FINAL ENVIRONMENTAL IMPACT REPORT (EIR)

For the development of a 75MW photovoltaic solar plant and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West

NEAS Reference: DEA/EIA/0001090/2012
DEA Reference: 14/12/16/3/3/2/308

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PROJECT DETAIL

NEAS Reference No.	:	DEA/EIA/0001090/2012
DEA Reference No.	:	14/12/16/3/3/2/308
Project Title	:	The construction of a 75MW photovoltaic solar facility and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West situated within the Naledi Local Municipality area of jurisdiction.
Authors	:	Ms. Carli Steenkamp Prof. Francois Retief
Client	:	DPS79 Solar Energy (Pty) Ltd.
Report Status	:	Final Environmental Impact Report (EIR)
Submission date	:	10 December 2012

When used as a reference this report should be cited as: Environamics (2012) Final Environmental Impact Report (EIR): Proposed 75MW Photovoltaic Solar facility and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West.

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GLOSSARY OF TERMS AND ACRONYMS

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
EIR	Environmental Impact Report
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.
GVA	Gross Geographic Value Added
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.
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
RFPs	Request For Proposals
SAHRA	South African Heritage Resources Act
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 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.

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 Feed-in Tariffs (FIT) for renewable energy was set. FITs are, in essence, guaranteed prices for electricity supply rather than conventional consumer tariffs. The basic economic principle underpinning the FITs is the establishment of a tariff (price) that covers the cost of generation plus a “reasonable profit” to induce developers to invest. The establishment of the Renewable Energy Feed-in Tariff (REFIT) 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 (NERSA, 2009).

In response to the above, DPS79 Solar Energy (Pty) Ltd. is proposing the development of a 75MW photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located near Vryburg in the North West Province (refer to Figure 1 and 2 for the locality and regional map).

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Naledi Local Municipality faces a number of challenges in addressing the needs of the community while planning for a sustainable future (IDP, 2012-17). The Naledi Local Municipality's Integrated Development Plan (IDP, 2012-17) reveals the following key weaknesses for the municipality: municipal financial viability; growing unemployment; generally declining economy; lack of industrial development in Vryburg; infrastructural neglect and service backlogs; and lack of a proper Land Use Management System. The following key threats are also identified: increasing urbanization of rural part of NLM population; environmental degradation; high unemployment and poverty levels; large housing backlogs; lack of capital to provide and maintain services infrastructure. The IDP does not explicitly deal with renewable energy development, but the Naledi LED however identifies carbon-footprint reduction, including supporting alternative energies, as LED programmes for the NLM.

In response DPS79 Solar Energy intends to develop a 75MW photovoltaic solar facility and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West situated within the Naledi Local Municipality area of jurisdiction.

The proposed development is located approximately 10 kilometres south east of Vryburg (refer to Figure 1 and 2 for the locality and regional map). The total footprint of the project will approximately be 150 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 (GN. R.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) (GN.R. 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 (GN.R. 545): *"The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."*
- Activity 15 (GN.R. 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) (GN.R. 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) Northern Cape Province (i) All areas outside urban areas."*

Being listed under Listing Notice 1, 2 and 3 (GN.R. 544, 545 & 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 independent consultants to undertake the EIA on DPS79 Solar Energy's behalf.

According to the DEA 2012 Integrated Environmental Management Guideline Series (Guideline 5) 'Companion to the Environmental Impact Assessment Regulations, 2010' the "*EIA phase assesses issues identified in the scoping phase".* The potential positive and negative impacts associated with the proposed development have been assessed. The potentially most significant environmental impacts associated with the development are briefly summarised 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 impact relates to potential soil compaction, chemical soil pollution and the direct positive impact through the provision of 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 soil erosion, increase in storm water runoff, the increased consumption of water, potential for leakage of hazardous materials, 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.

Impacts during the decommissioning phase:
The physical environment will benefit from the closure of the solar facility since the site will be restored to pre-development agricultural land use. However, the decommissioning phase will result in the loss of employment and the generation of waste that will require management measures.

Cumulative impacts:
Two other solar plants have been proposed in relative close proximity to the proposed development, namely the 19.5MW solar plant on a northern portion of the farm Waterloo 992 (NEAS Reference: DEA/EIA/0001105/2012 & DEA Reference: 14/12/16/3/3/1/506) and the 75MW solar plant on a portion of the Remaining Extent of the farm Rosendal 673 (NEAS Reference No: DEA/EIA/0001359/2012 & DEA Reference No.: 14/12/16/3/3/2/390). Due to their proximity the potential for cumulative impacts associated with combined impacts are assessed.

Regulation 31 of the EIA Regulations determine that an Environmental Impact Report (EIR) be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. Since the Department of Environmental affairs approved the final scoping report on 15 October 2012, this EIR will evaluate and rate each identified impact, and identify mitigation measures which may be required. This EIR also contains 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 Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

31(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include – (a) details of – (i) the EAP who compiled the report; and (ii) the expertise of the EAP to carry out an Environmental Impact Assessment.

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, 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, 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 DEA 2012 Integrated Environmental Management Guideline Series (Guideline 5) 'Companion to the Environmental Impact Assessment Regulations, 2010' the "*EIA phase assesses issues identified in the scoping phase and includes an environmental management programme (EMPr). The EMPr provides information on the proposed activity and the manner in which potential impacts will be minimized or mitigated*". The EIA report must comply with regulation 31(2) and include inter alia:

- A description and comparative assessment of all alternatives identified;
- A description of all environmental issues identified as well as significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- A reasoned opinion as to whether the activity should, or should not be authorised;
- An environmental impact statement; and
- A draft Environmental Management Programme (EMPr).

This report is the Final Environmental Impact Report (EIR) 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 reports. The final EIR will be made available to registered I&APs and all relevant State Departments. They will be requested to provide written comments on the report within 21 days.

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 the following contact details:

Contact person: Carli Steenkamp
Postal Address: PO Box 6484, Baillie Park, 2526
Telephone: 018 –299 1505 (w) 018 – 299 1580 (f)
Electronic Mail: 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 G8 to this report.

1.3 Details of specialists

The following specialists are also involved with the project:

Geotechnical Report - Soilkraft CC
Contact person: Mr. FJ Breytenbach
Postal Address: PO Box 73478, Lynnwood Ridge, 0040
Telephone: 012 991 0426 (w) 012 991 2555 (f) 0825702767 (Cell)
Electronic Mail: soilkraft@mylan.co.za

Archaeological Report -
Contact person: Mr. J.A. van Schalkwyk
Postal Address: 62 Coetzer Avenue, Monument Park, Pretoria, 0181
Telephone: 012 347 7270 (w) 086 611 3902 (f) 076 790 6777 (Cell)
Electronic Mail: jvchalkwyk@mweb.co.za

Ecological Fauna and Flora Habitat Survey - Anthene Ecological CC
Contact person: Mr Reinier Terblanche
Postal Address: Private Bag X6001, Potchefstroom, 2520
Telephone: 082 614 6684 (Cell)
Electronic Mail: Reinierf.terblanche@gmail.com

Visual Impact Assessment -
Contact person: Dr. L. A. Sandham
Postal Address: 27 Aalwyn Street, Potchefstroom, 2531
Telephone: 018-290-6791 (w) 086-622-0152 (f) 083 320 3576
Electronic Mail: Luke.sandham@gmail.com

Soil, Land Capability and Agricultural Potential Study – Environmental research consulting CC in association with Terra-Africa Consultant cc
Contact person: Mr. M. Pienaar & Mr. A.R. Götze
Postal Address: PO Box 20640, Noordbrug, 2522
Telephone: 018 291 1486 (w) 0086 621 4843 (f) 082 789 4669 (Cell)
Electronic Mail: erc@telkomsa.net

Social Impact Assessment – Tony Barbour Environmental Consulting and Research
Contact person: Mr. Tony Barbour
Postal Address: PO Box 1753, Sun Valley, 7975
Telephone: 021 789 1112 (w) 021 789 1112 (f) 082 600 8266 (Cell)
Electronic Mail: tbarbour@telkomsa.net

1.4 Status of the EIA process

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 26 to 35 of R543. 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 pre-application site visit and project meeting between the project proponent and the independent environmental assessment practitioner (EAP) was held on 7 March 2012 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 20 March 2012 and the Department registered the applications on the 28 March 2012.
- The public participation process has been conducted in strict accordance with Regulations 54 to 57 of GN.R. 543. The public participation process was initiated on 28 March 2012 and concluded on 14 May 2012.
- The draft scoping report was submitted to the National Department of Environmental Affairs on 25 May 2012.
- The draft scoping report was circulated to registered I&APs and relevant State Departments on 18-20 June 2012 and they were requested to provide their comments on the report within 40 days.
- The final scoping report was submitted to the National Department of Environmental Affairs on 15 August 2012.
- Registered I&APs and relevant State Departments were notified of the availability of the final scoping report on 14 August 2012 and they were requested to submit their comments on the report within 21 days after receiving the report.
- The Department of Environmental Affairs accepted the final scoping report on 15 October 2012.
- A public meeting was held at the Castello Guest House on 12 October 2012 at 17:00. An advertisement was placed in English in the local newspaper (Stellalander) on the 26 September 2012 (see Appendix G5) notifying the public of the public meeting. Key stakeholders were also directly informed of the public meeting via email on 26 September 2012.
- Registered I&APs and relevant State Departments were notified of the availability of the draft EIR on 31 October 2012 and they were requested to provide their comments on the report within 40 days.

The EIA process should be completed within approximately three to four months of submission of this report, i.e. by March/April 2013 – see Table 1.1.

Table 1.1: Project schedule

Tasks to be performed	March 2012				April 2012				May 2012				June 2012				July 2012				Aug. 2012				Sept. 2012				Oct. 2012				Nov. 2012				Dec. 2012			
	1	2	3	4	1	2	3	1	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	1	2	3	4
REGISTRATION																																								
Submit			X																																				
Pre application	X																																						
Site visits	X										X																												
SCOPING																																							
Public																																							
- Press					X																																		
- On site					X																																		
- Complete PP										X																													
Consultation																																							
- As required					X																																		
- Public meeting																														X									
Draft Scoping											X																												
Final Scoping																																							
- Circulate																																							
- Submission																						X																	
- Approval																														X									
POS for EIA																																							
- Submission																						X																	
- Approval																														X									
EIA PHASE																																							
Specialist																																							
- Draft terms of																																							
- Receive																																							
Draft EIA																																X							
Final EIA																																							
- Circulate																																							
- Submission																																						X	

Environmental authority accept Final EIA report within 60 days after submission according to Regulation 34
Decision and/or indicate specialist review – within 45 days after acceptance of EIA report according to Regulation 35
Appeal period – expires 20 days after I&APs have been informed of the decision according to Regulation 60

1.5 Structure of the report

This report is structured in accordance with the prescribed contents stipulated in Regulation 31(2) of GNR545. It consists of eleven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.2.

Table 1.2: Structure of the EIA report

Requirements for the contents of a EIA report as specified in the Regulations		Section in report	Pages
31(2) An environmental impact assessment report must contain all the information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 36, and must include –			
(a)	details of -	1	1-7
	(i) the EAP who prepared the report; and		
	(ii) the expertise of the EAP to carry out an environmental impact assessment;		
(b)	a detailed description of the proposed activity;	2	8-12
(c)	a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is –		
	(i) a linear activity, a description of the route of the activity; or		
	(ii) an ocean-based activity, the coordinates where the activity is to be undertaken;		
(d)	a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	3	13-19
(e)	details of the public participation process conducted in terms of subregulation (1), including –	4	20-26
	(i) steps undertaken in accordance with the plan of study;		
	(ii) a list of persons, organisations and organs of state that were registered as interested and affected parties;		
	(iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and		
	(iv) copies of any representations, objections and comments received from registered interested and affected parties;		
(f)	a description of the need and desirability of the proposed activity;	5	27-64
(g)	A description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may		

	be affected by the activity;		
(h)	an indication of the methodology used in determining the significance of potential environmental impacts;		
(i)	a description and comparative assessment of all alternatives identified during the environmental impact assessment process;		
(j)	a summary of the findings and recommendations of any specialist report or report on a specialised process;		
(k)	a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the		
(l)	an assessment of each identified potentially significant impact, including –		
	(i) cumulative impacts;		
	(ii) the nature of the impact;		
	(iii) the extent and duration of the impact;		
	(iv) the probability of the impact occurring;		
	(v) the degree to which the impact can be reversed;		
	(vi) the degree to which the impact may cause irreplaceable loss of resources; and		
	(vii) the degree to which the impact can be mitigated;		
(m)	a description of any assumptions, uncertainties and gaps in knowledge;		
(n)	A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	7	65-66
(o)	an environmental impact statement which contains –		
	(i) a summary of the key findings of the environmental impact assessment; and		
	(ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;		
(p)	a draft environmental management plan that complies with regulation 33;	Appendix F	
(q)	copies of any specialist reports and reports on specialised processes complying with regulation 32; and	Appendix D	
(r)	Any specific information that may be required by the competent authority; and	-	
(s)	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	-	
(3) The EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in subregulation 31(2)(g), exist.		N/a	N/a

2. ACTIVITY DESCRIPTION AND ALTERNATIVES

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

31(2)	An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include – (b) a detailed description of the proposed activity; (c) a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is – (i) a linear activity, a description of the route of the activity; or (ii) an ocean-based activity, the coordinates where the activity is to be undertaken.

2.1 Project location and description

The activity entails the development of a 75MW photovoltaic solar facility and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West situated within the Naledi Local Municipality area of jurisdiction. The proposed development is located approximately 10 kilometres south east of Vryburg – the location of the site is illustrated in Appendix A, Figure 1. The site is surrounded by agricultural land uses (grazing) and the site consists of land suitable for grazing – refer to Appendix B for photographs of the development area and the site.

The project entails the generation of approximately 75MW electrical power through photovoltaic (PV) panels. The total footprint of the project will be less than 150 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 DPS79 Solar Energy (Pty) Ltd. from the property owner, the Chris Van Zyl Trust, for the life span of the project (minimum of 20 years).

Table 2.1: General site information

Description of affected farm portion	The farm Waterloo 992, Registration Division IN, North West
21 Digit Surveyor General code	T0IN00000000099200000
Title Deed	T2995/1998
Photographs of the site	Refer to Appendix B for photographs of the site
Type of technology	Photovoltaic solar facility with crystalline silicon panels
Structure Height	Approximately 2.75 meters
Surface area to be covered	150 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 150 hectares
Generation capacity	75MW
Expected production	150 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 affect. 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 be tilted at a fixed northern angle in order to capture the most sun.

- Wiring to Central Inverters - Sections of the PV array would be wired to central inverters which have a rated power of 500kW each. The inverter is a pulse width mode inverter that converts 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 33,000V to 132,000V. 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 (via 33kV). A new substation will be required on the site to step the voltage up to 132kV, thereafter it will connect to the new Mookodi substation located approximately 5km west of the site. The power line will be constructed within a 32m wide servitude – refer to Annexure C for the coordinates of the proposed power line.

  The 33/132kV distribution substation will approximately be 90m x 120m in size and will ideally be located in close proximity to the existing power lines. The substation will be a transmission substation and will include transformer bays which will contain transformer oils.

- 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 400m² or less. Other supporting infrastructure includes voltage and current regulators and protection circuitry.

- Roads - Access to the site is from the dirt road towards Amalia, off the R34 towards Schweizer-Reneke. An internal site road network to provide access to the solar field and associated infrastructure will be required. Existing farm roads will be used where possible. 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 follows the limitations of the site and aspects such as roads, fencing and servitudes are 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, transmission lines and perimeter fences). Due to the nature of the site being used for grazing (refer to Appendix B for photographs of the site), limited features of conservation significance exist. However, water features in the form of pans located north and north west of the site were taken into consideration (refer to figure 3).

Figure 3 identified features as per available Department of Water Affairs (DWA) and SANBI databases related to surface and groundwater resources. The figure illustrates the area available for the proposed development when the legislative boundaries as specified in the National Water Act (Act 36 of 1996) (500m buffers surrounding the pans) are taken into account. In this regard an area of approximately 266.5 hectares was available for the proposed development. Subsequently the development will take place within the identified 150 hectare land on the southern portion of the property that is located outside the buffer zones of the surface water areas.

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, transmission lines and perimeter fences) – refer to table 2.2 below and Appendix C for the Layout Plan.

Table 2.2: General layout information

LAND USE	AREA (Square meters)
Laydown area	13 400
• Permanent	6 600
• Temporary	6 800
Roads and Access	40 000
Hardware	1 613k
• Modules	1 612k
• MW distribution cabinet	61
• Conversion & transformer cabinet	1 020
Buildings	310
• Security	40
• Office	50
• Warehouse	250

2.4 Services provision

Adequate provision of bulk infrastructure will be a prerequisite for the development. The services information described here were provided by the applicant and are summarized as follows:

2.4.1 Water

Adequate provision of water will be a prerequisite for the development. The Department of Water Affairs (DWA) has been asked to confirm the water resource availability in the relevant catchment management area in order to ensure sustainable water supply (refer to Appendix G4). The

Department of Water Affairs confirmed in a letter dated 4 December 2012 that sufficient water is available to meet the water requirements of the proposed project. DWA further confirm that 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 200m³ 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 000m³ 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. The water to be used for the development will be obtained from an existing borehole located on the farm. The borehole will be registered and licensed after appointment of DPS79 Solar Energy as the preferred bidder.

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 should be considered by the developer. Furthermore indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

2.4.2 Storm water

Storm water will be disposed of in open surface channels. The area has adequate slope to obtain this and a number of natural waterways run through the area, to which open channels will be directed.

2.4.3 Sanitation and waste removal

The proposed development will use the municipality for sanitation and waste removal. A closed septic (conservancy) tank will be installed on site to accommodate the sewerage from the office ablution facilities.

Construction waste will most likely consist of concrete, scrap metal and general waste. The waste will be collected and stored in suitable receptacles where after it will be transported to the nearest registered landfill. During the operational phase sources of general waste will be waste food, packaging, paper, etc. which will be stored on the site and removed on a weekly basis. The waste will be taken to a registered landfill by a contractor employed by the applicant, as the site is located outside of the waste collection route. If possible and feasible, all waste generated on site during the construction and operational phases must be separated into glass, plastic, paper, metal and wood to be recycled.

The Local Municipality confirmed in a letter dated 16 November 2012 that they will be able to remove the household refuse once a week from Solar Power Plant to the municipal dumping site and that the dumping site has the capacity to accommodate the additional waste generated by the employees working at the Solar Power Plant. The municipality also confirmed that they will be able to remove the sewerage once a week from the septic tanks at the Solar Power Plant and that the

sewage plant has the capacity to accommodate the additional sewage generated by the employees working at the Solar Power Plant.

2.4.4 Electricity

Electricity use will be limited, and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sources by the photovoltaic plant, and from the electricity connection at night. The cost estimate to be provided by Eskom will confirm that the proposed development will be allowed to connect to the national grid.

3. DESCRIPTION OF THE ENVIRONMENT

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

31(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include –

(d) a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;

3.1 Land uses on and adjacent the site

The site survey revealed that the farm Waterloo has been managed as a cattle farm for many years (see Plates 1-8 attached as Appendix B). Signs of veldt degradation are visible in all broad vegetation units and can be attributed to heavy grazing and possible drought conditions in the past.

The surrounding land in the area is also used for extensive cattle and possibly game farming activities. No industries or tourism activities are present within a 500m radius surrounding the site. Although the surrounding land use is predominantly agriculture, power lines are also located north east of the site. Therefore, the proposed land use is reasonably compatible with the surrounding land use.

3.2 Description of the biophysical environment

The biophysical environment is described with specific reference to geotechnical conditions, ecological habitat and landscape features, soils, agricultural potential, climate, and 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 perspective apart from the water features in close proximity to the site (in the form of pans) that had to be considered in the final layout plan.

3.2.1 Geotechnical conditions

A detailed Geotechnical Report has been conducted for the farm Waterloo 992 (refer to Appendix D1). The report revealed that the geological environment south of Vryburg is fairly complicated and contains materials of numerous geological origins. Geological lithologies encountered can be summarised in chronological order as follows:

- *Boomplaas Formation (Vb)*: This Formation is associated with the Schmidtsdrif Subgroup, Ghaap Group, Griqualand West Supergroup. Regional information indicates that the Formation contains materials such as oolitic and stromatolitic dolomite, interbedded quartzite, shale and flagstone.
- *Vryburg Formation (Vv)*: The Vryburg Formation forms part of the Griqualand West Supergroup and comprises quartzite, flagstone, dolomite, conglomerate, shale and andesitic lava.

The area investigated on this farm is located near the contact between the Vryburg Formation and the Boomplaas Formation. Subsequently this site is located on dolomitic land. Hence, further site investigation must comprise geotechnical soil and dolomite stability investigations. That feasibility of the site for the proposed development of a solar facility will be determined by the results of a dolomite stability investigation.

3.2.2 Ecological habitat and landscape features

In terms of vegetation type the site falls within the Ghaap Plateau Vaalbosveld vegetation type (Mucina and Rutherford, 2006). Ghaap Plateau Vaalbosveld vegetation covers areas of the Northern Cape and North West Provinces. The region is characterised by fairly flat plains with very elongated undulating landscape. Site drainage in all instances takes place by means of sheet wash and infiltration. Flood lines are not applicable to the study area. The conservation status of this vegetation type is described by Mucina and Rutherford (2006) as 'least threatened'.

The Habitat Survey (refer to Appendix D3) confirmed that no rocky ridges, rocky hills, caves or wetlands are present at the footprint allocated for development so that the microhabitat diversity is relatively low. No loss of particularly sensitive habitat of particular conservation importance is anticipated if the site is developed and no loss of corridors or connectivity of ecosystems is anticipated if the sites are developed. There also appears to be no threat to any protected tree species at the site (National Forests Act No. 84 of 1998) apart from *Acacia erioloba* trees which are present on the site. A permit should be requested in order to get permission to remove these trees. Note that though *Acacia erioloba* is a protected species, it is not a threatened species. *Acacia erioloba* trees on the site are not large and range from shrub-height individuals to small or medium sized trees. No particularly large *Acacia erioloba* trees appear to be present at the site. In the context of surrounding areas that harbour strong populations of *Acacia erioloba* of various heights, removal of the *Acacia erioloba* trees on the site proposed for developments are of less significance in terms of cost, time and priority. It is unlikely that there will be a loss of any plant species of particular high conservation priority, i.e. threatened or near threatened species, if the site is developed.

3.2.3 Soil, land capability and agricultural potential

Environment Research Consulting CC in association with Terra-Africa Consult CC was appointed by 2012/077659/07 (South Africa) to conduct a soil, land capability and agricultural potential study for the proposed development (refer to Appendix D5). The findings of the study are summarized below:

3.2.3.1 Land type data

According to the available Land Type data two land types occur in the studied area. These land types are Ag10 and Ae36:

- Land type Ag10 covers more than 90% of the study area and consists of red to yellow apedal, freely drained soils. Red soils have high base status. Ag10 soils are generally soils with minimal development, usually shallow (less than 300 mm deep) and occur on hard or weathering rock. Areas of the Ag10 land type are not suitable for crop production as very severe limitations in terms of effective soil depth occur.

- The Ae36 land type also consists of high base status red or yellow apedal, massive or weakly structured, freely drained soils and are generally more than 300 mm deep (no dunes are present). 10 - 30% of the area of Ae36 is marginally suitable for crop production, but mostly with severe limitations.

3.2.3.2 Soil classification

Only one soil form, from one soil family, was recorded in the study area. The site is dominated by shallow, marginal soils (between 50 to 300 mm deep) which consists of an orthic A-horizon on hard rock and is known as the Mispah soil form. The family under the Mispah form that occurs in the study area is Myhill, which represents Mispah soil forms with unbleached and non-calcareous A-horizons. Many rocky dolerite outcrops occur on site. The soil colour is homogenous throughout the study area and according to the Munsell colour chart the soil colour is recorded as: 7.5 YR 5/4 – bright brown.

3.2.3.3 Chemical soil properties

Soil pH is an indicator of soil acidity and alkalinity. Most soils have a pH in the range of 4 to 10. The pH of a particular soil, such as 5 or 8, reflects a certain chemical and mineralogical environment in that specific soil, and therefore the pH is of great importance to plant roots and microbial activity. Soil pH is one of the most important factors affecting soil fertility. Many parent materials and young soils are alkaline, but old and intensely weathered soils are typically acidic. The soils found in the study area can be described as strongly to moderately acidic.

3.2.3.4 Agricultural potential

The proposed development falls within an area previously 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). Figure 2 illustrates that the site falls within Class V, indicated by the brown shade covering the entire area.

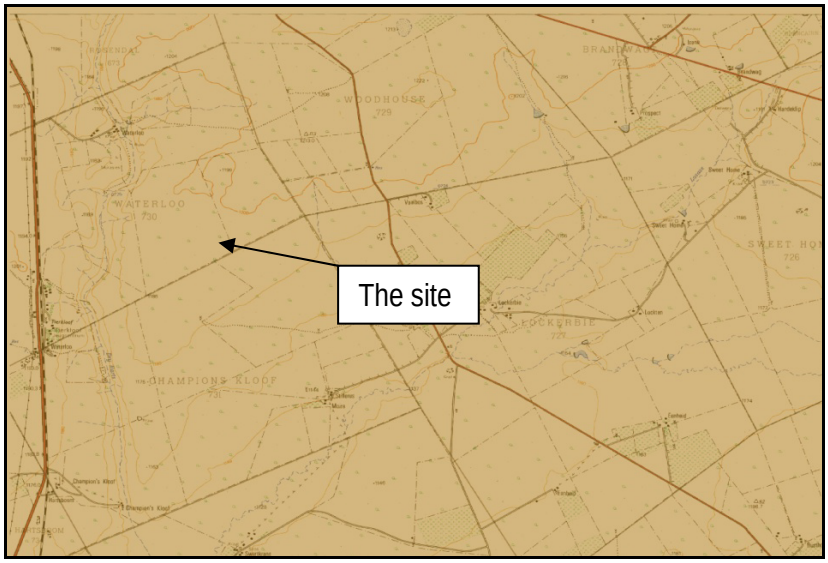


Figure 4: Land capability classification (The National Department of Agriculture, 2006)

The soil, land capability and agricultural potential study confirmed that the site has no potential for dry land or irrigated crop production due to the limitations of soil forms present (restricted depth) as well as the limiting climate (low and erratic rainfall). The site has potential for extensive cattle or game farming. With an average grazing capacity of 7.2 ha/LSU, the proposed development site of 150 ha can accommodate 20 head of cattle per year under average rainfall conditions. It can be concluded that should the development be authorised, it will have a low impact on agricultural potential of cattle production in the area and no impact on crop production.

3.2.4 Climate

The economic viability of a photovoltaic facility is directly dependent on the annual direct solar irradiation values. A study of available radiation data shows that the proposed site is uniformly irradiated by the sun. In addition the site also experiences temperatures which are suitable for PV technology. The site is located in a region with summer and autumn rainfall with very dry winters. The Mean Annual Precipitation is approximately 500mm. Mean monthly maximum and minimum temperatures are 36.6º and -5.5º for December and July, respectively.

3.2.5 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 potential visual impact of the proposed PV plant was assessed using the following criteria which provide the means to measure the magnitude and determine the significance of the potential impact, namely: visibility, viewer sensitivity, visual exposure, visual intrusion, and the value of the visual resource (refer to Appendix D4 for the visual impact assessment). Each of these criteria are described in more detail below.

3.2.5.1 Visibility

The view catchment covers a large area, which indicates a high visibility. However, within a 2 km radius little of the site is visible, and there are no areas in the catchment where all or most of the site be seen. Due to the low population density of the area, there are very few visual receptors that may be affected by the development. Moreover, due to the location of the site on a slightly elevated plateau, and the fact that the PV structures of the development are less than 3m high, existing and additional vegetation will be effective at screening the development from most of the surrounding area. Beyond the 1 km zone the receptors are the residents of Tiger Kloof Educational Centre, and motorists on the N18, for who the view is transient, partial and distant. In addition, since Tiger Kloof and the N18 are located at the same or slightly lower height than the site (1180 m above sea level, only the edge of the facility is likely to be visible, and there will be a significant degree of screening by the 2 km width of land cover on the intervening land.

3.2.5.2 Sensitive Viewers and Viewpoints

The following sensitive viewers or viewpoints were identified:

- Residents of the Tiger Kloof Educational Centre: The development will potentially be visible from the residents of the Tiger Kloof Educational Centre (2 km to west). Due to distance from the site, and also due to the topography which places the PV site at the same height as Tiger Kloof and thereby presents only the edge of the site to view.

- Motorists using the N18: The development will potentially be visible from a small number of residents on neighbouring farms, whose viewpoints may be affected by the development. However, due to distance and the small numbers of such people, this area falls in the category of low viewer sensitivity. The N18 runs 2 km to the west of the site. Motorists are seen as low sensitivity visual receptors since they are transient and therefore likely to spend very little time studying the landscape, which will be only a partial, distant view from the N18.

3.2.5.3 Visual Exposure

The residents of Tiger Kloof will have potentially moderate exposure to the project. There are very few farmhouses surrounding the site that will have potentially low exposure to the project. A short section of the N18 will be partially and distantly exposed to the PV plant where it passes 2 km.

3.2.5.4 Visual Intrusion

Residents of Tiger Kloof Education Centre currently have some elements common to this development in some of their views, including main roads (N18) and power lines. They will experience low visual intrusion due mainly to distance from the site and also due to the topography which places the PV site at the same height as Tiger Kloof and thereby presents only the edge of the site to view.

Residents and workers on surrounding farmsteads currently have some elements common to developments in some of their views, including main roads (N18) and power lines. They will experience low visual intrusion due mainly to distance from the site, and also due to the topography which places the PV site at the same height or higher than and thereby presents only the edge of the site to view.

Motorists driving on the N18 between Vryburg and Warrenton will experience low visual exposure and intrusion for a short section (3-4 km) as the road approaches from the north and the south. Photovoltaic panels may be partially and distantly visible for a very brief period.

3.2.5.5 Visual resource value

The site's visual resource value is of low visual quality and hence of low value as a visual resource, to all of the affected visual receptors i.e. the occupants of surrounding farms, and motorists making use of the roads.

3.3 Description of the socio-economic environment

3.3.1 Socio-economic conditions

The 2012-2017 NLM IDP notes that Vryburg and Naledi are at the hub of the economically most underperforming district in the North West (NLM, 2012: 23). The 2009 Naledi GDP was estimated at ~R1.945 billion. The main sectors of the NLM economy in terms of GDP generation were Agriculture and hunting (21%), Finance and Insurance (8%), Administration (8%), and Transport (5%). Manufacturing (food, beverages and tobacco) accounts for ~1%. Beef production development centered on Vryburg currently constitutes the anchoring economic strategy. Construction and manufacturing (agricultural, especially beef processing) have been identified as

further potential growth areas in the 2012-2017 IDP, specifically in order to absorb the large group of unemployed youth (NLM, 2012).

The Naledi population is currently estimated at 68 380 people (~16 338 households). The NLM reflects the DM's high youthful dependence rate. Approximately 49.5% of the NLM population is of school going age, or younger (0-19), while only 4% is retired (65 and older). The 2012-2017 IDP also notes that the number of youthful dependents has significant implications in terms of household income and poverty (NLM, 2012).

Approximately 18% of the NLM adult population had no formal schooling, and 66% had some schooling, but less than Grade 12. Only 6.5% of the NLM population has tertiary qualifications, including diplomas. The NLM unemployment rate is estimated at 47%. The bulk of the NLM economically active population cohort is comprised of Black Africans (78%), but the majority of this group however lacks skills and is not functionally literate. The population group with the highest overall unemployment was the Coloured group (~45%). The NLM IDP notes that, as a result of reinforcing factors of unemployment, lack of skills, illiteracy and poverty, average Naledi household income levels are generally low, with ~53% of household heads earning less than R3 500/ month.

The key employment sectors in the NLM are Agriculture and hunting (~37%), Community Services (~21%), Private households (~18%), and Trade (~10.5%). Manufacturing provides less than 2% of employment opportunities. The Agriculture subsector is largely responsible for the uptake of lower skilled portion of the Black part of the labour force. The NLM informal economy is sizeable. Approximately half of those employed in the sector so as street traders, retailers and marketers (NLM, 2012).

3.3.2 Cultural and heritage aspects

The cultural landscape qualities of the larger region essentially consist of two components. The first is a rural area in which the human occupation is made up of a pre-colonial element (Stone Age and Iron Age) as well as a much later colonial (farmer and industrial/mining) component. The Heritage Impact Assessment identified the following sites:

- Algal stromatolites have been identified to outcrop in two areas. The heritage consultant recommended that a geologist be contracted to review the region and decide on the significance of these features. A palaeontological heritage assessment will be conducted in order to determine the significance of the algal stromatolites. For projects where SAHRA requested that a palaeontological assessment be conducted they stated that the planning phases of the project are in no way contingent on these palaeontological assessment being compiled, and they need only be conducted, and commented on by SAHRA, prior to any construction work taking place on the properties. SAHRA will therefore comment on the reports once finalised and advise whether construction can then commence or whether mitigation is necessary.
- A number of stone tools, all dating to the Middle Stone Age were identified in two small areas that occurs on the western side of the a small ridge. As these areas are very small and the density of the artifacts are not high, it is recommended that these areas are viewed to be documented in full after acceptance of this report by SAHRA and that no further action is required.

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 SAHRA and a heritage practitioner 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. PUBLIC PARTICIPATION AND CONSULTATION

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

31(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include –

(e) details of the public participation process conducted in terms of subregulation (1), including –

(i) steps undertaken in accordance with the plan of study;

(ii) a list of persons, organisations and organs of state that were registered as interested and affected parties;

(iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and

(iv) copies of any representations, objections and comments received from registered interested and affected parties.

4.1 Requirements for public participation included in the plan of study for EIA

Since no I&APs registered as part of the scoping process no new participation process was proposed in the approved plan of study for EIA. No additional inputs were received from the key stakeholders (refer to Table 4.1 and Appendix E for written comments).

4.2 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, the following public participation mechanisms were deemed necessary and have already been completed:

- Newspaper advertisement
  Since the proposed development is unlikely to result in any impacts that extent beyond the municipal area where it is located, it was deemed necessary to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Stellalander) on the 4 April 2012 (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. IAPs were given the opportunity to raise comments within 30 days of the advertisement.

- Site notices

  Site notices were placed on site in English on the 7 March 2012 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments within by 2 May 2012. 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 2 April 2012 and were requested to submit comments by 2 May 2012. 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
  - 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. Ruth Segomotsi Mompati District Municipality
  - The Naledi Local Municipality
  - The Local Councilor
  - The Civil Aviation Authority (CAA)
  - The Vryburg Ratepayers association

  It was expected from the IAPs to provide their inputs and comments within 30 days after receipt of the notification. To date the NWDEDECT, the Department of Agriculture, the Department of Rural Development and Land Reform, SAHRA, Eskom, and the CAA 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 April 2012. For a list of surrounding land owners see Appendix D. To date Transnet, the Tiger Kloof Educational Institution, and the Nollies Family Trust have provided feedback (see Appendix F for written comments).

- Circulation of draft scoping report

  The draft scoping report was circulated to the following registered I&APs and key stakeholders:

  - The North West Department of Agriculture, Conservation, Environment and Rural Development (NWDEDECT)
  - The Naledi Local Municipality
  - Tiger Kloof Educational Institution
  - Nollies Family Trust

The registered I&APs and key stakeholders were requested to provide their inputs and comments within 30 days after receipt of the draft report. To date only the NWDEDECT provided feedback (see Appendix F for written comments).

- Circulation of final scoping report

The following key stakeholders were notified of the availability of the final scoping report:

- The North West Department of Agriculture, Conservation, Environment and Rural Development (NWDEDECT)
- The National Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- ESKOM
- The Naledi Local Municipality
- Tiger Kloof Educational Institution
- Nollies Family Trust

The key stakeholders were requested to provide their inputs and comments within 21 days after receipt of the notification of the availability of the final report. To date only SAHRA and the Tiger Kloof Educational Institution requested a copy of the report. No additional comments were received.

- Public participation meeting

All I&APs were invited to attend the public meeting held at the Castello Guest House in Vryburg on 12 October 2012 at 17:00. The public meeting was an opportunity to provide information regarding the proposed development and provided I&APs an opportunity to raise any issues and provide comments. An advertisement was placed in English in the local newspaper (Stellalander) on the 26 September 2012 (see Appendix G5) notifying the public of the public meeting. The following key stakeholders were also directly informed of the public meeting via email on 26 September 2012:

- The Department of Environmental Affairs
- North West Department of Economic Development, Environment, Conservation and Tourism (NWDEDECT)
- The Department of Water Affairs
- The National Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- ESKOM
- The Dr. Ruth Segomotsi District Municipality
- The Naledi Local Municipality
- CAA
- Transnet
- Tiger Kloof Educational Institution
- Nollies Family Trust

Unfortunately the public meeting did not enjoy any interest and nobody attended the meeting. Refer to Appendix G5 for the Power Point presentation.

- Circulation of the draft EIR

  The following Registered I&APs and key stakeholders were notified of the availability of the final scoping report:

  - The North West Department of Agriculture, Conservation, Environment and Rural Development (NWDEDECT)
  - The National Department of Agriculture
  - The Department of Water Affairs
  - The South African Heritage Resources Agency (SAHRA)
  - ESKOM
  - PRASA
  - SANRAL
  - The Naledi Local Municipality
  - Tiger Kloof Educational Institution
  - Nollies Family Trust

  The key stakeholders were requested to provide their inputs and comments within 40 days after receipt of the notification of the availability of the draft EIR.

4.3 Consultation process

Regulation 54 requires that the municipality, relevant ward councilor 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 notices as well as proof of registered post is attached as Appendices G3 and G4.

4.4 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed development. To date the Tiger Kloof Educational Institution and the Nollies Family Trust has requested to be included as a registered I&AP. According to Regulation 56(1) "*A registered interested and affected party is entitled to comment, in writing, on all written submissions*". This report is the Final Environmental Impact Report (EIR) to be submitted to the Department of Environmental Affairs. The report will be made available to the following registered I&APs and State Departments:

- The North West Department Economic Development, Environment, Conservation and Tourism (NWDEDECT)
- The Naledi Local Municipality
- The Department of Water Affairs
- The National Department of Agriculture
- SANRAL
- PRASA
- SAHRA
- Eskom
- Transnet
- Tiger Kloof Educational Institution
- Nollies Family Trust

They will be notified of the availability of the final EIR and will be requested to provide written comments on the report within 21 days.

4.5 Issues raised by IAPs and consultation bodies

Table 4.1 summarizes the comments received from consultation bodies. The full wording and original correspondence is included in Annexure F.

Table 4.1: Issues raised by key consultation bodies

Organisation	Person	Written comment (see Annexure F)
NW DEDECT	Ms. Malefyane Mosadi	The Department confirmed receipt of the scoping report in a letter dated 05/2012 and stated that they have no objection to the acceptance of the scoping report and requested that the following be considered: • Additional site photographs must be attached in the scoping report. • The facility layout has not been included in the draft scoping report. • Figures 1 and 2 have not been included in the draft scoping report. • Specialist studies must contain all the information specified in Regulation 32(3) of the 2010 EIA Regulations.
Department of Agriculture	Delegate of the Minister: Ms Mashudu Marubini & AgriLand Liaison office: Ms Thoko Buthelezi	The Department confirmed receipt of the report in an e-mail dated 23 May 2012 and stated in an e-mail dated 23 May 2012 that the application with Agriland reference number 2012_04_0081 (Waterloo) is on step 4 of 8. The Department explained that this means that the official working with the application is currently compiling a submission to the committee.
Department of Rural Development and Land Reform	Ms. R.S. Mapapanyane	The Department stated in a letter dated 8 June 2012 that there are no land claims lodged on the property.
SAHRA	The Chief executive officer: Ms. Colette Scheermeyer	SAHRA stated in a letter dated 15 June 2012 that the sensitive areas near the ridge, although outside of the development area, should be avoided during construction activities. The Environmental Control Officer should be made aware of the presence of archaeological resources there so that their safeguarding during construction can be ensured. As there is apparently no evidence of any significant archaeological material in this area, the SAHRA has no objection to the development on condition that, if any new evidence of archaeological sites or artefacts, palaeontological fossils, graves or other heritage resources are found during development, construction or mining,

		SAHRA and an archaeologist and/or palaeontologist, depending on the nature of the finds, must be alerted immediately.
ESKOM	Senior Advisor Demand Side Management: Mr. Valmon Muller	Eskom confirmed in an e-mail dated 14 June 2012 that they have received the application for a cost estimate for the construction of a solar plant on the farm Waterloo 992 and that they have no objection to the proposed development.
CAA	Acting Manager AOG: Mr. Christopher Isherwood	The CAA confirmed that they have no objection to the proposed development with a maximum height restriction of 12m above ground level in a letter dated 18 May 2012.
Transnet	Risk Manager: Environment Management Mr. Francis Rahlapane	Transnet confirmed in an e-mail dated 15 May 2012 that they have reviewed the project and that there would not be any environmental impact on them due to the distance of the site more than 4km from the railway line. Requested not to receive any further correspondence.
Tiger Kloof Education Institution – Science club	-	The Tiger Kloof Educational Institution stated in a letter dated 23 April 2012 the following: Conditionally yes: a) 60% local labour should be used. b) Make use of local supply. c) Use already disturbed plot. d) Minimize visual pollution. e) Rehabilitation of the sites.
Nollies Familie Trust	-	Provided no comments in a letter dated 04/05/2012.
The Naledi Local Municipality	The Municipal Manager: Mr. Segapo	The Local Municipality confirmed in a letter dated 16 November 2012 that it has the capacity to provide the proposed development with the following services for the lifetime of the project: • The municipality will be able to remove the household refuse once a week from Solar Power Plant to the municipal dumping site. • The municipality confirms that the dumping site has the capacity to accommodate the additional waste generated by the employees working at the Solar Power Plant. • The municipality will be able to remove the sewerage once a week from the septic tanks at the Solar Power Plant. • The municipality confirms that the sewage plant has the capacity to accommodate the additional sewage generated by the employees working at the Solar Power Plant.

The Department of Water Affairs (DWA)	Regional Head: Northern Cape Mr. Abe Abrahams	• The DWA confirmed in a letter dated 4 December 2012 that sufficient water is available to meet the water requirements of the proposed project. DWA further confirm that 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.

5. ENVIRONMENTAL IMPACT ASSESSMENT

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

31(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include –

f) a description of the need and desirability of the proposed activity;
g) a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;
h) an indication of the methodology used in determining the significance of potential environmental impacts;
i) a description and comparative assessment of all alternatives identified during the environmental impact assessment process;
j) a summary of the findings and recommendations of any specialist report or report on a specialised process;
k) a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
l) an assessment of each identified potentially significant impact, including –
   (i) cumulative impacts;
   (ii) the nature of the impact;
   (iii) the extent and duration of the impact;
   (iv) the probability of the impact occurring;
   (v) the degree to which the impact can be reversed;
   (vi) the degree to which the impact may cause irreplaceable loss of resources; and
   (vii) the degree to which the impact can be mitigated;
m) a description of any assumptions, uncertainties and gaps in knowledge;

5.1 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, 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 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 Naledi Local Municipality's Integrated Development Plan (Naledi IDP, 2012-17).

5.2 The desirability of the proposed development

The development of a solar facility will have several benefits for society in general, some of which are discussed below:

- Security of power supply - 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 employment - 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 promotion and development of photovoltaic solar facilities, which will in turn lead to growth in tax revenues and sales of carbon credits, will result in increased foreign direct investment.

- Reduced air pollution, carbon dioxide emissions and water consumption - The additional power supplied through solar energy will reduce the reliance on the combustion of fossil fuels to produce power. The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO2 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. Coal power also requires high volumes of water, in areas of South Africa where water supply is already over-stretched and water availability is highly variable.

- 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 2013 and the reduction of South Africa's GHG emissions by approximately 34% below the current emissions baseline by 2020.

- Increased surety of supply and increased quantity of available power - By diversifying the sources of power in the country, the surety of supply will increase. Additionally, 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.

- 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 since security guards and general laborers will be required on a full time basis.

- 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.

5.3 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 recognises 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.

5.3.1 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 grazing (refer to Appendix B for photographs of the development area). However the land is classified by the Department of Agriculture (NDA, 2006) as having limited irrigation potential, generally not suited to cultivation, and therefore has low agricultural potential. If the no-go alternative prevails the land will continue to be used for low density cattle grazing.

5.3.2 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 legally secured by DPS79 Solar Energy in the Vryburg area to potentially establish solar facilities. From a local perspective, the farm Waterloo 992 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). Therefore no further property alternatives will be considered in this report.

Alternative locations on the farm Waterloo 992, which is 1618.8454 hectares in extent, were considered – refer to Appendix A for a locality map of the alternative site. However as a result of the findings of the Heritage Impact Assessment and the recommendations made by the visual and ecological specialists this site was rendered undesirable due to certain environmental characteristics, for example the presence of archaeological sensitive areas, its visibility, and strong populations of *Acacia erioloba* of various heights.

5.3.3 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 solar facility - DPS79 Solar Energy (Pty) Ltd. is a South African project development company that is focused on developing renewable energy power projects that will produce electricity from clean renewable energy sources, whilst advancing environmental, social and economic upliftment. DPS79 Solar Energy (Pty) Ltd. is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Vryburg 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.

5.3.4 Technical alternatives

The electricity generated from the solar panels will be transmitted via either overhead or underground lines to the existing 132kV transmission lines west of the site. Either overhead or underground transmission lines will be constructed. Either of these options would be able to be constructed within a 32m wide servitude.

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 powerline. 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.

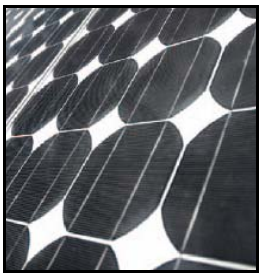
5.3.5 Design and layout alternatives

Design and layout alternatives were also 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 follows the limitations of the site and aspects such as roads, fencing and servitudes are 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, transmission lines and perimeter fences).

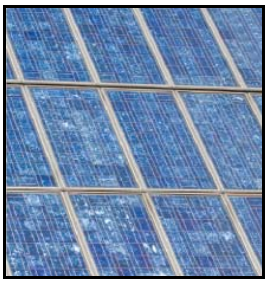
5.3.6 Technology alternatives

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.



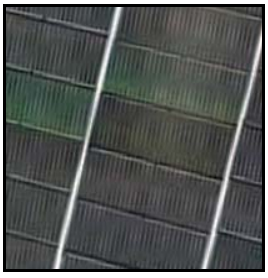
- Multicrystalline Silicon - Multicrystalline (also called polycrystalline) panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than monocrystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, 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.

5.4 Methodology for the identification of key issues

The methodology for the identification of key issues aims, as far as possible, to provide a user-friendly analysis of information to allows for easy interpretation.

- Checklist (see section 5.5): 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 5.6): 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 5.7): 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 programme as part of the EIA report should aim to formalise the proposed mitigation measures.

5.5 Checklist analysis

The independent consultant together with the developer conducted a site visit on 7 March 2012. 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-known	Description
1. Are any of the following located on the site earmarked for the development?					
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.	Site of geological significance	✕			The site is subject to the presence of dolomite. The geotechnical study recommends that a dolomitic stability investigation be conducted to determine the feasibility of the site. Mitigation measures are provided in the Environmental Management Programme to avoid the formation sinkholes and to limit the risks involved should a sinkhole develop.
V.	Areas of outstanding natural beauty		✕		None.
VI.	Highly productive agricultural land		✕		None.
VII.	Flood plain		✕		None.
VIII.	Indigenous forest		✕		None.
IX.	Grass land		✕		None.
X.	Bird nesting sites		✕		None.
XI.	Red data species		✕		None.
XII.	Tourist resort		✕		None.

2.	Will the project potentially result in?				
I.	Removal of people		✕		None.
II.	Visual Impacts	✕			The Visual Impact Assessment (Refer to Appendix D4) concluded that the proposed development will have a limited visual impact on the visual environment within 2 km of the proposed facility.
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	✕			Access to the site is from the dirt road towards Amalia, off the R34 towards Schweizer-Reneke. The road wil,l need to be extended.
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 proposed photovoltaic solar plant will require 2,800,000 liters of water 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.
3.	Is the proposed project located near the following?				
I.	A river, stream, dam or wetland		✕		The site is located approximately 2.5 kilometers east of the Dry Harts river. Water features, in the form of pans are located in close proximity to the site. However these features are not located within the development footprint of the site.

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.

5.6 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									
		Construction Phase			Operational Phase			Decommissioning Phase			Possible Mitigation
		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	✓
	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.

5.6.1 Physical environment

During the construction phase various negative impacts are foreseen over the short term. The latter refers to a period of months. The installation of infrastructure will inevitably result in the compaction and potential chemical pollution of the soil.

During the operational phase the study area will serve as an electricity generation facility and the negative impacts are generally associated with the potential soil erosion, increase in storm water runoff, and the increased consumption of water.

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.

5.6.2 Social/Economic environment

The negative impacts during the construction phase relate primarily to 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 positive 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 the visual impact of photovoltaic solar facilities. However, the Visual Impact Assessment (Refer to Appendix D4) concluded that the proposed development will have a limited visual impact on the visual environment within 2 km of the proposed facility. The operational phase will also 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 employment and the generation of waste that will require certain management measures.

5.7 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 diagrams are presented, which specify the following (see Diagrams 5.1 and 5.2):

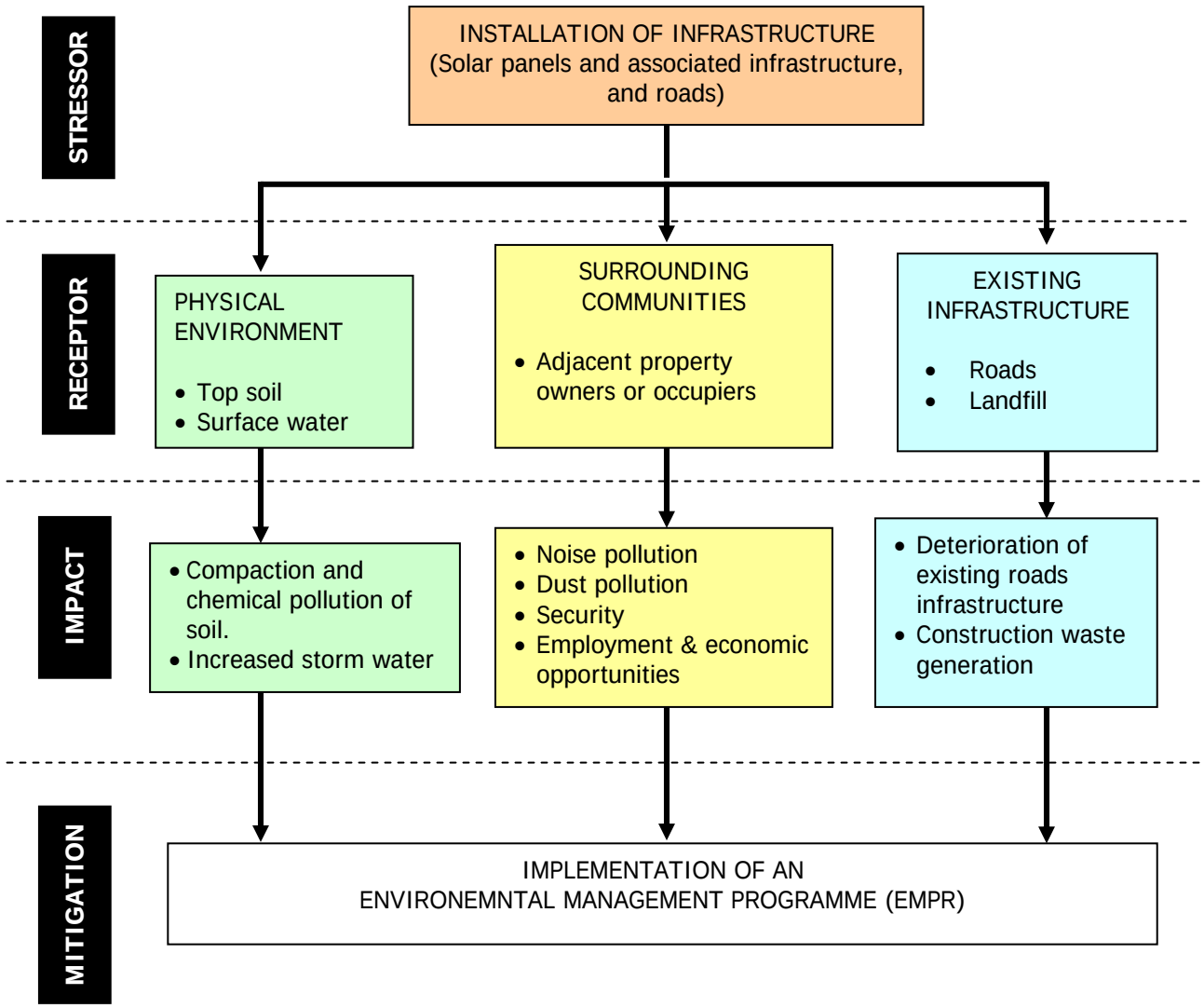
- Stressor: Indicates the aspect of the proposed development, which initiates and cause impacts on elements of the environment.
- Receptor: Highlights the recipient and most important components of the environment affected by the stressor.
- Impacts: Indicates the net result of the cause-effect between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

5.7.1 Impacts during the construction phase

Stressors during the construction phase predominantly refer to the installation of infrastructure relating to the solar panels, supporting infrastructure and internal roads. Receptors refer to the physical and socio-economic environment as well as the existing infrastructure. Diagram 5.1 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.

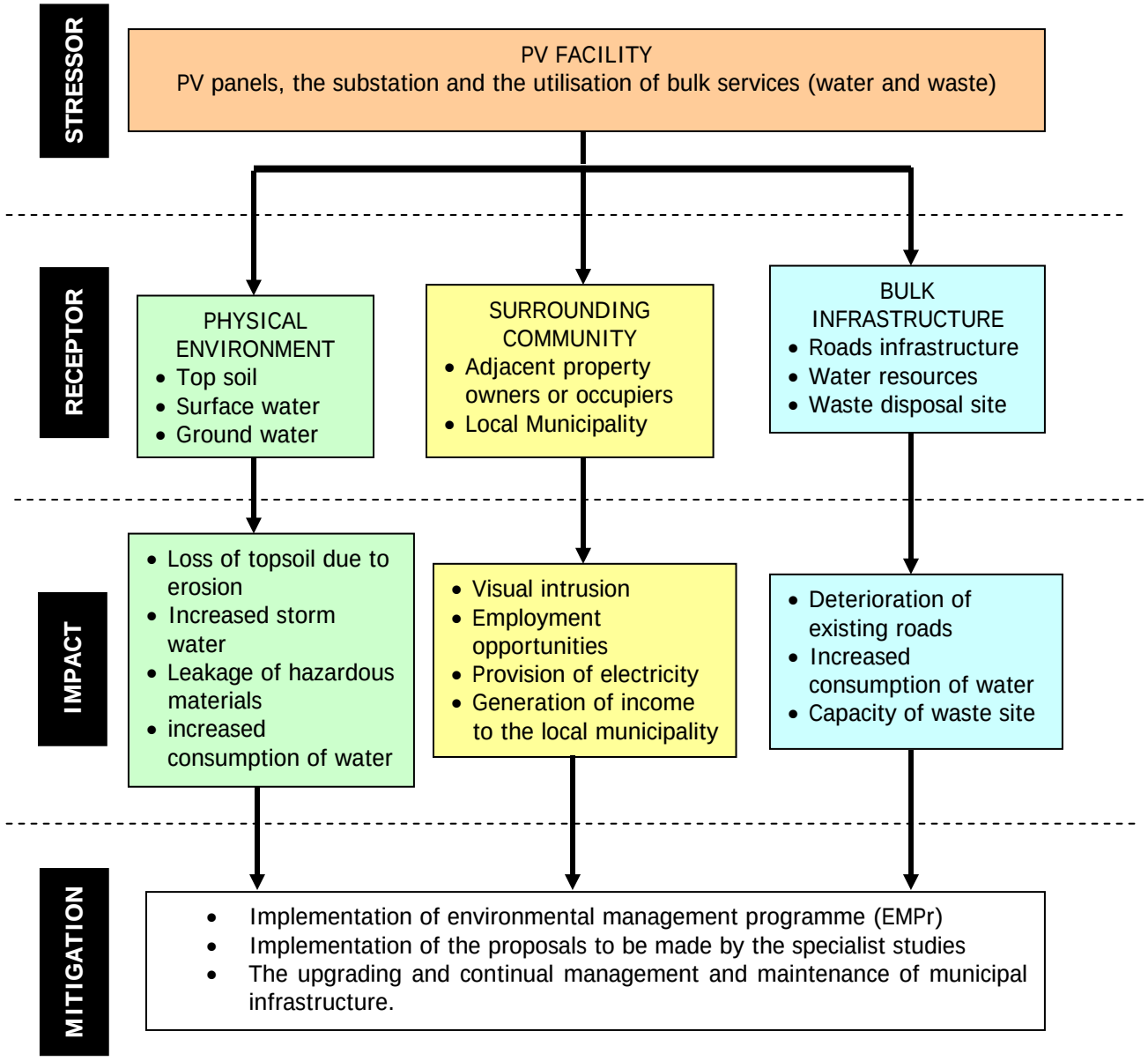
Diagram 5.1: Conceptual model of impacts during the Construction Phase



5.7.2 Impacts during the operational phase

Stressors during the operational phase predominantly refer to the photovoltaic (PV) facility, and the associated water use and waste production. Receptors refer to the physical and socio-economic environment. Diagram 5.2 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 5.2: Conceptual model of impacts during the Operational Phase



5.8 Key issues identified

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

5.8.1 Impacts during the construction phase

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

5.8.2 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 the potential for soil erosion, increase in storm water runoff, the increased consumption of water, potential for 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 municipality.

5.8.3 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. However, the decommissioning phase will result in the loss of employment and the generation of waste that will require management measures.

5.9 Environmental assessment of significant issues

The following sections summarize the key findings from the specialist reports after which an assessment is conducted on the significance of the key issues. The mitigation measures related to the key issues are highlighted or reference is made to the mitigation measures set out by the EMPr. This section concludes by pointing out the remaining gaps in knowledge and uncertainties in results, which need to be considered during final recommendations.

It needs to be stressed that although these issues were identified as potentially significant it does not imply that they are significant. Establishing the significance of these issues is exactly the purpose of the EIA phase. It also needs to be highlighted that the significance assessment and rating is based on conditions after mitigation and not based on the baseline scenario without mitigation.

5.9.1 Summary of recommendations from specialist studies

To address the key issues highlighted in the previous section the following specialist studies and processes were commissioned:

- Study on the best practice specifications for a construction environmental management programme (EMPr) – conducted by the lead consultant, Environamics (see Appendix F).

- Study on the best practice specifications for an environmental management programme (EMPr) for the operational phase – conducted by the lead consultant, Environamics (see Appendix F).
- Confirmation on the availability of water – by the Department of Water Affairs. The DWA confirmed in a letter dated 4 December 2012 that sufficient water is available to meet the water requirements of the proposed project.
- A geotechnical investigation comprising a geotechnical soil investigation – conducted by Soilkraft CC (see Appendix D1).
- A Heritage Impact Assessment - conducted by Mr. J.A. van Schalkwyk (see Appendix D2).
- An ecological fauna and flora habitat survey - conducted by Anthene Ecological CC (see Appendix D3).
- A visual impact assessment - conducted by Dr. L. A. Sandham (see Appendix D4).
- A Soil, Land Capability and Agricultural Study – conducted by Environmental research consulting CC in association with Terra-Africa Consultant CC (see Appendix D5).
- Social Impact Assessment - conducted by Tony Barbour Environmental Consulting and Research (see Appendix D6).
- Study on the best practice specifications for an environmental management programme (EMPr) for the decommissioning phase – conducted by the lead consultant, Environamics (see Appendix F).
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics (refer to Section 5.12 of this report).

The following sections summarise the main findings from the specialist reports in relation to the key issues raised during the scoping phase.

5.9.1.1 Issue 1: Impacts during construction

It is evident that the construction phase of the project will have certain unavoidable environmental impacts related to the installation of infrastructure. The main question which needs to be addressed emanating from the scoping report is:

> *"How will the construction process be managed to minimise and avoid environmental impacts?"*

A comprehensive construction environmental management programme (EMPr) was compiled and is included as Appendix F to this report. The construction management programme includes a clear description of roles and responsibilities and provides detailed specifications for the different actions during construction. It is imperative that these specifications be incorporated into the tender documentation prepared for the different construction activities.

5.9.1.2 Issue 2: Impacts during operation

It is evident that the photovoltaic solar plant will have certain unavoidable environmental impacts during operation. The main question which needs to be addressed emanating from the scoping report is:

> *"How will the facility be managed to minimize and avoid environmental impacts?"*

A comprehensive environmental management programme (EMPr) was compiled for the operational phase of the plant and is included as Appendix F to this report. The management programme includes a clear description of roles and responsibilities and provides detailed specifications for the different actions during the operational phase.

5.9.1.3 Issue 3: Provision of sustainable water supply

Adequate provision of water will be a prerequisite for the development. The main question which needs to be addressed emanating from the scoping report is:

> *"Will the proposed development have a sustainable water supply?"*

The Department of Water Affairs provided a non-binding letter of approval for the development which confirms the availability of water for the proposed development - refer to Appendix E for comments received.

5.9.1.4 Issue 4: Geotechnical suitability

The geotechnical suitability of the site for the proposed development needed to be determined. The main question which needs to be addressed emanating from the scoping report is:

> *"Are the geotechnical conditions favorable for the development of a solar plant?"*

The Geotechnical Report recommends that the feasibility of the site for the proposed establishment of a solar power facility be determined by the results of a dolomite stability investigation, as conducted based on guidelines (SANS 1936 Parts One to Three – Development of Dolomite Land: Draft issue 2012). – refer to Appendix D1.

5.9.1.5 Issue 5: Heritage and archeological impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed emanating from the scoping report is:

> "Will the proposed development impact on any heritage or archeological artifacts?"

The Heritage Impact Assessment identified the following sites:

- Algal stromatolites have been identified to outcrop in two areas. It is recommended that a geologist be contracted to review the region and decide on the significance of these features.
- A number of stone tools, all dating to the Middle Stone Age were identified in two small areas that occurs on the western side of the a small ridge. As these areas are very small and the density of the artifacts are not high, it is recommended that these areas are viewed

to be documented in full after acceptance of this report by SAHRA and that no further action is required.

It is recommended that the proposed development continue, on condition of acceptance of the above recommendations and requests that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. It is not recommended that a paleontological study be conducted.

5.9.1.6 Issue 6: Ecological Impacts

The potential impact of the proposed development on threatened flora and fauna known to occur in North West Province had to be determined. The main question which needs to be addressed emanating from the scoping report is:

"How will the proposed development impact on the ecology?"

The fauna and flora ecological study (refer to Appendix D3) concluded that it is highly unlikely that there would be a threat to any threatened animal species or any other animal species of particular conservation concern. There is no distinct reason why this relatively small footprint allocated for the development, in the vast countryside of the North West Province is of particular conservation concern for any threatened vertebrate species, including those that roam large areas and which may occasionally or coincidently visit the site. It is to be commended that more sensitive areas with a high abundance of taller *Acacia erioloba* as well as the riverine gorge in the larger area and two pans > 500 m north of the site have been excluded from the proposed development.

5.9.1.7 Issue 7: Visual Impacts

Due to the extent of the proposed photovoltaic solar plant (150 hectares) it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed emanating from the scoping report is:

"To what extent will the proposed development be visually intrusive to the surrounding communities?"

The Visual Impact Assessment (Refer to Appendix D4) concluded that in view of the moderately low visual value of this landscape, the small numbers of sensitive receptors, and the strategic importance of developing sustainable energy alternatives, the significance of the overall visual impact of this development can be regarded as low. It is recommended that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions.

5.9.1.8 Issue 8: Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to

Appendix D6). The main question which needs to be addressed emanating from the scoping report is:

"How will the proposed development impact on the socio-economic environment?"

The findings of the SIA (Refer to Appendix D6) indicate that the development of the proposed solar plant will create employment and business opportunities for locals during both the construction and operational phase of the project. The establishment of a Community Trust will also benefit the local community. The enhancement measures listed in the report should be implemented in order to maximise the potential benefits. In addition, the proposed establishment of a number of renewable energy facilities in the NLM and NWP will create socio-economic opportunities, which, in turn, will result in a positive social benefit. The significance of this impact is rated as High Positive.

Due the number of other renewable energy projects proposed in the vicinity of the Vryburg and the NLM as a whole, it is recommended that the NLM investigate the establishment of a single, renewable energy linked Development Trust whereby all potential renewable energy producers would contribute to the Trust. The motivation for the establishment of a larger, local municipality or district municipality trust would be to maximize the potential benefits to the broader region by creating a single fund that can be used to promote and support local, socio-economic development in the region as a whole. The option of establishing a municipal level fund should be investigated by the NLM in consultation with other renewable energy companies.

The proposed development also represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The establishment of the proposed solar plant is therefore supported by the findings of the SIA. However, the potential impacts associated with large, solar energy facilities on an areas sense of place and landscape cannot be ignored. These impacts are an issue that will need to be addressed by the relevant environmental authorities, specifically given the large number of applications for solar facilities in the area.

5.9.1.9 Issue 9: Agricultural impacts

In order to determine the potential impacts that the proposed development will have on agricultural production, the soil forms and current land capability of the area where the proposed project will be situated a soil survey has been conducted. The main question which needs to be addressed emanating from the scoping report is:

"How will the proposed development impact on agricultural resources?"

Based on the findings of the soil survey (refer to Appendix D5) the site has potential for extensive cattle or game farming. With an average grazing capacity of 7.2 ha/LSU, the proposed development site of 150 ha can accommodate 20 head of cattle per year under average rainfall conditions. It can be concluded that should the development be authorised, it will have a low impact on agricultural potential of cattle production in the area and no impact on crop production.

5.9.1.10 Issue 10: Impacts associated with decommissioning activities

It is evident that the photovoltaic solar plant will have certain unavoidable environmental impacts during decommissioning. The main question which needs to be addressed emanating from the scoping report is:

> *"How will the decommissioning process be managed to minimize and avoid environmental impacts?"*

A comprehensive environmental management programme (EMPr) was compiled for the decommissioning phase of the plant and is included as Appendix F to this report. The management programme includes a clear description of roles and responsibilities and provides detailed specifications for the different actions during the decommissioning phase.

5.9.1.11 Issue 11: Addressing cumulative impacts

The main question which needs to be addressed emanating from the scoping report is:

> *"How will the cumulative impacts resulting from the proposed facility be managed?"*

The potential cumulative impacts were considered during the significance rating of the potential impacts (refer to Section 5.12 of this report). The significance of these were considered to be of low to medium (-) significance and low to medium (+), without mitigation. These potential cumulative impacts would decrease, with implementation of mitigation measures for the proposed project as well as other proposed projects in the area, and are considered to be acceptable. It should however be noted that it is not possible to assess these cumulative impacts in a project specific EIA, not least because not all the proposed projects in the area may be approved or constructed. As such it would be necessary for DEA, or a similar body, to undertake a strategic assessment in this regard.

5.10 Method of environmental assessment

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed development. Different impacts need to be evaluated in terms of its 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 5.3.

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.

5.10.1 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 5.3: *The rating system*

NATURE		
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.		
GEOGRAPHICAL EXTENT		
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.
PROBABILITY		
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).
DURATION		
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.
INTENSITY/ MAGNITUDE		
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.
REVERSIBILITY		
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.

IRREPLACEABLE LOSS OF RESOURCES		
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.
CUMULATIVE EFFECT		
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: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x 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.

5.11 Consideration of Cumulative Impacts

Section 2 of the NEMA requires the consideration of cumulative impacts as part of any environmental assessment process. The EIA Regulations (2010) determine that cumulative impacts, *"in relation to an activity, means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area."* Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this EIR and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. Finally, comment is provided on the potential cumulative impacts which could result should this development, and others like it in the area, be approved.

5.12 Description of uncertainties and gaps in knowledge

The uncertainties in results are mostly related to the availability of information, time available to gather the relevant information as well as the sometimes subjective nature of the assessment methodology. In terms of addressing the key issues the EAP is satisfied that there are no major gaps in knowledge and that the specialist reports provide sufficient information to conduct the significance rating and provide the environmental authority with sufficient information to make an informed decision.

5.13 Significance of potential impacts

The following sections present the outcome of the significance rating exercise. The results suggest that none of the key issues identified as part of the scoping process had a negative high environmental significance. Instead the overall score indicate a low environmental significance score.

5.13.1 Impacts that may result from the Construction Phase

Direct impacts: During the construction phase 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 fauna, flora and top soil with a degree of dust being created in the process, potential soil compaction, chemical soil pollution, temporary noise disturbance, and the increase in construction vehicle traffic and crime levels. It is obvious that the construction phase will also have a direct positive impact through the provision of employment opportunities for its duration. The abovementioned impacts are discussed in more detail below:

- Loss of vegetation - In terms of vegetation type the site falls within the Ghaap Plateau Vaalbosveld vegetation type (Mucina and Rutherford, 2006). The conservation status of this vegetation type is described by Mucina and Rutherford (2006) as 'least threatened'. The insignificant negative impact as a result of the removal of vegetation is outweighed by the positive impacts associated with the proposed development (refer to Appendix D3 for the fauna and flora habitat survey).

Loss of vegetation	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Permanent (4)	Permanent (4)
Magnitude	Low (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Negligible cumulative impacts (1), due to the vegetation type being classified as 'least threatened'.	
Significance	Negative low (15)	Negative low (15)
Can impacts be mitigated?	Yes, re-vegetation and habitat rehabilitation are dealt with in the fauna and flora habitat survey and the EMPr also provides numerous mitigation measures.	

- Soil compaction – Soil compaction due to unnatural load in the area will change the soil structure. Although there is already some soil compaction due to sections of the study site being used as a farm road, soil compaction will increase because of the increase in activity. The effect of this will largely be within the site boundary and will continue during the operational phase. If probable mitigating measures are not implemented the effect of the compaction will affect soil structure of soils on the site (refer to Appendix D5 for the Soil, Land Capability and Agricultural Potential Study).

Soil compaction	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Low (1)

Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Low cumulative impact (2). Should these impacts occur, there may be a cumu lative impact on stormwater runoff in the study area.	
Significance	Negative Medium (30)	Negative low (10)
Can impacts be mitigated?	Yes, the most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted – refer to Appendix F for the EMPr.	

- Chemical soil pollution – The use of vehicles that can result in oil and fuel spills on site as well as waste generation by construction and construction workers can result in possible chemical soil pollution. Chemical soil pollution can also be caused by unlawful discarding of broken and old batteries (refer to Appendix D5 for the Soil, Land Capability and Agricultural Potential Study).

Chemical soil pollution	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Probable (3)	Likely (2)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Low (1)
Reversibility	Barely reversible (3)	Barely reversible (3)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative Medium (36)	Negative low (11)
Can impacts be mitigated?	Yes, the following mitigation measures are suggested: • All waste generated on site during construction should be stored in waste bins and removed from site on a regular basis. • Vehicles accessing the site should regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil should be removed and transported to a designated waste site. • No broken or old batteries or components of the PV plant should be dumped on or around the site but should be removed immediately and taken to a special chemical waste facility	

- Loss of habitat for fauna – Given the low probability of resident threatened species occurring at the footprint site, the low probability of any significant conservation corridor or buffer zone at the footprint site, the absence of any wetland or rocky ridge habitats of particular conservation concern at the footprint site, the site proposed for development

could be viewed as less sensitive in the region (refer to Appendix D3 for the fauna and flora ecological habitat survey).

Loss of habitat for fauna	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Negligible cumulative impacts (1), since these types of developments are not located on ecological sensitive areas.	
Significance	Negative low (9)	Negative low (9)
Can impacts be mitigated?	No mitigation required.	

- Temporary noise disturbance - Construction activities will result in the generation of noise over a period of months. Sources of noise are likely to include vehicles, the use of machinery such as drills and people working on the site. The noise impact is unlikely to be significant; but construction activities should be limited to normal working days and hours (7:00 – 17:00).

Temporary noise disturbance	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1).	
Significance	Negative low (20)	Negative low (9)
Can impacts be mitigated?	Yes, management actions related to noise pollution are included in the EMPr.	

- Generation of waste - general waste, construction waste, sewage and grey water - The workers on site are likely to generate general waste such as food wastes, packaging, bottles, etc. Construction waste is likely to consist of packaging, scrap metals, waste cement, etc. The applicant will need to ensure that general and construction waste is appropriately disposed of i.e. taken to the nearest registered landfill. Sufficient ablution facilities will have to be provided, in the form of portable/VIP toilets. No pit latrines, French drain systems or soak away systems shall be allowed.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/district (2)	Local/district (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand for landfill space could result in significant cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	
Significance	Negative Medium (13)	Negative low (13)
Can impacts be mitigated?	Yes, it is therefore important that all management actions and mitigation measures included in the EMPr are implemented.	

- Temporary employment and other economic benefits – Approximately 300 temporary job opportunities will be created to undertake the construction activities. It is likely that local construction companies with the necessary expertise to construct solar facilities will be partnered with. The construction period is estimated to take approximately 12 months. During this period security personnel will also be required to work at the site particularly after working hours. It is also likely that some materials such as fencing, and other construction related consumables will be sourced locally.

Temporary employment and other economic benefits	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Province (3)	Province (3)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) - The community will have an opportunity to better their social and economic well being, since they will have the opportunity to upgrade and improve skills levels in the area.	
Significance	Positive Medium (30)	Positive Medium (30)
Can impacts be mitigated?	No mitigation measures required.	

Indirect impacts: The nuisance aspects generally associated with the installation of infrastructure will also be applicable to this development, which relates primarily to the increase in construction vehicle traffic.

- Increase in construction vehicle traffic – Building materials and infrastructure will be transported to site on a daily basis and there will be an increase in construction vehicles on access roads. However, mitigation measures are available to effectively manage the impacts. The significance of this impact after mitigation is low.

Increase in construction vehicle traffic	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative low (20)	Negative low (10)
Can impacts be mitigated?	Yes, the management of traffic are dealt with in the following sections of the EMPr: • 2.4.2. Construction traffic and access • 2.4.12. Noise and Vibrations • 2.4.15. Occupational Health and Safety The EMPr includes specific mitigation measures to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. The EMPr also includes mitigation measures to minimize impacts on local commuters e.g. the movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods.	

- Increased crime levels – The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.

Increase in construction vehicle traffic	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1), provided that losses are compensated for.	
Significance	Negative low (20)	Negative low (10)

Can impacts be mitigated?	Yes, detailed mitigation measures are included in Section 2.4.16 of the environmental management plan.

5.13.2 Impacts that may result from the Operational Phase

Direct impacts: During the operational phase the study area will serve as an electricity generation facility and the impacts are generally associated with soil erosion, the change of land use, increase in storm water runoff, increased consumption of water, visual intrusion, the generation of general waste, leakage of hazardous materials and security. The operational phase will also have a direct positive impact through the provision of permanent employment opportunities, the generation of additional electricity and the generation of income to the local community. The abovementioned impacts are discussed in more detail below:

- Soil erosion – Soil erosion will not be a problem during the construction phase for the PV plants will be cemented into the soil and very little natural vegetation will be removed. The largest risk factor for soil erosion will be during the operational phase when storm water run-off from the surfaces of the photo-voltaic panels will cause erosion. Erosion will be localised within the site boundary but will have a permanent effect that would stretch into the operational phase of the project. This will ultimately lead to the irretrievable commitment of this resource. The measurable effect of reducing erosion by utilizing mitigation measures may reduce possible erosion significantly (refer to Appendix D5 for the Soil, Land Capability and Agricultural Potential Study).

Soil erosion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Probable (3)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Significant loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3). Should these impacts occur, there will be a cumulative impact on the air and water resources in the study area in terms of pollution.	
Significance	Negative Medium (30)	Negative low (13)
Can impacts be mitigated?	Yes, to avoid soil erosion it will be a good practice to design storm water canals into which the water from the panels can be channeled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Another important measure is to avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads.	

- Change in land-use – The use of the area for the construction and operation of the PV plant will result in the area not being used for livestock grazing anymore. The soil survey

(refer to Appendix D5) confirmed that the site has an average grazing capacity of 8.4 ha/LSU, therefore the proposed development site of 150 ha can possibly accommodate 18 head of cattle. It can be concluded that should the development be authorised, it will have very low impact on agricultural potential of cattle production in the area and limited impact on crop production.

Change in land use	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impacts (2). The presence of the PV facility can set an unintended precedent for land use change, which in future can lead to cumulative impacts. However, these types of projects are located on land with low agricultural potential.	
Significance	Negative low (13)	Negative low (13)
Can impacts be mitigated?	No mitigation measures required. Due to the permanent nature of the project it is not foreseen that it can be mitigated to any lower impact.	

- Increase in storm water runoff – The development will potentially result in an increase in storm water run-off that needs to be managed to prevent soil erosion, especially where vegetation will be cleared. Run-off from solar panels will be led into water furrows that traverse the site. Vegetation corridors should be maintained within the subject area.

Increase in storm water runoff	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3) - Should these impacts occur, there will be a cumulative impacts on the wider area.	
Significance	Negative medium (30)	Negative low (13)

Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in the EMPr are implemented to ensure that these impacts do not occur.

- Increased consumption of water - Approximately 2,800,000 liters of water per annum will be required for the operation of the solar plant. Cleaning will take place once every quarter. It is foreseen that water will be sourced from an existing borehole on the farm. It needs to be determined whether the borehole is registered and the necessary authorisation for the water use must be obtained from the Department of Water Affairs.

Increased consumption of water	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Region (3)	Region (3)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resources (2)	Marginal loss of resources (2)
Cumulative impact	Medium cumulative impacts (3) - An additional demand on water sources could result in medium cumulative impacts with regards to the availability of water.	
Significance	Negative medium (38)	Negative medium (38)
Can impacts be mitigated?	Yes, management actions and mitigation measures related to the use of water are included in the EMPr.	

- Visual intrusion - The Visual Impact Assessment (Refer to Appendix D4) concluded that the proposed development will have a limited visual impact on the visual environment within 2 km of the proposed facility, given that the number of sensitive receptors is very low, electrical infrastructure such as a substation and power lines are already located in close proximity to the site and the polycrystalline panels considered for this development are non-reflective. The Visual Impact Assessment also stated that it is important to note that this facility has an advantage over other more conventional power generating plants (e.g. coal-fired power stations). The facility utilises a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a more favorable light. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks to observers.

Visual intrusion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)

Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	Low cumulative impact (2). The construction of the solar plant and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure in the region. However this is not yet relevant in light of relatively low level occurrence of such infrastructure.	
Significance	Negative low (24)	Negative low (12)
Can impacts be mitigated?	Yes, mitigation measures are included in the visual impact assessment study and the EMPr.	

- Generation of waste - Security guards will be stationed at the solar facility 24 hours a day and 7 days a week. Sources of general waste will be waste food, packaging, paper, etc. General waste will be stored on the site and removed on a weekly basis. Since the site is located outside of the waste collection route, the waste will be taken to a registered landfill by a contractor employed by the applicant. The Local Municipality confirmed in a letter dated 16 November 2012 that they will be able to remove the household refuse once a week from Solar Power Plant to the municipal dumping site and that the dumping site has the capacity to accommodate the additional waste generated by the employees working at the Solar Power Plant.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand for landfill space could result in significant cumulative impacts with regards to the availability of landfill space.	
Significance	Negative low (15)	Negative low (15)
Can impacts be mitigated?	Yes, management actions related to waste management are included in the EMPr.	

- Leakage of hazardous materials - The proposed development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies and must be prevented by constructing oil bunds to ensure that any oil spills are suitably attenuated and not released into the environment.

Leakage of hazardous materials	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative medium (36)	Negative low (22)
Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in the EMPr are implemented to ensure that these impacts do not occur.	

- Security risks – The surrounding rural communities may have negative security impacts on the solar facility. This may potentially result in significant negative impacts and therefore the solar facility will need to be fenced with security personnel securing the site 24 hours every day of the week.

Security risk	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Probable (3)	Possible (2)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	High (3)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative medium (33)	Negative medium (30)
Can impacts be mitigated?	Yes – refer to the EMPr, Appendix F.	

- Permanent employment - Security guards will be required for 24 hours every day of the week and general labourers will also be required for the cleaning of the panels.

Permanent employment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)

Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2) – Creation of permanent employment and skills and development opportunities for members of the local community and creation of additional business and economic opportunities in the area.	
Significance	Negative Medium (30)	Negative Medium (30)
Can impacts be mitigated?	No mitigation measures required.	

- Generation of additional electricity - The photovoltaic effect of the panels will generate electricity that will be fed into the new Mookodi substation. The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).

Generation of additional electricity	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2) - The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).	
Significance	Positive medium (30)	Positive medium (30)
Can impacts be mitigated?	No mitigation measure required.	

- Generation of income to the local community – As a result of the proposed development an amount of approximately R4 200 000 will be donated to the local community per annum for local socio economic development. In addition to this it is also required that the applicant donate 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 (refer to Appendix D6 for the Social Impact Assessment).

Generation of income to the local community	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)

Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) - The donations may improve the social and economic situation of the local community.	
Significance	Positive medium (32)	Positive medium (32)
Can impacts be mitigated?	No mitigation measure required.	

Indirect impacts: The operational phase will have an indirect negative impact through the change in the sense of place and an indirect positive impact through the provision of additional electrical infrastructure.

- Change in the sense of place – The site is characterized by open veldt with a rural agricultural sense of place. The surrounding area has already been subject to transformation in terms of the substation, and power lines located in close proximity to the site. Since the number of sensitive receptors is also very low, the impact of a low-lying PV facility on the sense of place is expected to be insignificant. No mitigation measures are required.

Change in sense of place	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Low cumulative impact (2). The construction of the solar plant and associated infrastructure will increase the cumulative change in the sense of place due to industrial type infrastructure in the region. However this is not yet relevant in light of relatively low level occurrence of such infrastructure.	
Significance	Negative low (26)	Negative low (26)
Can impacts be mitigated?	Yes, mitigation measures relating to visual impacts are included in the EMPr.	

- Financial implications to tourism in the area – The Visual Impact Assessment (Refer to Appendix D4) stated that the plant is an unfamiliar but novel facility that invokes a curiosity factor. The advantage is that the facility can become an attraction or a landmark within the region that people would actually want to come and see. As it is impossible to completely hide the facility, the only option would be to promote it as an alternative and sustainable energy facility. Therefore the proposed development may enhance tourism in the area and have positive financial implications as a result.

Financial implications to tourism	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Province/Region (3)	Province/Region (3)
Probability	Possible (2)	Possible (2)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/a	N/a
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative low (13)	Negative low (13)
Can impacts be mitigated?	No mitigation measures required.	

- Additional electrical infrastructure - The proposed solar facility will add to the existing electrical infrastructure in the immediate area and aid to lessen the reliance of electricity generation from coal-fired power stations. Due to the small scale of the project, the significance of this positive impact is low.

Additional Electrical Infrastructure	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Probable (2)	Probable (2)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) with the development of several renewable energy facilities.	
Significance	Positive low (14)	Positive low (14)
Can impacts be mitigated?	In order to maximise the benefits of the proposed project DPS79 Solar Energy should use the project to promote and increase the contribution of renewable energy to the national energy supply.	

5.13.3 Impacts that may result from the Decommissioning and Closure Phase

Direct impacts: It is anticipated that the infrastructure will be removed after a 20/25 year period and that the site will be returned to its natural state. Therefore the physical environment will benefit from the closure of the solar facility. However, the decommissioning phase will result in the loss of employment and the generation of waste that will require management measures.

- Rehabilitation of the physical environment – The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state.

Rehabilitation of the physical environment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Site (1)	Site (1)
Probability	Possible (2)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Medium (2)
Reversibility	N/A	N/A
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative low (7)	Negative low (16)
Can impacts be mitigated?	No mitigation measures required.	

- Generation of waste - The panels contain material that may be hazardous in nature if released into the environment. If the panels are intact, there will be no risk of exposure. The removal of the supporting infrastructure such as the concrete foundations, cabling, fencing and control rooms, etc. will generate waste. Some of the waste will where possible be recycled, for example steel support structures can be re-used elsewhere or melted down to form new products. The amount of waste will be limited and is not expected to significantly reduce the capacity of the local landfill. However, the project is estimated to last for 20-25 years and the current landfill site at Vryburg may at that stage (or sooner) reach its capacity. The applicant will need to assess the project lifespan and make suitable arrangements for waste disposal when the site is decommissioned.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Irreversible (4)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	
Significance	Negative medium (45)	Negative low (26)
Can impacts be mitigated?	Yes – refer to the EMPr, Appendix F.	

- Loss of employment - It is a general trend that over time there will be people leaving one job for another and so it is expected that there will periodically be staff turnover. At the stage where decommissioning becomes the next logical step, any staff employed at that time must be given adequate notice so that they may seek alternative employment.

Loss of employment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative medium (33)	Negative medium (22)
Can impacts be mitigated?	Yes	

Indirect impacts: No indirect impacts are anticipated from the decommissioning phase of the proposed development.

6. ENVIRONMENTAL IMPACT STATEMENT

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

31(2) An environmental impact assessment report must contain all information that is necessary for the competent authority to consider the application and to reach a decision contemplated in regulation 35, and must include –

(m) an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

(n) an environmental impact statement which contains –

(i) a summary of the key findings of the environmental impact assessment; and

(ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives

6.1 Summary of key findings and assessment results

Based on the contents of the report the following key environmental issues were identified, which were addressed in this EIA report:

- Impacts during the construction phase.
  - Soil compaction (- Low)
  - Chemical Soil pollution (- Low)
  - Temporary employment opportunities (+ Medium)

- Impacts during the operational phase, which include:
  - Soil erosion (- Low)
  - Increase in storm water runoff (- Low)
  - Increase in consumption of water (- Medium)
  - Leakage of hazardous materials (- Low)
  - Security risks (- Medium)
  - Permanent employment opportunities (+ Medium)
  - Generation of additional electricity (+ Medium)
  - Generation of income to the local community (+ Medium)

- During the decommissioning phase -
  - Generation of waste (- Low)
  - Loss of employment (- Medium)

6.2 Recommendation of EAP

The final recommendation by the EAP considered firstly if the legal requirements for the EIA process had been met and secondly the validity and reliability of the substance of the information contained in the EIA report. In terms of the legal requirements it is concluded that:

- The scoping phase complied with the agreement and specification set out in the Regulations 28 to 29 – already approved by the environmental authority.

- All key consultees have been consulted as required by the Regulations 28 and 54 to 57 - already approved by the environmental authority.
- The EIA process has been conducted as required by the Regulations 31 and 33.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and thus, no terms of reference are provided for such studies.

In terms of the contents and substance of the EIA report the EAP is confident that:

- All key environmental issues were identified during the scoping phase.
- These key issues were adequately assessed during the EIA phase to provide the environmental authority with sufficient information to allow them to make an informed decision.

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the photovoltaic solar facility and associated infrastructure on a portion of the farm Waterloo 992, Registration Division IN, North West be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr.
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.

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

Carli Steenkamp

Environamics - Environmental Consultants

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