of life, and create new businesses to strengthen their economies (IDP, 2012/13).</p>
Klerksdorp Spatial Development Framework (SDF)	City of Matlosana Local Municipality	2009	<p>The Klerksdorp SDF aims to provide general direction and guide decision-making and action on all land related matters. The SDF provides spatial guidance in the form of maps and spatial development plans.</p>

#### 4.4 Other legislation

Other legislation mainly refers to the following:

- Planning legislation governing the rezoning process and approval of the layout plan.
- Design standards and legislation for services provision such as water, sewerage, electricity, etc.
- Municipal bylaws related to building plans, building regulations, etc.

#### 4.5 Relevant guidance

The following guidance was considered in conducting the EIA:

- The Equator principles (2006)<sup>1</sup>
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines)(2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations

#### 4.6 Conclusion

The Environmental Impact Assessment was undertaken in accordance with the Environmental Impact Assessment Regulations (2010) published in GNR 543, in terms of Section 24(5), 24(M) and 44 of the National Environmental Management Act, 1998 (Act No 107 of 1998) as amended; all relevant National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

---

<sup>1</sup> Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that the EPs will need to be complied with should funding for the project be required.

## 5. DESCRIPTION OF ENVIRONMENTAL ISSUES

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (g) a description of environmental issues and potential impacts, including Cumulative impacts that have been identified.

### 5.1 Scoping methodology

The contents and methodology of the scoping report aims to provide, as far as possible, a user-friendly analysis of information to allow for easy interpretation.

- Checklist (see section 5.2): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 5.3): The matrix analysis provides a holistic indication of the relationship and interaction between the various development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed development.
- Conceptual model (see section 5.4): The model is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts and related mitigation measures. The environmental management plan as part of the EIA report should aim to formalise the proposed mitigation measures.

### 5.2 Checklist analysis

The independent consultant conducted a site visit on 15 May 2013. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the study area. Table 5.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 5.3.

**Table 5.1:** Environmental checklist

QUESTION	YES	NO	Un- sure	Description
<b>1. Are any of the following located on the site earmarked for the development?</b>				
I. A river, stream, dam or wetland		✘		None.
II. A conservation or open space area		✘		None.

III. An area that is of cultural importance		×		The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development. However a Heritage Impact Assessment will be conducted to ensure that there would be no impact on cultural or historical features as a result of the proposed development.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous forest		×		None.
IX. Grass land		×		None.
X. Bird nesting sites		×		None.
XI. Red data species		×		None.
XII. Tourist resort		×		None.
<b>2. Will the project potentially result in potential?</b>				
I. Removal of people		×		None.
II. Visual Impacts	×			The visual impact of a low-lying PV facility is not expected to be significant as the number of sensitive receptors in the area is very low and the polycrystalline modules are non-reflective. However a visual impact study will be conducted.
III. Noise pollution		×		Construction activities will result in the generation of noise over a period of months. The noise impact is unlikely to be significant.
IV. Construction of an access road		×		None.
V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		×		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	×			Approximately 300 employment opportunities will be created during the construction phase of the project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the facility's 20 years of production is approximately 2 800m <sup>3</sup> per annum.

VIII. Job creation	×			Approximately 350 employment opportunities will be created during the construction and operational phases.
IX. Traffic generation		×		None.
X. Soil erosion		×		The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities		×		None.
<b>3. Is the proposed project located near the following?</b>				
I. A river, stream, dam or wetland		×		None.
II. A conservation or open space area		×		None.
III. An area that is of cultural importance		×		None.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort		×		None.
VIII. A formal or informal settlement		×		None.

### 5.3 Matrix analysis

The matrix highlights areas of particular concern (see Table 5.2). Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented. The matrix also provides an indication if mitigation measures are available.

Table 5.2: Matrix Analysis

Elements		Significance and magnitude of potential impacts									Possible Mitigation
		Construction Phase			Operational Phase			Decommissioning Phase			
		Minor	Major	Duration	Minor	Major	Duration	Minor	Major	Duration	
PHYSICAL ENVIRONMENT	Flora	-		S	-		L	+		L	✓
	Fauna	-		S	-		L	+		L	✓
	Air Quality	-		S	*		NA	*		NA	✓
	Soil		-	S		-	L		+	L	✓
	Geology	-		S	*		NA	*		NA	✓
	Waste Disposal	-		S	-		L		-	S	✓
	Ground Water	-		S	-		L	+		L	✓
	Surface Water	-		S	-		L			L	✓
SOCIAL / ECONOMIC ENVIRONMENT	Employment		+	S		+	L		-	S	✓
	Visual Impacts	-		S		-	L		+	L	✓
	Security	-		S	-		L	+		L	✓
	Traffic Volumes	-		S	-		L	+		L	✓
	Health Hazard	-		S	*		NA	*		NA	✓
	Noise Pollution	-		S	*		NA	*		NA	✓
	Tourism	*		NA	*		NA	*		NA	NA
	Aesthetics	-		S	-		L	+		L	✓
	Archaeology	*		NA	*		NA	*		NA	NA

(\*) No impact (+) Positive Impact (-) Negative Impact (✓) Mitigation Measures Available  
 (S) Short Term (M) Medium Term (L) Long Term

From the above it is evident that mitigation measures should be available for potential impacts associated with the development.

### 5.3.1 Physical environment

During the construction phase various minor negative impacts are foreseen over the short term. The latter refers to a period of months. The installation of services will inevitably result in the removal of top soil with a degree of dust being created in the process. The construction activities may also potentially impact on water features and soil in terms of soil compaction and pollution.

During the operational phase the study area will serve as an electricity generation facility and the negative impacts are generally associated with soil erosion, the potential increase in storm water runoff, the increased consumption of water, and the leakage of hazardous materials. The provision of sustainable services delivery also needs to be confirmed.

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. However the disposal of waste during decommissioning will require certain management measures. It should be noted that 90% of the decommissioned PV plant material (panels, cables, and steel mounting structures) will be recyclable.

### 5.3.2 Social/Economic environment

The negative impacts during the construction phase relate primarily to security risks, the increase in construction vehicle traffic and associated dust and noise pollution. Special care should be taken to minimise the latter. The potentially most significant impacts relate to the provision of temporary employment and other economic benefits for the duration of the construction phase.

The negative impacts during the operational phase are generally associated with security risks, and the visual impact of photovoltaic solar facilities. The operational phase will have direct positive impacts through the provision of employment opportunities for its duration, the generation of additional electricity and the generation of income to the local community.

The decommissioning phase will result in the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created.

## 5.4 Conceptual framework

The anticipated key impacts are evaluated for the construction and operational phases of the proposed development respectively. In order to conceptualise the different impacts a diagram is presented, which specify the following (see Diagrams 1 and 2):

- **Stressor:** Indicates the aspect of the proposed development, which initiates and cause impacts on elements of the environment.
- **Receptor:** Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts:** Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation:** Impacts need to be mitigated to minimise the effect on the environment.

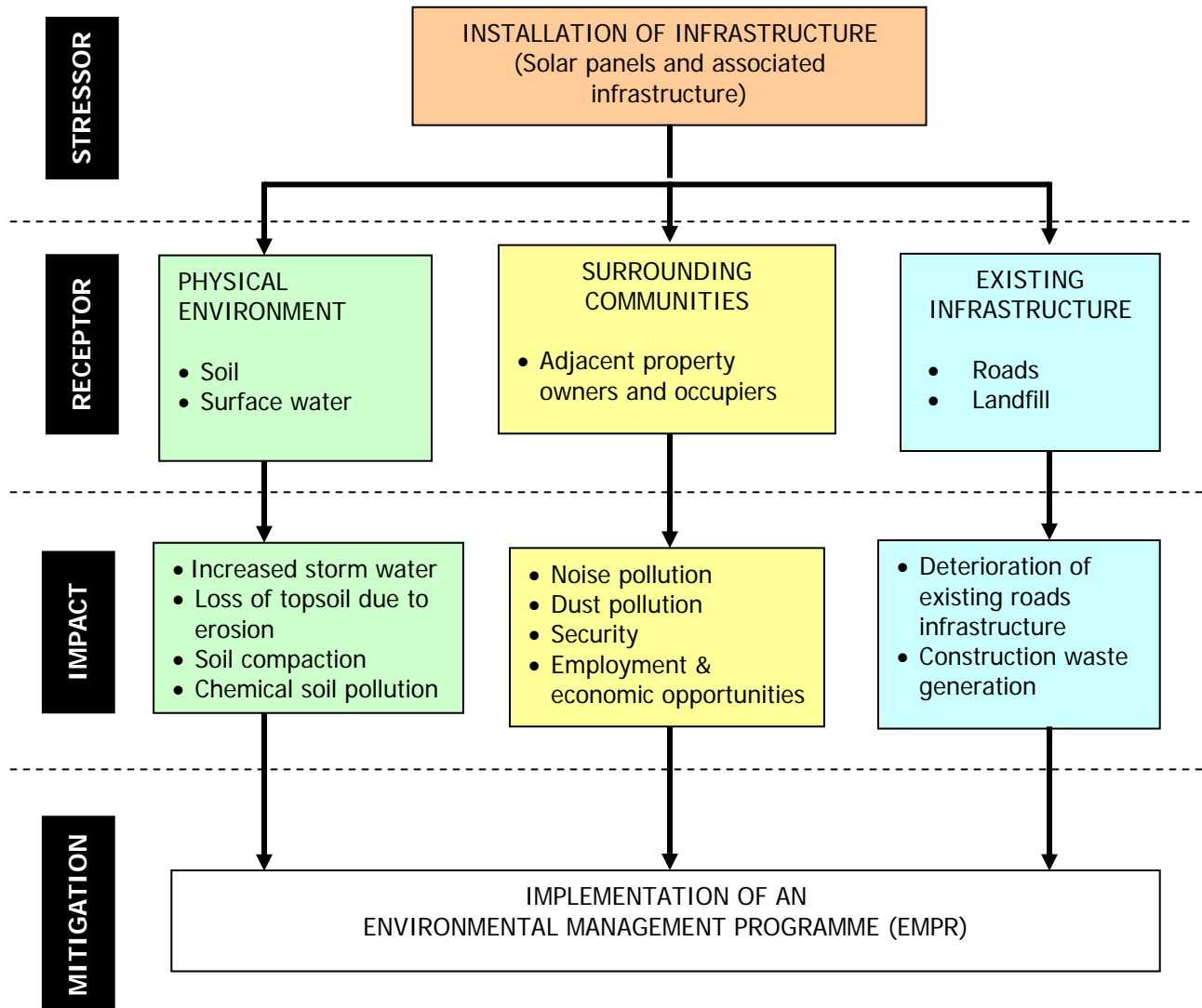


The scoping process aims to scope potential impacts and focus on the most significant impacts in order to determine key issues for more in depth assessment during the EIA process as well as whether the proposed mitigation measures (if available) would be sufficient.

#### 5.4.1 Impacts during the construction phase

Stressors during the construction phase predominantly refer to the installation of the solar panels and associated infrastructure. Receptors refer to the physical environment and surrounding communities as well as the existing infrastructure. Diagram 1 provides a conceptual model of the stressors, receptors and impacts. The main mitigation measures would be included in a detailed construction environmental management programme (EMPr) to be compiled as part of the EIA report.

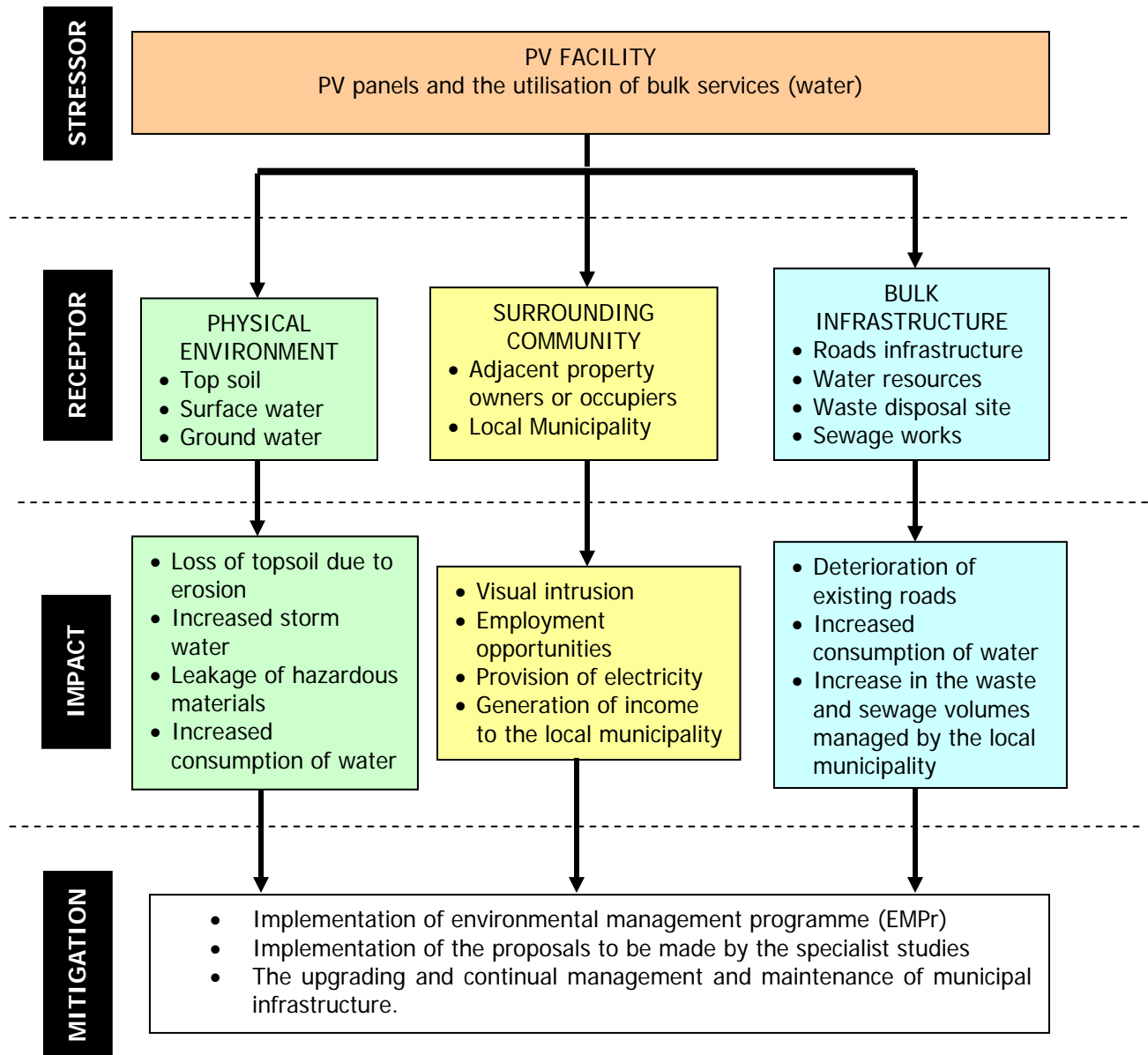
Diagram 1: Conceptual model of impacts during the construction phase



## 5.4.2 Impacts during the operational phase

Stressors during the operational phase predominantly refer to the multiple photovoltaic (PV) panels and the utilisation of bulk services. Receptors refer to the physical and socio-economic environment. Diagram 2 provides a conceptual model of the stressors, receptors and impacts. The main mitigation measures would be included in a detailed environmental management programme (EMPr) to be compiled as part of the EIA report.

Diagram 2: Conceptual model of impacts during the Operational Phase



## **5.5 Key issues identified**

The scoping methodology identified the following key issues which should be addressed in the EIA report.

### **5.5.1 Impacts during the construction phase**

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on the soil and pans, and the provision of temporary employment and other economic benefits for the duration of the construction phase.

### **5.5.2 Impacts during the operational phase**

During the operational phase the study area will serve as an electricity generation facility and the negative impacts are generally associated with soil erosion, the potential increase in storm water runoff, the increased consumption of water, leakage of hazardous materials, visual intrusion, and security risks. The operational phase will have direct positive impacts through the provision of employment opportunities for its duration, the generation of additional electricity and the generation of income to the local community.

### **5.5.3 Impacts during the decommissioning phase**

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will result in the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created in the process. The generation of waste that will also require certain management measures.

## 6. PUBLIC PARTICIPATION AND CONSULTATION

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (h) details of the public participation process conducted in terms of regulation 27(a), including –
- (i) the steps that were taken to notify potentially interested and affected parties of the application;
  - (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the application have been displayed, placed or given;
  - (iii) a list of all persons or organisations that were identified and registered in terms of regulation 55 as interested and affected parties in relation to the application; and
  - (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.

### 6.1 Public participation process

The public participation process was conducted strictly in accordance with Regulations 27 and 54 to 57. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the site already being degraded and the fact that no conflict were foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

- Newspaper advertisement  
Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Klerksdorp Record) on the 31 May 2013 (see Appendix B) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 40 days of the advertisement.
- Site notices  
Site notices were placed on site in English on the 15 May 2013 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs

were given the opportunity to raise comments by 10 July 2013. Photographic evidence of the site notices is included in Appendix C.

➤ Direct notification of identified I&APs

Identified I&APs, including key stakeholders representing various sectors, were directly informed of the proposed development via registered post on 30 May 2013 and were requested to submit comments by 10 June 2013. For a complete list of stakeholder details see Appendix D and for proof of registered post see Appendix E. The consultees included:

- North West Department of Economic Development, Environment, Conservation and Tourism (NWDEDECT)
- The Department of Energy
- The Department of Water Affairs
- The National Department of Agriculture
- Department of Mineral Resources
- The South African Heritage Resources Agency (SAHRA)
- ESKOM
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Dr. Kenneth Kaunda District Municipality
- The Municipal Manager at the Matlosana Local Municipality
- The Local Councilor
- The Civil Aviation Authority (CAA)
- The Leeudoringstad Ratepayers association
- Transnet
- Passenger Rail Agency of South Africa (PRASA)
- The South African National Roads Agency Ltd. (SANRAL)

It was expected from I&APs to provide their inputs and comments within 40 days after receipt of the notification. To date the Department of Agriculture, the Department of Energy, Dr. Kenneth Kaunda District Municipality, PRASA, the City of Matlosana Local Municipality and Eskom provided feedback (see Appendix F for written comments).

➤ Direct notification of surrounding land owners and occupiers

Written notices were also provided to all surrounding land owners and occupiers on 12 July 2013. The surrounding land owners were given the opportunity to raise comments within 40 days of the notification. For a list of surrounding land owners see Appendix D (see Appendix F for written comments). To date Mr. Grobler provided feedback (see Appendix F for written comments).

➤ Circulation of draft scoping report

The following registered I&APs and State Department were informed of the availability of the Draft Scoping Report:

- The North West Department of Agriculture, Conservation, Environment and Rural Development (NWDEDECT)(A hard copy was sent via courier)
- The Department of Water Affairs
- The National Department of Agriculture

- The Department of Energy
- The South African Heritage Resources Agency (SAHRA)
- ESKOM
- The Dr. Kenneth Kaunda District Municipality (A soft copy was sent via the post office)
- The Matlosana Local Municipality
- Mr. Grobler (A soft copy was sent via the post office)

The registered I&APs and State Departments were requested to provide their inputs and comments within 40 days after receipt of the draft report or notification of its availability. To date only the NWDEDECT provided feedback (see Appendix F for written comments).

## 6.2 Consultation process

Regulation 54 requires that the municipality, relevant ward councillor and any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of registered post is attached as Appendices D and E.

## 6.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed development. According to Regulation 56(1) "*A registered interested and affected party is entitled to comment, in writing, on all written submissions, including Final reports made to the competent authority*". This report is the Final Scoping Report to be issued for public comments in terms of the EIA Regulations. The final scoping report will be made available to the following registered I&APs and State Departments:

- The North West Department of Agriculture, Conservation, Environment and Rural Development (NWDEDECT)
- The Department of Water Affairs
- The National Department of Agriculture
- The Department of Energy
- The South African Heritage Resources Agency (SAHRA)
- ESKOM
- The Dr. Kenneth Kaunda District Municipality
- The Matlosana Local Municipality
- Mr. Grobler

They will be notified of the availability of the Final Scoping Report and will be requested to provide written comments on the report within 21 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the EIR.

## 6.4 Issues raised by IAPs and consultation bodies

Table 6.1 summarises the comments received from consultation bodies. The full wording and original correspondence is included in Appendix F.

**Table 6.1: Issues raised by key consultation bodies**

Organisation	Person	Written comment (see Appendix F)
The NWDEDECT	Environmental Officer: Ms. Ouma Skosana	The Department requested additional information via a telephone conversation on 3 July 2013 and confirmed receipt of additional information in an e-mail dated 3 July 2013. The Department also confirmed receipt of the Draft Scoping Report in a letter dated 1 August 2013.
Department of Agriculture	Director: Land Use and Soil Management HJ Buys	The Department confirmed receipt of our notification and request for comments in a letter dated 7 June 2013. The application has been captured in the Department's AgriLand tracking and management system with reference number 2013_06_0060.
Department of Energy	Director General: Ms. Nelly Magubane	The Department acknowledged receipt of the initial notification in a letter dated 28 June 2013 and requested to be informed of the progress of this project.
Dr. Kenneth Kaunda District Municipality	Mr. M.F. Lephale	The municipality requested that a copy of the scoping report be provided in a letter dated 15 July 2013.
PRASA	Regional Planner: Southern Gauteng	In a letter dated 4 July 2013, PRASA confirmed that they have no objection to the approval of the EIA application.
City of Matlosana Local Municipality	Municipal Manager: E.T. Motsemme	The Local Municipality confirmed receipt of notification and advised that the matter is receiving attention in a letter dated 11 June 2013.
I&AP	Mr. J. Grobler	Mr. Grobler noted in a letter dated 22 July 2013 that he would like to know exactly what the influence of the proposed project would be on his neighbouring farm. Mr. Grobler also requested a copy of the report in an email dated 23 July 2013.

## 7. THE NEED AND DESIRABILITY

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (i) a description of the need and desirability of the proposed activity.

### 7.1 The need for the proposed development

The proposed development is a direct result of the growing demand for electricity and the need for renewable energy forms in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process.

The primary rationale for the proposed photovoltaic solar facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by the Department of Energy (DoE) (Integrated Resource Plan, 2010-2030). In terms of the Integrated Resource Plan (IRP), approximately 8.4GW of the renewable energy mix is planned to be the new installed capacity generated from solar photovoltaic (PV) technologies over the next thirty years

The establishment of the photovoltaic solar facility will significantly contribute to achieving this objective and will also address some of the key weaknesses and threats identified by the Matlosana Local Municipality's Integrated Development Plan (IDP, 2012/13).

### 7.2 The desirability of the proposed development

The facilities' contribution towards sustainable development and the associated benefits to society in general is discussed below:

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of "securing" economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.



- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of photovoltaic solar facilities will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.
- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel based power sources. It will assist in achieving the goal to generate 10 000 GWh of electricity from renewable energy by 2015 and the reduction of South Africa's GHG emissions by approximately 34% below the current emissions baseline by 2020.
- Reduction in greenhouse gas emissions - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The South African electricity grid is predominantly coal-fired and therefore GHG emissions intensive (coal accounts for more than 92% of the fuel used in South Africa's electricity generation). The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO<sub>2</sub> emissions from combustion of fossil fuel at the existing grid-connected power plants and plants which would likely be built in the absence of the project activity.
- CDM Project - A solar energy facility also qualifies as a Clean Development Mechanism (CDM) project (i.e. a financial mechanism developed to encourage the development of renewable technologies) as it meets all international requirements in this regard.
- Climate change mitigation - On a global scale, the project makes a contribution to greenhouse gas emission reduction and therefore contributes toward climate change mitigation.
- Reduced environmental impacts - The reduction in electricity consumed from the grid will not only result in a reduction in greenhouse gas emissions, but also the prevention of negative impacts associated with coal mining. For example, coal power requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable. Photovoltaic solar energy technology also does not produce the sulphur emissions, ash or coal mining concerns associated with conventional coal fired electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better quality environment for employees and nearby communities.
- Social - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.

- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from Orkney, Kanana and Leeudoringstad since security guards and general laborers will be required on a full time basis. Approximately 350 employment opportunities will be created during the construction and operational phases.
- Generation of income to the local community - In addition to the provision of job opportunities, it is required that the applicant donate approximately R4 200 000 per annum on local socio economic development, and approximately R1 500 000 per annum on local enterprise development. This will be for the full length of the project (minimum of 20 years). Therefore the local community may be granted the opportunity to improve their social and economic situation.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.

## 8. PLAN OF STUDY FOR EIA

---

This section aims to address the following requirements of the regulations:

28. (1) A scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping, and must include –
- (n) a plan of study for environmental impact assessment which sets out the proposed approach to the environmental impact assessment of the application, which must include –
    - (i) a description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
    - (ii) an indication of the stages at which the competent authority will be consulted;
    - (iii) a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity; and
    - (iv) particulars of the public participation process that will be conducted during the environmental impact assessment process.

### 8.1 Approach to EIA

This section gives a brief outline of the process Environamics will follow when conducting the Environmental Impact Report (EIR) process for the construction of the proposed 75MW photovoltaic solar facility. The approach to the EIA is to focus on those key issues identified during the scoping process. This will ensure that the EIA focus on the most significant impacts and in the process save time and resources. During this phase, specialist studies will be undertaken to assess all potential impacts that are significant. The specialist studies will assess impacts on both the social and the biophysical environment. The studies will also help in identifying ways that can help to mitigate the envisaged impacts.

Table 8.1 provides a summary description of:

- Key environmental issues;
- Key questions to be addressed as part of the EIA;
- Tasks to be performed in order to address the questions;
- Specialist to be involved (if applicable);
- Methods to be applied; and
- Target date for completion of the task.

The EIA will thus aim to identify impacts and make proposals to avoid them, and where they cannot be avoided to mitigate them to acceptable levels.

**Table 8.1:** Summary of tasks and methods as part of EIA process

Key issues	Question to be addressed (terms of reference)	Task	Specialist to be appointed (if applicable)	Method to be applied	Target date for completion
<b>CONSTRUCTION PHASE</b>					
Addressing impacts associated with construction activities	➤ How will the construction process be managed to minimize and avoid environmental impacts?	The EAP to compile a detailed construction environmental management programme (EMPr).	N/a	Review of best practice EMP to be included in the contractual agreements and tender documentation	Included with submission of EIA report.
<b>OPERATIONAL PHASE</b>					
Addressing impacts associated with the operation of the solar plant (This includes the provision of services by the local municipality)	<ul style="list-style-type: none"> <li>➤ How will the facility be managed to minimize and avoid environmental impacts?</li> <li>➤ Will the Local Municipality have the capacity to provide the required services?</li> </ul>	<p>The EAP to compile an environmental management programme (EMPr).</p> <p>The Local Municipality to confirm that they have capacity to provide the required services.</p>	N/A	<p>Review of best practice EMPr</p> <p>As determined by the Local Municipality</p>	Included with submission of EIA report.
Impacts on water quantity	➤ Will the proposed development have a sustainable supply of water?	The EAP to consult with the Department of Water Affairs on the availability of water.	N/a	As determined by the Department of Water Affairs and the specialist	Included with submission of EIA report.
Geotechnical impacts	➤ Are the geotechnical conditions favorable for the development	A geologist to conduct a geotechnical investigation,	Geologist	As determined by specialist	Included with submission of

	of a solar plant?	comprising a geotechnical soil investigation.			EIA report.
Heritage and archeological impacts	➤ Will the proposed development impact on any heritage or archeological artifacts?	An archeologist to conduct a heritage and archeological study.	Archeologist	As determined by specialist	Included with submission of EIA report.
Visual impacts	➤ To what extent will the proposed development be visually intrusive to the surrounding communities or other receptors?	A specialist to conduct a visual impact assessment.	Visual specialist	As determined by specialist	Included with submission of EIA report.
Socio-economic impacts	➤ How will the proposed development impact on the socio-economic environment?	A specialist to conduct a social impact assessment.	Socio-economic specialist	As determined by specialist	Included with submission of EIA report.
Agricultural impacts	➤ How will the proposed development impact on soil and agricultural resources?	A specialist to conduct a soil survey.	Agricultural economist	As determined by specialist	Included with submission of EIA report.
Ecological Impacts	➤ How will the proposed development impact on the ecology?	A specialist to conduct an Ecological Fauna and Flora Habitat Survey.	Ecologist	As determined by specialist	Included with submission of EIA report.
<b>DECOMMISSIONING PHASE</b>					
Addressing impacts associated with decommissioning activities	➤ How will the decommissioning process be managed to minimize and avoid environmental impacts?	The EAP to compile a environmental management programme (EMPr)	N/a	Review of best practice EMPr	Included with submission of EIA report.

CUMMULATIVE IMPACTS					
Addressing cumulative impacts associated with the potential development of solar plants in the vicinity of the proposed development.	➤ How will the cumulative impacts resulting from a number of potential facilities be managed?	The EAP to conduct a detailed assessment of the cumulative impacts associated with the development of multiple solar plants in the proximity of the proposed development.	N/a	Cumulative effects assessment.	Included with submission of EIA report.

## 8.2 Public participation process

All registered I&APs and relevant State Departments will be given the opportunity to review the Final Scoping Report in accordance with Regulation R543. A minimum of 21 days commenting period will be allowed and all stakeholders and I&APs will be given an opportunity to forward their written comments within that period. All issues identified during this public review period will be documented and compiled into a Comments and Response Report to be included as part of the EIR.

After comments from the public on the Final Scoping Report have been received and incorporated into the Draft EIR, the report will be submitted to the National Department of Environmental Affairs for consideration. In addition, registered I&APs and relevant State Departments would be afforded, unless otherwise indicated by DEA, at least 40 days to comment on the Draft EIR. Arrangements will be made to discuss the report with the Environmental Officer responsible for the project from the DEA.

## 8.3 Method of environmental assessment

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed development. Different impacts need to be evaluated in terms of their significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 8.2.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

### 8.3.1. Impact Rating System

Impact assessment must take account of the nature, scale and duration of impacts on the environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact the following criteria is used:

**Table 8.2: *The rating system***

<b>NATURE</b>		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
<b>GEOGRAPHICAL EXTENT</b>		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
<b>PROBABILITY</b>		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
<b>DURATION</b>		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.



<b>INTENSITY/ MAGNITUDE</b>		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
<b>REVERSIBILITY</b>		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
<b>IRREPLACEABLE LOSS OF RESOURCES</b>		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
<b>CUMULATIVE EFFECT</b>		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		

1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects

### SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula:

$(\text{Extent} + \text{probability} + \text{reversibility} + \text{irreplaceability} + \text{duration} + \text{cumulative effect}) \times \text{magnitude/intensity}$ .

The summation of the different criteria will produce a non weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

## 9. CONCLUSION

---

This Final Scoping Report aimed at identifying the 'scope' of the EIA that will be conducted in respect of the activity for which authorisation is being applied for. It can be concluded that:

- The scoping phase complied with the specifications set out in Regulations 26 to 29.
- All key consultees have been consulted as required by the Regulations 26 and 54 to 57.

Based on the contents of the report the following key environmental issues were identified which need to be addressed in the EIA report:

- Impacts during construction phase:
  - Impacts on the soil (soil compaction and chemical soil pollution)
  - Temporary employment and other economic benefits
- Impacts during the operational phase:
  - Soil erosion
  - Increase in storm water runoff
  - Increased consumption of water
  - Leakage of hazardous material
  - Visual intrusion
  - Security risks
  - Sustainable services delivery (water, waste, sanitation)
  - Permanent employment opportunities
  - Generation of additional electricity
  - Generation of income to the local community
- Impacts during the decommissioning phase:
  - Generation of waste
  - Loss of employment
- Cumulative biophysical impacts resulting from similar developments.

The latter issues will be addressed in more detail in the EIA report. The EAP thus recommended that:

The scoping report be approved after which the EIA process, as required by Regulations 31 to 35 can commence.

We trust that the department find the report in order and eagerly await your final decision in this regard.

**Ms. Carli Steenkamp**  
Environamics Environmental Consultants

## 10. REFERENCES

---

ACTS *see* SOUTH AFRICA

CONSTITUTION *see* SOUTH AFRICA. 1996.

DEPARTMENT OF ENERGY (DoE). Integrated Resource Plan 2010-2030

DEPARTMENT OF MINERALS AND ENERGY (DME). 2003. White Paper on Renewable Energy.

DR. KENNETH KAUNDA DISTRICT MUNICIPALITY. Integrated Development Plan (IDP), 2012 – 2016

FIRST SOLAR. 2011. PV Technology comparison.

INTERNATIONAL FINANCE CORPORATION (IFC). 2012. International Finance Corporation's Policy on Environmental and Social Sustainability.

IFC & WORLD BANK GROUP. 2007. Environmental, Health, and Safety General Guidelines.

MUCINA, L. AND RUTHERFORD, M.C. 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

MATLOSANA LOCAL MUNICIPALITY. Integrated Development Plan (IDP) Review, 2012/13.

NATIONAL DEPARTMENT OF AGRICULTURE. 2006. Development and Application of a Land Capability Classification System for South Africa.

NERSA. 2009. South Africa Renewable Energy Feed-in Tariff (REFIT) – Regulatory Guidelines.

SOUTH AFRICA(a). 1998. The Conservation of Agricultural Resources Act, No. 85 of 1983. Pretoria: Government Printer.

SOUTH AFRICA. 1996. Constitution of the Republic of South Africa as adopted by the Constitutional Assembly on 8 May 1996 and as amended on 11 October 1996. (B34B-96.) (ISBN: 0-260-20716-7.)

SOUTH AFRICA(a). 1998. The National Environmental Management Act, No. 107 of 1998. Pretoria: Government Printer.

SOUTH AFRICA(b). 1998. The National Water Act, No. 36 of 1998. Pretoria: Government Printer.

SOUTH AFRICA. 1999. The National Heritage Resources Act, No. 25 of 1999. Pretoria: Government Printer.

SOUTH AFRICA. 2004. The National Environment Management: Air Quality Act, No. 39 of 2004. Pretoria: Government Printer.

SOUTH AFRICA(a). 2008. The National Energy Act, No. 34 of 2008. Pretoria: Government Printer.

SOUTH AFRICA(b). 2008. The National Environmental Management: Waste Act, No. 59 of 2008. Pretoria: Government Printer.

SOUTH AFRICA. 2010. Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998. (GNR. 543, 544 and 545. 2010.). Pretoria: Government Printer.

SOUTH AFRICA. 2009. Minister in the Presidency: Planning. Medium Term Strategic Framework. – A Framework to guide Governments Programme in the Electoral Mandate Period 2009-2014.

SWINGLER, S. 2006. Statistics on Underground Cable in Transmission networks, Final Report of CIGRE Working Group B1.07.

WORLD BANK GROUP. 2006. The Equator Principles.