PROJECT DETAIL

DEA Reference No.	:	14/12/16/3/3/2/914
Project Title	:	Proposed Protea Solar Power Plant near Vryburg, North West Province
Authors	:	Mrs. Carli Otte Ms. Marelie Griesel
Client	:	Protea Solar Power Plant (RF) (Pty) Ltd.
Report Status	:	Final Scoping Report
Submission date	:	11 April 2016

When used as a reference this report should be cited as: Environamics (2016) Final Scoping Report: Proposed Protea Solar Power Plant near Vryburg, North West Province.

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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report

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

CONTEXT FOR THE DEVELOPMENT

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

The primary rationale for the proposed solar photovoltaic (PV) facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by DoE (Integrated Resource Plan Update 2010-2030). In terms of the Integrated Resource Plan Update (IRP Update, 2010-2030), over the short term (of the next two or three years), clear guidelines arose; namely to continue with the current renewable bid programme with additional annual rounds of 1000 MW PV, with approximately 8.4GW of the renewable energy capacity planned to be installed from PV technologies over the next twenty years.

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

In response to the above, Protea Solar Power Plant (RF) (Pty) Ltd. intends to development of a 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 for the locality map). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of 1780 kWh/m²/annum.

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 (NLM) 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 local economic development (LED) however identifies carbon-footprint reduction, including supporting alternative energies, as LED programmes for the NLM.

In response to the above Protea Solar Power Plant (RF) (Pty) Ltd. intends to develop up to 115MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of the farm Hartsboom 734, Registration Division HN, North West situated within the Naledi Local Municipality area of jurisdiction. The town of Vryburg is located approximately 13km north of the proposed development (refer to Figure 1 and 2 for the locality and regional map). The total area assessed is 240 hectares, making provision for any changes in the layout and the total footprint of the project will be approximately 204 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, ecological sensitivity 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, 2014 (Regulation 982) 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 11(i) (GN.R. 983): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*

- Activity 28(ii) (GN.R. 983): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*

- Activity 1 (GN.R. 984): *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more..."*

- Activity 15 (GN.R. 984): *"The clearance of an area of 20 hectare or more of indigenous vegetation..."*

- Activity 4(e)(i)(ee) (GN.R. 985): "*The development of a road wider than 4 metres with a reserve less than 13.5 metres (e) in North West (i) outside urban areas, in (ee) critical biodiversity areas as identified in bioregional plans..*"

- Activity 12(a)(ii) (GN.R. 985): "*The clearance of an area of 300 square metres or more of indigenous vegetation…(a) in North West (ii) within critical biodiversity areas identified in bioregional plans.*"

Being listed under Listing Notice 1, 2 and 3 (Regulation 983, 984 & 985) 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 21-24. Environamics has been appointed as the independent consultant to undertake the EIA on Protea Solar Power Plant's behalf.

Regulation 21 of the EIA Regulations requires that a scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified during scoping. The potential positive and negative impacts associated with the proposed activity have been identified. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on the fauna and flora, soils, geology, existing services infrastructure, impacts on heritage resources, traffic impacts and socio-economic impacts such as the provision of temporary employment.

Impacts during the operational phase:

During the operational phase the study area will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the fauna and flora, soils, geology, the increased consumption of water and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community. Additional electricity will also be generated. from a clean, renewable resource.

Impacts during the decommissioning phase:

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

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Energy Blog's database only one other solar PV plant has been granted preferred bidder status within close proximity to the proposed Protea PV plant, namely the Waterloo Solar Park with a capacity of 75MW near Vryburg, North West Province (Approvals, planning and financing phase). However, according to the Department's database seven (7) other solar plants have been proposed in relative close proximity to the proposed activity. Environamics and other environmental consultants are also in the process of applying for Environmental Authorisation for ten (10) additional PV projects in the area.

The potential for cumulative impacts may therefore exist. The Final Scoping Report includes a detailed assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats, generation of waste, temporary employment opportunities, impact of construction workers on local communities, and an influx of job seekers and traffic impacts. Cumulative impacts (-Medium) during the operational phase relate to: visual intrusion, soil erosion, generation of additional electricity, the establishment of a community trust and the development of infrastructure for the generation of clean, renewable energy. The cumulative effect of the generation of waste was identified as potentially significant during the decommissioning phase.

Regulation 23 of the EIA Regulations determine that an EIA report be prepared and submitted for the proposed activity after the competent authority approves the final scoping report. The EIA report will evaluate and rate each identified impact, and identify mitigation measures that may be required. The EIA report will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation Appendix 3 of the EIA Regulations.

1 INTRODUCTION

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

Appendix 2. (2) A scoping report (...) must include- (a) details of:
(i) the EAP who prepared the report; and
(ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

Regulations No. 982, 983, 984 and 985 (of 4 December 2014) promulgated in terms of Section 24(5) and 44 of the National Environmental Management Act, (107 of 1998) determine that an EIA process should be followed for certain listed activities, which might have a detrimental impact on the environment. According to Regulation No. 982 the purpose of the Regulations is: *"…to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto*".

The EIA Regulations No. 983, 984 and 985 outline the activities for which EIA should apply. The following activities with special reference to the proposed activity are listed in the EIA Regulations:

Table 1.1: Listed activities [1]

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 983, 4 December 2014	Activity 11(i)	• *"The development 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 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute

[1] Please refer to Table 5.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

		electricity of 132 kilovolts outside an urban area.
GNR. 984, 4 December 2014	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28 is triggered since the farm has been previously cultivated and the property will be re-zoned to "special" use.
GNR. 984, 4 December 2014	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 115MW megawatts of electricity.
GNR. 984, 4 December 2014	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Ghaap Platau Vaalbosveld vegetation type, which is described by Mucina and Rutherford (2006) as 'least threatened'. The site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed.
GNR. 985, 4 December 2014	Activity 4(e)(i)(ee)	• *"The development of a road wider than 4 metres with a reserve less than 13.5 metres (e) in North West (i) outside urban areas, in (ee) critical biodiversity areas as identified in bioregional plans..."* • The site is located in a critical biodiversity area as described in relevant bioregional plans, and will require an internal road network, between 5 and 6 metres.
GNR. 985, 4 December 2014	Activity 12(a)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation…(a) in North West (ii) within critical biodiversity areas identified in bioregional plans."* • The site is located in a critical biodiversity area as described in relevant bioregional plans. The site has not been lawfully disturbed during the preceding ten

		years; therefore, more than 300 square metres of indigenous vegetation will be removed.

Being listed under Listing Notices 1, 2 and 3 (Regulation 983, 984 & 985) implies that the proposed activity is considered as potentially having a significant impact on the environment. Subsequently a 'thorough assessment process' is required as described in Regulations 21-24. According to Appendix 2 of Regulation 982 the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

This report is the Final Scoping Report to be submitted to the Department of Environmental Affairs. According to Regulation 982 all registered I&APs and relevant State Departments must be allowed the opportunity to review the scoping report. The draft scoping report was made available to I&APs and all relevant State Departments. They were requested to provide written comments on the report within 30 days of receiving it. All issues identified during the review period are documented and compiled into a Comments and Response Report included as part of the Final Scoping Report.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Marélie Griesel

Postal Address: PO Box 6484, Baillie Park, 2526

Telephone: 018-290 8228 (w) 086 762 8336 (f)

Electronic Mail: marelie@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the EIA. In terms of the independent status of the EAP a declaration is attached as Appendix A to this report. The expertise of the EAP responsible for conducting the EIA is also summarized in a curriculum vitae included as part of Appendix A.

1.3 DETAILS OF SPECIALISTS

Table 1.2 provides information on the specialists that have been appointed as part of the EIA process. Regulation 13(1)(a) and (b) determines that an independent and suitably qualified, experienced and independent specialist should conduct the specialist study, in the event where the specialist is not independent, a specialist should be appointed to externally review the work of the specialist as contemplated in sub regulation (2), must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix H to this report. The expertise of the specialists is also summarized in their respective curriculum vitaes.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Avifaunal Study	Dr. Williams Bird Surveys	Dr A. J. Williams	52 Circle Road, Tableview 7441	Tel. 021 556 1284: Cell 084 50 55 450	capeokapi@gmail.com
Ecological Fauna & Flora Habitat Survey	Anthene Ecological CC	R. F Terblanche	P. O. Box 20488 Noordbrug, 2522	Cell 082 614 6684	reinierf.terblanche@gmail.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue, Monument Park, 0181	Cell 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	Natura Viva CC	Dr. John E. Almond	P. O. Box 12410 Mill Street Caoe Town, 8010	-	naturaviva@universe.co.za
Agricultural & Soils Impact Assessment	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel. 021 866 1518 Cell 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	7a Burger Street Potchefstroom, 2531	Tel. 082 316 7749	johan@phala-environmental.co.za
Traffic Assessment Study	BVi Consulting Engineers	Dirk van der Merwe	Block B2, Edison Square, c/o Edison Way & Century Avenue Century City, 7441	-	dirkvdm@bviwc.co.za

1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 982. Table 1.2 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A site visit was conducted on 26 October 2015 to discuss the proposed development and assess the site.
- The public participation process was initiated on 11 November 2015 and all I&APs were requested to submit their comments by 11 December 2015.
- The public participation process was initiated once more on 13 January 2016, in order to provide I&APs with a revised Background Information Document (BID) which incorporated some minor information changes. I&APs were requested to send their comments by 12 February 2016.
- A fully completed application form and Draft Scoping report was submitted to the Department on 19 February 2016 and the Department acknowledged receipt on 7 March 2016.
- The Draft Scoping Report was made available to all registered I&APs and relevant State Departments on 26 February 2016 and they were requested to provide their comments on the report within 30 days of the notification (22 March 2016).
- A Public Meeting will be held on 21 April 2016 and all registered I&APs were invited to attend though emails and a newspaper advertisement on 6 April 2016.

It is envisaged that the Final Scoping Report will be accepted by the Department in May 2016. The EIA process should be completed within approximately nine months of submission of the draft scoping report, i.e. by November 2016 – see Table 1.3.

Table 1.3: Project schedule

Activity	**Prescribed timeframe**	**Timeframe**
Site visit		26 Oct. 2015
Appoint Avifaunal Specialist	6 Months	Oct. 2015 – April 2016
Public participation (BID)	30 Days	11 Nov. – 11 Dec. 2015
Pre-application meeting with DEA	-	19 Nov. 2015

Conduct specialist studies	-	Nov. 2015 – Feb. 2016
Public participation (BID) Round 2	30 Days	13 Jan. – 12 Feb. 2016
Submit application form and DSR	-	26 Feb. 2016
Public participation (DSR)	30 Days	26 Feb. – 30 March 2016
Submit FSR	-	11 April 2016
Department acknowledges receipt	10 Days	April 2016
Department approves/reject	43 Days	May 2016
Public participation (DEIR)	30 Days	June 2016
Submission of FEIR & EMPr	-	July 2016
Department acknowledges receipt	10 Days	July 2016
Decision	107 Days	October 2016
Department notifies of decision	5 Days	October 2016
Registered I&APs notified of decision	14 Days	October 2016
Appeal	20 Days	November 2016

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 2 of Regulation No.982. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of a scoping report as specified in the Regulations		Section in report	Pages
Appendix 2. (2) - A scoping report must contain all the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-			
(a)	details of -	1	13-22
	(i) the EAP who prepared the report; and		

	ii) the expertise of the EAP, including a curriculum vitae.		
(b)	the location of the activity, including-	2	23-29
	(i) the 21-digit Surveyor General code of each cadastral land parcel;		
	(ii) where available, the physical address and farm name;		
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-		
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or		
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;		
(d)	a description of the scope of the proposed activity, including-		
	(i) all listed and specified activities triggered;		
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.		
(e)	a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	3	30-45
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4	46-48
(h)	a full description of the process followed to reach the proposed preferred activity, site and location within the site, including –	5	49-76
	(i) details of all the alternatives considered;		
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;		
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.		
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(ix) the outcome of the site selection matrix;		
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and		

	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;		
(h)	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6	77-95
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;		
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;		
(i)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	8	109-124
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;		
	(ii) a description of the aspects to be assessed as part of the EIA process;		
	(iii) aspects to be assessed by specialists;		
	(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;		
	(v) a description of the proposed method of assessing duration and significance;		
	(vi) an indication of the stages at which the competent authority will be consulted;		
	(vii) particulars of the public participation process that will be conducted during the EIA process; and		

	(viii) a description of the tasks that will be undertaken as part of the EIA process;		
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.		
(j)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report	
	(i) the correctness of the information provided in the report;		
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and		
	(iii) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;		
(k)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the EIA;		
(l)	where applicable, any specific information required by the CA; and	N/A	-
(m)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A	-

2 ACTIVITY DESCRIPTION

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

Appendix 2. (2) A scoping report (...) must include-

(b) the location of the activity, including-

(i) the 21-digit Surveyor General code of each cadastral land parcel;

(ii) where available, the physical address and farm name;

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity applied for at an appropriate scale, or, if it is-

(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including-

(i) all listed and specified activities triggered;

(ii) a description of the activities to be undertaken, including associated structures and infrastructure.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on the Remaining Extent of the farm Hartsboom No. 734, Registration Division IN, North West Province situated within the Naledi Local Municipality area of jurisdiction. The proposed development is located in the North West Province in the northern central interior of South-Africa (refer to Figure 2 for the regional map). The town of Vryburg is located approximately 13km north east of the proposed development (refer to Figure 1 for the locality map).

The project entails the generation of up to 115MW electrical power through photovoltaic (PV) panels. The total area assessed is 240 hectares, making provision for any layout changes and the total footprint of the project will be approximately 204 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 Protea Solar Power Plant (RF) (Pty) Ltd. from

the property owner Mr. N. J. J van Rooyen, for the life span of the project (minimum of 20 years).

Table 2.1: General site information

Description of affected farm portion	The Remaining Extent of the farm Hartsboom No. 734, Registration Division HN, North West
21 Digit Surveyor General codes	T0HN00000000073400000
Title Deed	T258/2000
Photographs of the site	Refer to the Plates
Type of technology	Photovoltaic solar facility
Structure Height	Panels ~3.5m, buildings ~ 4m and power lines ~32m
Surface area to be covered	Approximately 204 hectares (Assessed 240 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	Approximately 204 hectares (Assessed 240 hectares)
Generation capacity	115MW
Expected production	130 - 270 GWh per annum

The site is located in a rural area and is bordered by farms. The site survey revealed that the site currently consists of grazing for sheep and cattle – refer to plates 1-12 for photographs of the development area. The property on which the development is to be established is owned by Mr. N. J. J. van Rooyen.

On 9 December 2015 a letter was received by the North West Department of Mineral Resources confirming that according to their office records, no applications or existing rights were found on the Remaining Extent of the farm Hartsboom 734 HN – Refer to Appendix I.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities [2]

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 983, 4 December 2014	Activity 11(i)	• *"The development 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 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.
GNR. 984, 4 December 2014	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered since the farm has been previously cultivated and the property will be re-zoned to "special" use.
GNR. 984, 4 December 2014	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 115MW megawatts electricity.
GNR. 984, 4 December 2014	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • In terms of vegetation type the site falls within the Ghaap Platau Vaalbosveld vegetation type, which is described by Mucina and Rutherford (2006) as 'least threatened'. The site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed.
GNR. 985, 4 December 2014	Activity 4(e)(i)(ee)	• *"The development of a road wider than 4 metres with a reserve less than 13.5 metres (e) in North West (i) outside urban areas, in (ee) critical*

[2] Please refer to Table 5.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

		biodiversity areas as identified in bioregional plans…" • The site is located in a critical biodiversity area as described in relevant bioregional plans, and will require an internal road network, wider between 5 and metres.
GNR. 985, 4 December 2014	Activity 12(a)(ii)	• *"The clearance of an area of 300 square metres or more of indigenous vegetation…(a) in North West (ii) within critical biodiversity areas identified in bioregional plans."* • The site is located in a critical biodiversity area as described in relevant bioregional plans. The site has not been lawfully disturbed during the preceding ten years; therefore, more than 300 square metres of indigenous vegetation will be removed.

The potentially most significant impacts will occur during the construction phase of the development, which will include the following activities:

- Site clearing and preparation: Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.

- Civil works to be conducted:

- Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.
- Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
- Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration.
- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

2.3 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 Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e. semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a

circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed project are described below:

- PV Panel Array - To produce up to 115MW, 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 northern angle in order to capture the most sun.

- Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. 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 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Protea Solar Power Plant (RF) (Pty) Ltd. has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with the Mookodi-Mogopela 132kV transmission line. The Project will inject up to 100MW into the transmission line. The installed capacity will be up to approximately 115MW.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be lain ~2-4m underground as far as practically possible.

- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:

    - Office (~16m x 9.85m);

    - Switch gear and relay room (~25m x 14m);

    - Staff lockers and changing room (~21.7m x 9.85m); and

    - Security control (~11.8m x 5.56m)

- Roads – Access will be obtained via the N18. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access road will have a width of ~6m and the internal road/track ~5m.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.

2.4 LAYOUT DESCRIPTION

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be considered – refer to figure 8 below. 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 and historical mining (refer to the Plates). Limited features of environmental significance exist on site. A draft layout plan is included as Figure 7.

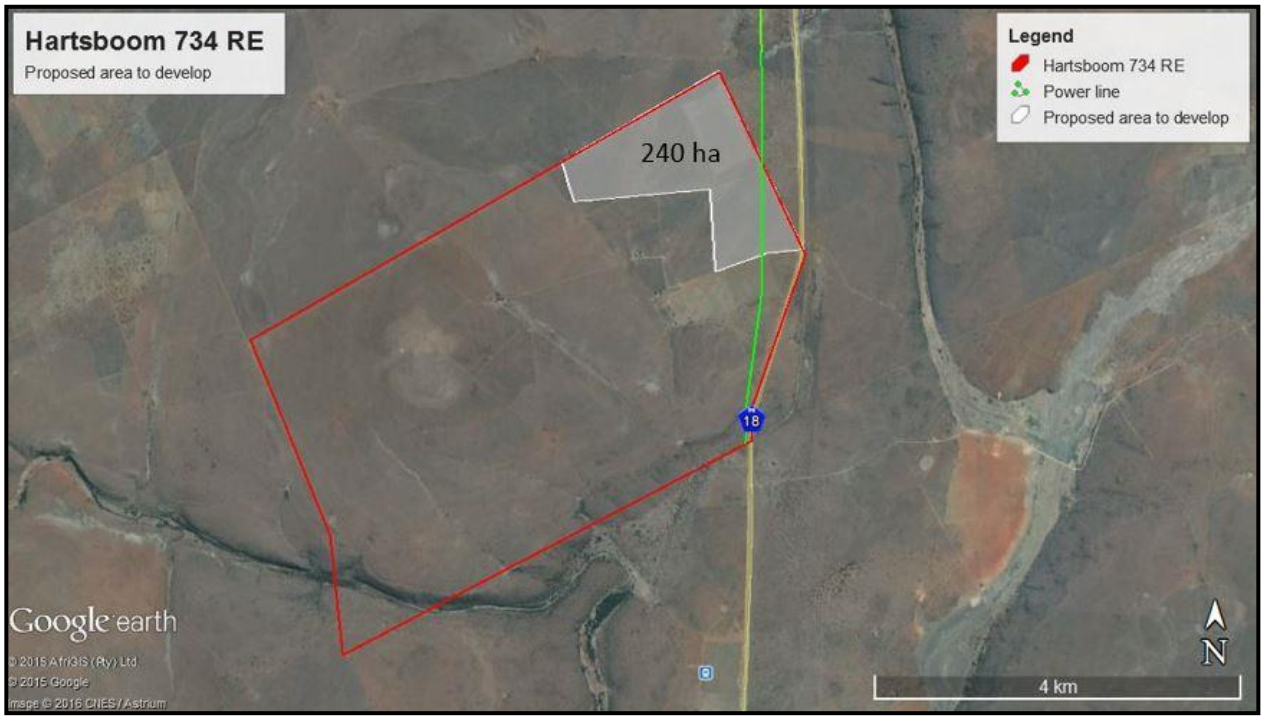


Figure 8: Proposed layout on the Remaining Extent of the farm Hartsboom 734

2.5 SERVICES PROVISION

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

The site falls within the C32 quaternary drainage region, this drainage region falls under Zone C, which refers to the amount of water that may be taken from the ground water resource per hectare, per annum. According to the Revision of General Authorisations in terms of Section 39 of the National Water Act of 1998 (Act No. 36 of 1998), Zone C indicates that 75m^3 of water per

hectare may be taken from these drainage regions per annum. The proposed site will cover an area of approximately 240 hectares, which in effect means that a total of 18 000m^3 of water may be abstracted from a ground water resource without applying for a Water Use License.

The estimated maximum amount of water required during construction is 200m^3 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 880m^3 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 460 000 panels will require 920 000 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 3,680,000 liters per annum for washing, and allows 200,000 liters per annum (or 548 liters per day) for toilet use, drinking water, etc. This totals to approximately 3 880m^3 of water required per annum. Drinking water supplied will comply with the SANS:241 quality requirements and it is noted that the Naledi Local Municipality remains the Water Service Authority in that area of jurisdiction.

Generally, the water supply does not require the construction of a reverse osmosis plant. This is however dependant on the quality of the water, or what the mineral content is. Should a reverse osmosis plant be required, brine (the excess minerals) will be formed during the filtration process that will be stored and then removed. Determining baseline water quality conditions is important in order to appropriately manage incidents in the future. The quality of the water will however only undergo testing if the project is selected as preferred bidder by the Department of Energy. 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.

Portable chemical toilets will be utilized, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed waste site (such as Hoopstad, Vryburg, Wolmaranstad, Wesselsbron, Warrenton or Welkom). The construction and hazardous waste will be removed to licensed landfill sites accepting such kinds of wastes. During the operational phase household waste will be removed to a licensed landfill site by a private contractor or by the local municipality. The relevant Local Municipality(s) was asked in a letter dated 14 December 2015, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years). In a letter dated 17 December 2015 the Naledi Local Municipality formally informed that they would not be able to collect the construction solid waste and general waste due to the fact that the municipality does not have enough capacity within the current operational fleet, but the licensed Naledi landfill site (Licence No.: NW/WM/DR1/2009/01) has the capacity (1200m3) to accommodate the refuse generated.

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 2. (2) A scoping report (...) must include-
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

3.1 INTRODUCTION

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

- The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
- National Environmental Management Act, 1998 (Act No. 107 of 1998) [NEMA]
- The National Energy Act, 2008 (Act 34 of 2008)
- National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999)
- Conservation of Agricultural Resources Act, 1983 (Act No. 85 of 1983)
- Strategic Plan, 2015 – 2020 (2015)
- The White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Resource Plan (IRP) for South Africa (2010-2030)
- North West Province Growth and Development Strategy (2004-2014)

- Dr Ruth Segomotsi Mompati District Municipality Integrated Development Plan (IDP) 2010/2011
- Naledi Local Municipality Integrated Development Plan (IDP) 2015/2016
- Naledi Spatial Development Framework (SDF)

The key principles and objectives of each of the legislative and policy documents are briefly summarised in Tables 3.1 and 3.2 to provide a reference framework for the implications for the proposed activity.

3.2 LEGISLATIVE CONTEXT

Table 3.1: Legislative context for the construction of photovoltaic solar plants

LEGISLATION	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
The Constitution of South Africa (Act No. 108 of 1996)	National Government	1996	The Constitution is the supreme law of the Republic and all law and conduct must be consistent with the Constitution. The Chapter on the Bill of Rights contains a number of provisions, which are relevant to securing the protection of the environment. Section 24 states that "everyone has the right to (a) an environment that is not harmful to their health or well-being and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that – (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution therefore, compels government to give effect to the people's environmental right and places government under a legal duty to act as a responsible custodian of the countries environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.
The National Environmental Management Act (Act No. 107 of 1998)	National and Provincial Department of Environmental Affairs	1998	NEMA provides for co-operative governance by establishing principles and procedures for decision-makers on matters affecting the environment. An important function of the Act is to serve as an enabling Act for the promulgation of legislation to effectively address integrated environmental management. Some of the principles in the Act are accountability; affordability; cradle to grave management; equity; integration; open information; polluter pays; subsidiary; waste avoidance and minimisation; co-operative governance; sustainable development; and environmental protection and justice. The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 982, 983, 984, and 985 promulgated in terms of Section 24 of NEMA. The EIA Regulations determine that an Environmental Authorisation is required for certain listed activities,

			which might have a detrimental effect on the environment. This EIA was triggered by activity 11(i), and 28(ii) listed in Regulation R983, activities 1 and 15 listed in Regulation R984 and Activity 4 (e)(i)(ee) and Activity 12 (a)(ii) listed in Regulation 983, which requires a 'scoping and environmental impact assessment process.'
The National Energy Act (Act No. 34 of 2008)	Department of Minerals and Energy	2008	One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar: "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (Preamble).
The National Water Act (Act No. 36 of 1998)	Department of Water Affairs (DWA)	1998	Sustainability and equity are identified as central guiding principles in the protection, use, development, conservation, management and control of water resources. The intention of the Act is to promote the equitable access to water and the sustainable use of water, redress past racial and gender discrimination, and facilitate economic and social development. The Act provides the rights of access to basic water supply and sanitation, and environmentally, it provides for the protection of aquatic and associated ecosystems, the reduction and prevention of pollution and degradation of water resources. As this Act is founded on the principle that National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, a person can only be entitled to use water if the use is permissible under the Act. Chapter 4 of the Act lays the basis for regulating water use. The site falls within the C32 quaternary drainage region, this drainage region falls under Zone C, which refers to the amount of water that may be taken from the ground water resource, per hectare. According to the Revision of General Authorisations in terms of Section 39 of the National Water Act of 1998 (Act No. 36 of 1998), Zone C indicates that 75m³ of water per hectare may be taken from these

			drainage regions per annum. The proposed site will cover an area of approximately 240 hectares, which in effect means that a total of 18 000m^3 of water may be abstracted from a ground water resource without applying for a Water Use License. It should be noted that if the development occurs within 500m from a wetland, a WULA may be required.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Department of Environmental Affairs (DEA)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determine that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development.
National Environment Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs (DEA)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National	South African	1999	The Act aims to introduce an integrated and interactive system for the management of the heritage

Heritage Resources Act (Act No. 25 of 1999)	Heritage Resources Agency (SAHRA)		resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS and all relevant documents will be submitted for their comments and approval.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement.

3.3 POLICY CONTEXT

Table 3.2: Policy context for the construction of solar PV plants

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
Strategic Plan, 2015 – 2020	Department of Energy	2015	The strategic plan identifies six departmental programmes. Programme 6 relates to clean energy. The purpose of this programme is to manage and facilitate the development and implementation of clean and renewable energy initiatives as well as EEDSM. Strategic objective 6.3 relates to effective renewable energy: To ensure the integration of renewable energy into the mainstream energy supply of South Africa by planning & coordinating initiatives & interventions focused on the development & improvement of the renewable energy market through: • facilitating the incorporation of renewable energy technologies into the IEP & other key energy policy documents; • resource mapping; • establishing a conducive environment for the growth of decentralised (renewable energy based) embedded electricity generation; • providing up-to-date data on performance & costs of renewable energy technologies as inputs to the IEP; • identity further development opportunities & providing necessary support to other renewable energy technologies that have the potential to contribute to the electricity, heat & transport sectors; • continuing support & monitoring of renewable energy initiatives & programmes that are already under way; & • implementing awareness campaigns to increase awareness of renewable energy & its benefits within the public sector & the general public.
The White Paper on the	Department of Minerals and	1998	The White Paper on the Energy Policy of the Republic of South Africa establishes the international and national policy context for the energy sector, and identifies the following energy policy objectives:

Energy Policy of the Republic of South Africa	Energy		• Increasing access to affordable energy services • Improving energy governance • Stimulating economic development • Managing energy-related environmental and health impacts • Securing supply through diversity • Energy policy priorities The White Paper sets out the advantages of renewable energy and states that Government believes that renewables can in many cases provide the least cost energy service, particularly when social and environmental costs are included. The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist. The White Paper notes that renewable energy applications have specific characteristics that need to be considered. Advantages include: • Minimal environmental impacts in operation in comparison with traditional supply technologies; and • Generally lower running costs, and high labour intensities. Disadvantages include: • Higher capital costs in some cases; • Lower energy densities; and • Lower levels of availability, depending on specific conditions, especially with sun and wind based systems.
The White Paper on Renewable	Department of Minerals and Energy	2003	This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing

Energy			renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix).
Integrated Resource Plan (IRP) for South Africa	Department of Minerals and Energy	2010-2030	The current iteration of the Integrated Resource Plan (IRP) for South Africa, after a first round of public participation in June 2010, led to the Revised Balanced Scenario (RBS) that was published in October 2010. The document outlines the proposed generation new build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on the cost-optimal solution for new build options, which was then "balanced" in accordance with qualitative measures such as local job creation. In addition to all existing and committed power plants, the RBS included a nuclear fleet of 9,6GW; 6,3GW of coal; 11,4GW of renewables; and 11,0GW of other generation sources. A second round of public participation was conducted in November/December 2010, which led to several changes to the IRP model assumptions. The main changes were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP) and wind options; the inclusion of learning rates, which mainly affected 38renewable; and the adjustment of investment costs for nuclear units (a possible increase of 40%). Additional cost-optimal scenarios were generated based on the changes. The outcomes of these scenarios, in conjunction with the following policy considerations, led to the Policy-Adjusted IRP:

			• The installation of 39 renewables were brought forward in order to accelerate a local industry; • To account for the uncertainties associated with the costs of 39renewable and fuels, a nuclear fleet of 9,6GW was included in the IRP; • The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and • Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS. The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for 39renewable. In addition to all existing and committed power plants (including 10GW committed coal), the plan includes 9,6GW of nuclear; 6,3GW of coal; 17,8GW of 39renewable; and 8,9GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from 39 renewable from 11,4 GW to 17,8 GW.
North West Province Growth and Development Strategy	North West Provincial Government	2004 - 2014	The renewable energy strategy for the North West Province was developed in response to the need of the North West Provinces to participate meaningfully within the renewable energy sector of South Africa. The renewable energy strategy aims to improve the North West Province's environment, reduce the North West Province's contribution to climate change, and alleviate energy poverty, whilst promoting economic development and job creation in the province whilst developing its green economy. This strategy attempts to focus the efforts of all stakeholders and provides a foundation to make the North West Province a primary contributor towards the renewable energy sector within South Africa. There are a number of international, national and provincial mandates and driving forces that play a pivotal role in the development of this renewable energy strategy for the North West Provinces. These include the fact that South Africa was ranked the 12th largest emitter of CO2 emissions in 2009 and has committed to reduce its greenhouse gas emissions by 34% by 2020. The North West is rated as the fourth largest electricity consuming province in South Africa and consumes approximately 12% of the available electricity. This is mainly due to the high demand of the electrical energy-intensive mining and related industrial sector. Approximately 63% of the electricity supplied to the North West Province is

consumed in its mining sector.

South Africa has an abundance of renewable energy resources available. The applicability of these RE resources depend on a number of factors and are consequently not equally viable for the NWP. The renewable energy sources that were identified to hold the most potential and a competitive strength for the North West Province are Solar Energy (photovoltaic as well as solar water heaters), Municipal Solid Waste, hydrogen and fuel cell technologies, bio-mass, and energy efficiency. The Dr Ruth Segomotsi Mompati District Municipality has an annual Solar radiation range of 8,501 MJ/m2. Compared to a location such as Upington, which is considered a prime location for solar energy projects and also located within the area of maximum solar radiation, the Dr Ruth Segomotsi Mompati District Municipality receive on average only 5% less solar radiation than Upington. The North West Province consequently shows considerable potential for solar applications in renewable energy as a whole, with high potential specifically in the Dr. Ruth Mompati district municipality.

Dr. Ruth Segomotsi Mompati District Municipality Integrated Development Plan (IDP)	Dr. Ruth Segomotsi Mompati District Municipality	2012 - 2017	The IDP serves as the basic developmental framework and the basis for annual reviews of municipal performance for the period up to 2017. The IDP is explicitly aligned with the requirements of the Municipal Systems Act (2000) and the developmental objectives outlined in the National Priority Outcomes, and the National Medium Term Strategic Framework (2009). Identified key intervention priority areas include: • More inclusive economic growth, decent work and sustainable livelihoods; • Developing economic and social infrastructure; • Rural development, food security and land reform; • Improving access to quality education; • Improved health care; • Fighting crime and corruption; • Sustainable resource management and use. A situation analysis of the DM indicates, amongst others, the following key developmental challenges: • The DM's largely African population generally suffers from low education, low income and high unemployment levels, and many have minimal access to water and sanitation; • A mainly youthful African population, with a correspondingly small labour force cohort, and hence high levels of youthful dependency; • High functional illiteracy amongst the African population group; • Great dependency upon government as employer in the DM, and therefore the crucial need to develop the private sector (mainly in agriculture and mining), and develop the Small Medium Micro Enterprise (SMME) sector both in the formal and informal sectors; Renewable energy is not directly addressed, but the IDP does indicate the transition to a low carbon economy as a DM goal, and recommends that the DM speeds up and expands renewable energy (generation) (DRSMDM, 2012: 114).
Naledi Local Municipality	Naledi Local Municipality	2012-2017	The Naledi IDP includes a municipal turnaround strategy ("Municipal Plan") in response to the NLM's current financial non-viability, and consequent inability to fully meet its developmental and service

Integrated Development Plan (IDP) Review	delivery obligations. The IDP is aligned with key national and provincial developmental policy, including the National Priority Outcomes and the NWP PGDS. The IDP is informed by a SWOT analysis of the Naledi LM. Key identified NLM Strengths include: a strong agricultural sector in a high capacity beef grazing area; the most diverse and dominant economy in the DRSMDM; strategic location with regard to the N14 transport corridor; identification of the NLM as Priority Two investment area in the NWP Spatial Development Framework. Key Weaknesses include: 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. Key Opportunities include: capitalizing on Vryburg's status as Secondary Regional Centre and the NLM's strategic location; local economic development (LED) opportunities linked to establishing Vryburg as regional beef beneficiation centre, tourism, and game farming. Key Threats include: 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. A summary of the 9 NLM Ward Plans indicates that key identified community needs are mainly linked to roads (1), housing (2), municipal services (3), security, and employment/ LED. The IDP notes that the NLM has been suffering from chronic water shortages since 2009; that the waste water treatment plant exceeds capacity by 40%, that many municipal roads are in a bad state; and that illegal dumping is a serious and widespread issue in the NLM. The IDP does not explicitly deal with renewable energy development, but identifies carbon-footprint reduction, including supporting alternative energies, as LED programmes for the NLM. The Local Economic Development (LED) Strategy is specifically aligned with National Priority Outcomes 4 ("decent employment through inclusive economic growth); 5 (a skilled and capable economic work force to support an inclusive growth path") and 7 (vibrant, equitable rural communities and food security for all).

Naledi Spatial Development Framework (SDF)	Naledi Local Municipality	2012-2017	As noted in the 2012-2017 IDP, the most recent approved 2007 SDF is outdated, and lacks spatial guidance in the form of maps and spatial development plans. The SDF is currently under review, and in early Final stage. The NLM planner has indicated that the Vryburg urban edge is currently in the process of being demarcated, but that no urban-edge or land use related maps were available for the Vryburg area. The development of a municipal landfill site on the northern portion of Rosendal Farm west of the N18 was confirmed, but the planner was unable to provide specific details with regard to location.

3.4 OTHER LEGISLATION

Other legislation mainly refers to the following:

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

3.5 RELEVANT GUIDANCE

The following guidance was considered in conducting the EIA:

- The Equator principles III (2013)[3]
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2015). Guidelines to minimise the impact on birds of Solar Facilities and Associated Infrastructure in South Africa

3.6 CONCLUSION

The EIA was undertaken in accordance with the EIA Regulations (2014) published in GNR 982, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant

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

National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

4 THE NEED AND DESIRABILITY

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

28. (1) A scoping report (...) must include – (i) a description of the need and desirability of the proposed activity.

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental responsible development, the impacts of climate change and the need for sustainable development.

The primary rationale for the proposed solar PV facility is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by 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 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 objectives identified by the Naledi Local Municipality's Integrated Development Plan (IDP, 2012-17).

4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

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

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

it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.

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

- Social benefits - The project activity is likely to have significant long-term, indirect positive social impacts that may extend to a regional and even national scale. The larger scale impacts are to be derived in the utilization of solar power and the experience gained through the construction and operation of the power plant. In future, this experience can be employed at other similar solar installations in South Africa.
- Provision of job opportunities - The main benefit of the proposed development operating in the area is that local companies or contractors will be hired for the duration of the construction period. The operational phase will provide permanent job opportunities to the local communities from the surrounding area since security guards and general labourers will be required on a full time basis. Approximately 350 employment opportunities will be created during the construction and operational phases.
- Indirect socio-economic benefits - The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

Appendix 2. (2) A scoping report (...) must include-

(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including –

(i) details of all the alternatives considered;

(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;

(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(ix) the outcome of the site selection matrix;

(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and

(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;

5.1 CONSIDERATION OF ALTERNATIVES

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

An initial site assessment (refer to Appendix G) was conducted by the developer on the Remaining Extent of the farm Hartsboom 734 and the farm was found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. Some parts of the farm have been deemed not suitable for the development of a solar plant namely areas where certain farm structures (cattle loading bays) are located. These factors where then taken into consideration and appropriate buffers have been implemented to exclude them from the plant layout. The site selection also took the site geology, land capability, grazing capacity, water availability and land use into consideration before deciding on the specific site. From the information obtained, a single preferred alternative has emerged (Subsolar, 2015).

The following sections explore different types of alternatives in relation to the proposed activity in more detail.

5.1.1 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 activity not proceed, the site will remain unchanged and will continue to be used for grazing for game and sheep (refer to the photographs of the site). However, the potential opportunity costs in terms of the supporting social and economic development in the area would be lost.

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the proposed activity. No other properties have at this stage been secured by Protea Solar Power Plant (RF) (Pty) Ltd. in the Vryburg area to potentially establish solar facilities. From a local perspective, the Remaining Extent of the farm Hartsboom 734 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The proposed development falls within an area used for grazing and the site is therefore considered to have limited environmental sensitivity as a result. The National Department of Agriculture (2006) classified land capability into two broad categories, namely land suited to cultivation (Classes I – IV) and land with limited use, generally not suited to cultivation (Classes V – VIII). The site falls within Class 6 and therefore the agricultural potential of the site is limited and it is highly unlikely that the change in land use will impact significantly on agricultural production (refer to figure 3 for an illustration of the land capability classification).

Two alternative locations on the farm Hartsboom 734 have been considered. However, provision was made after the initial investigation to exclude the areas surrounding the existing farm house. Therefore, a single preferred location alternative will be assessed – refer to figure 9.

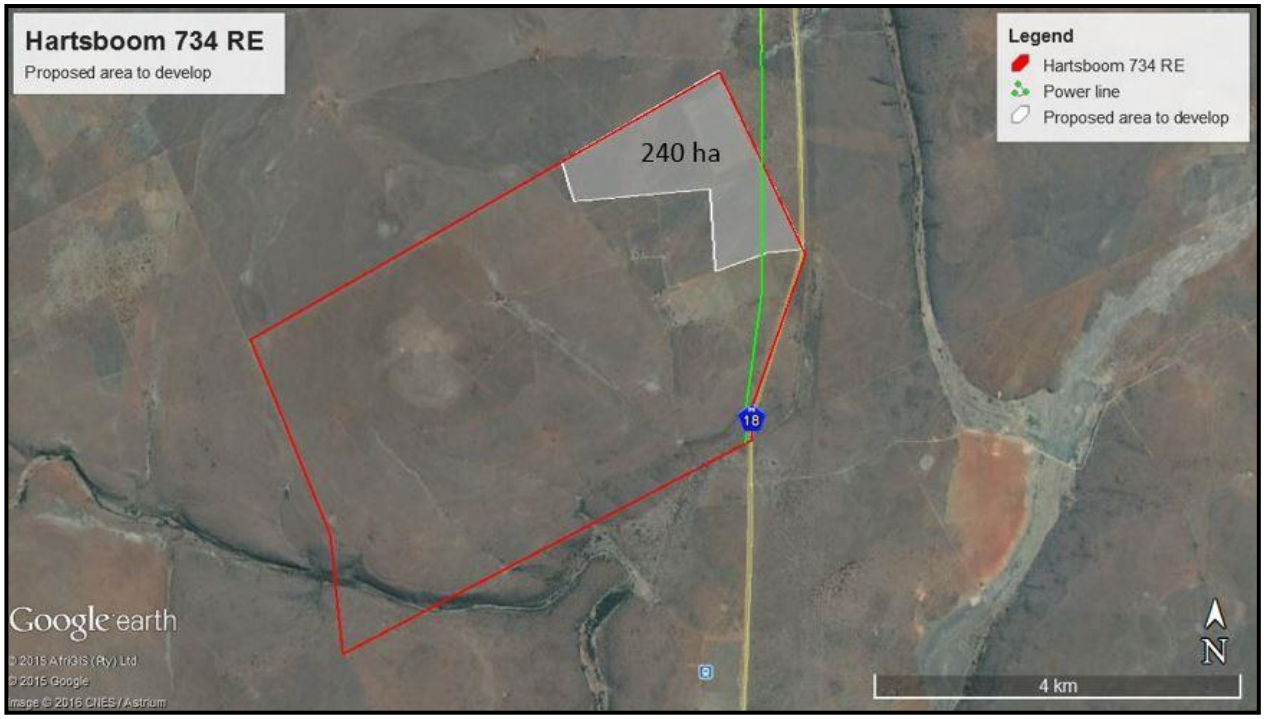


Figure 9: Alternatives on the Remaining Extent of the farm Hartsboom 734

5.1.3 Activity alternatives

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

Photovoltaic (PV) solar facility – Protea Solar Power Plant is part of a portfolio of solar PV projects throughout South Africa. Protea Solar Power Plant (RF) (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 – refer to figure 10.

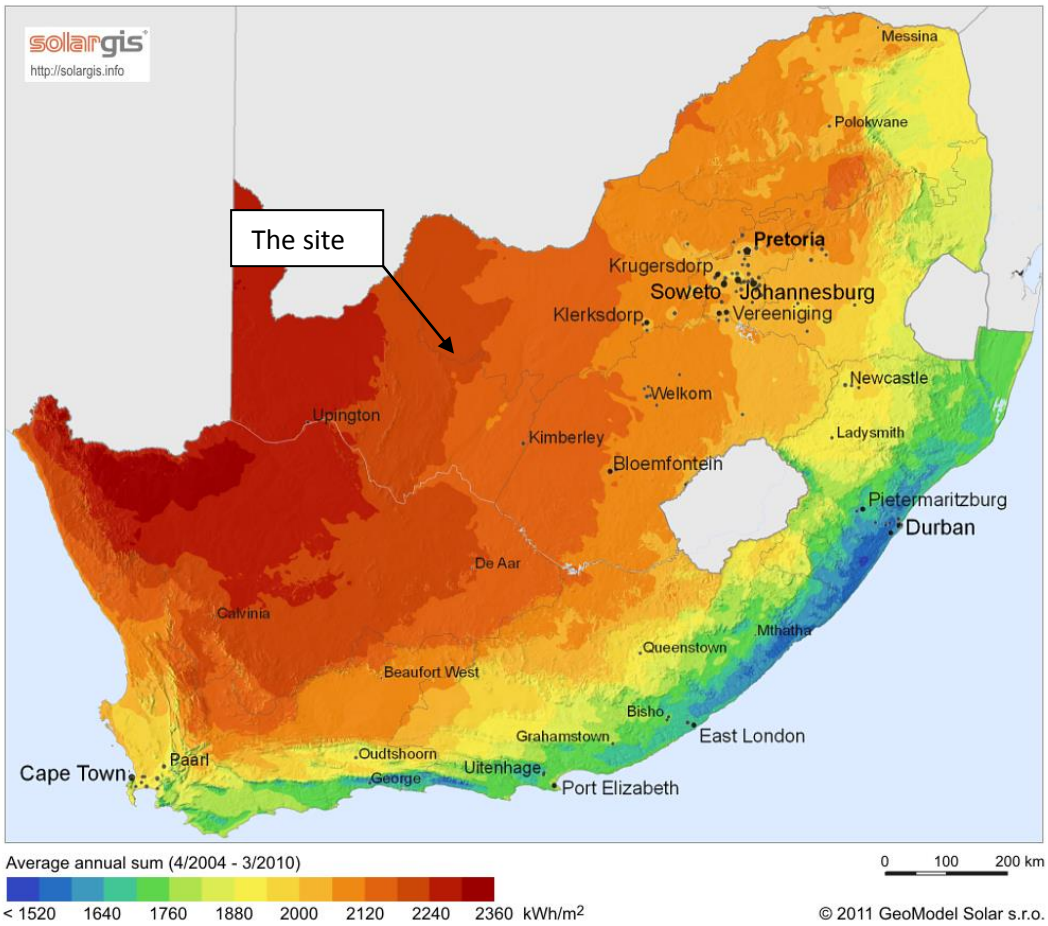


Figure 10: Horizontal irradiation for South Africa (SolarGIS, 2011)

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.

5.1.4 Technical alternatives

It is expected that generation from the facility will tie in with the Mookodi-Magopela 132kV power line. The transmission line will be constructed within 36m wide servitude towards the Mookodi-Magopela power line which runs through the project site. The 132kV overhead

transmission line is the only preferred alternative for the applicant due to the following reasons:

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

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

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

5.1.5 Design and layout alternatives

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

It is envisaged that the following environmental features will need to be considered:

- How to accommodate the disturbed mine areas on site.
- How to accommodate any protected tree or plant species.

The layout plan will be submitted as part of the EIA Report.

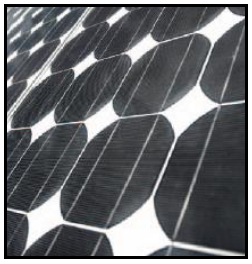
5.1.6 Technology alternatives

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:

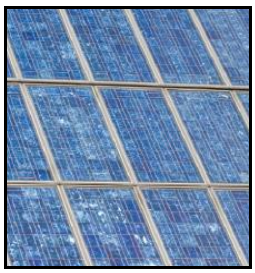
Crystalline (high efficiency technology at higher cost):

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:



- Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline 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.



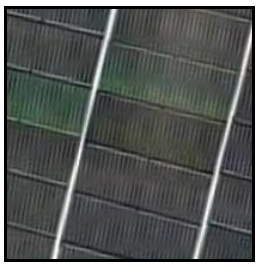
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline 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 (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used will only be confirmed at the onset of the project.

5.2 PUBLIC PARTICIPATION PROCESS

The following sections provide detailed information on the public participation process conducted in terms of Regulations 39 to 44.

5.2.1 General

The public participation process was conducted strictly in accordance with Regulations 39 to 44. 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 low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process. The following actions have already been taken:

- <u>Newspaper advertisement</u>

  Since the proposed development is unlikely to result in any impacts that extent beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Stellalander) on the 11 November 2015 (see Appendix B) notifying the public of the EIA process and requesting Interested and Affected Parties (I&APs) to register with, and submit their comments to Environamics Environmental Consultants. I&APs were given the opportunity to raise comments within 30 days of the advertisement.

- <u>Site notices</u>

  Site notices were placed on site in English on 26 October 2015 to inform surrounding communities and immediately adjacent landowners of the proposed development.

I&APs were given the opportunity to raise comments by 11 December 2015. 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 and emails on 11 November 2015 and were requested to submit comments by 11 December 2015. 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 Rural, Environment & Agricultural Development (NWREAD)
- The Department of Energy
- The North West Department of Energy
- The Department of Water Affairs
- The National Department of Agriculture
- The North West Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- The Provincial Heritage Resources Agency (PHRA), North West
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Department of Communications
- Department of Mineral Resources NW
- Transnet
- ESKOM
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the Dr, Ruth Segomotsi Mompati District Municipality
- The Municipal Manager at the Naledi Local Municipality
- The Local Councilor at the Naledi Local Municipality
- The Civil Aviation Authority (CAA)
- The North West Department of Public Works, Roads and Transport

It was expected from I&APs to provide their inputs and comments by 11 November 2015. To date comments were received from DMR, SAHRA, PRASA and NWREAD.

- <u>Direct notification of surrounding land owners and occupiers</u>

Written notices were also provided to all surrounding land owners and occupiers on 11 November 2015. The Naledi Local Municipality and other local property owners were contacted to obtain contact details of the surrounding land owners – refer to figure 11. The surrounding land owners were given the opportunity to raise comments by 11 December 2015. To date only Mr. Kriel from Vryburg Makelaars and owner of Portion 2 of the farm Hartsboom 734 registered as an I&AP (see Appendix F for written comments). For a list of surrounding land owners see Appendix D.

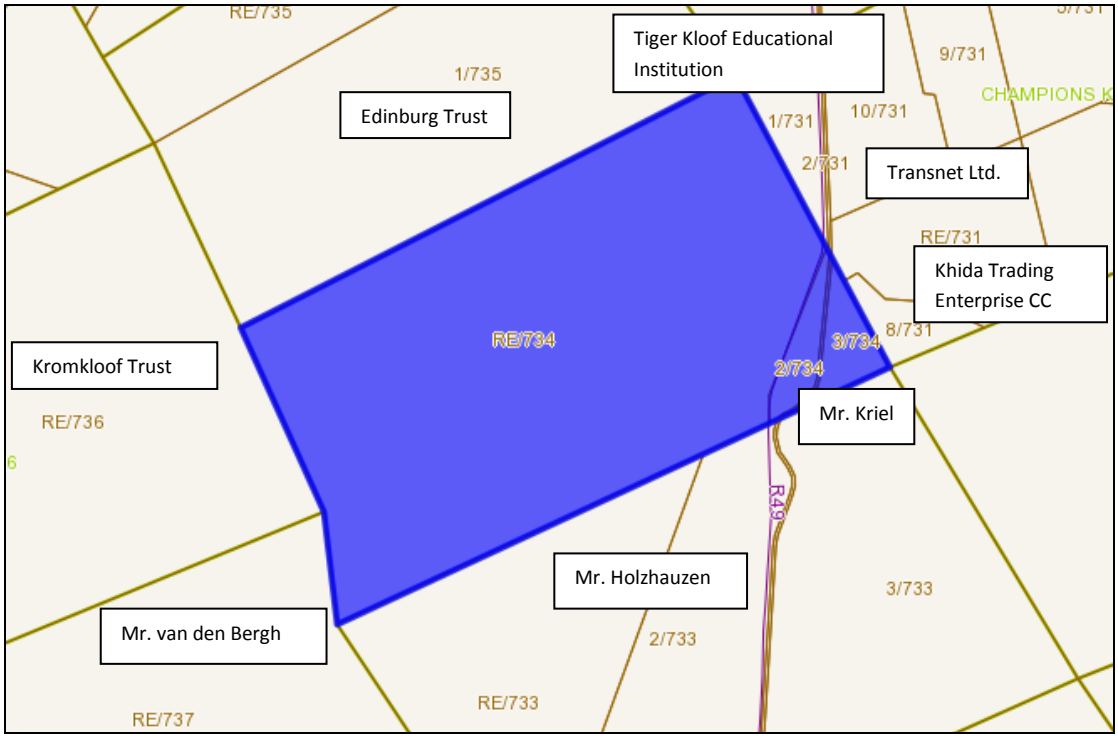


Figure 11: Surrounding Land Owners

- <u>Direct notification of registered I&APs (Round 2)</u>

Due to minor information changes incorporated after the initial notification, it was deemed necessary to circulate a revised Background Information Document (BID) to all registered I&APs. I&APs were directly informed of the information changes via email on 13 January 2016 and were requested to submit comments by 12 February 2016.

- North West Department of Rural, Environment & Agricultural Development (NWREAD)
- The Department of Energy

- The North West Department of Energy
- The Department of Water Affairs
- The National Department of Agriculture
- The North West Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- The Provincial Heritage Resources Agency (PHRA), North West
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Department of Communications
- Department of Mineral Resources NW
- Transnet
- ESKOM
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the Dr, Ruth Segomotsi Mompati District Municipality
- The Municipal Manager at the Naledi Local Municipality
- The Local Councilor at the Naledi Local Municipality
- The Civil Aviation Authority (CAA)
- The North West Department of Public Works, Roads and Transport
- BirdLife SA
- Mr. P. A. Kriel
- AMDA Developments – Mr. Charlie Berrington
- Cape EAPrac – Mr. Dale Holder
- Leads 2 Business – Mrs. Marlaine Andersen
- CVV Enviro – Mrs. Carla van der Vyver

To date, no further comments have been received.

- <u>Circulation of Draft Scoping Report</u>

The following registered I&APs and State Departments were informed of the availability of the Draft Scoping Report on 19 February 2016.

- North West Department of Rural, Environment & Agricultural Development (NWREAD)
- The Department of Energy
- The North West Department of Energy
- The Department of Water Affairs
- The National Department of Agriculture
- The North West Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- The Provincial Heritage Resources Agency (PHRA), North West
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Department of Communications
- Department of Mineral Resources NW
- Transnet
- ESKOM
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the Dr, Ruth Segomotsi Mompati District Municipality
- The Municipal Manager at the Naledi Local Municipality
- The Local Councilor at the Naledi Local Municipality
- The Civil Aviation Authority (CAA)
- The North West Department of Public Works, Roads and Transport
- BirdLife SA
- Klondike Beleggings CC
- AMDA Developments – Mr. Charlie Berrington
- Cape EAPrac – Mr. Dale Holder
- Leads 2 Business – Mrs. Marlaine Andersen

- CVV Enviro – Mrs. Carla van der Vyver
- Kabi Solar – Mr. Mike Levington

It was expected from I&APs to provide their inputs and comments within 30 days after receipt of the notification or copy of the Draft report (By 22 March 2016). To date only ???? provided comments (see Appendix F for written comments).

- Public participation meeting

  All I&AP's were invited to attend the public meeting to be held at Castello Guest House in Vryburg on 21 April 2016 at 13:00 PM. The public meeting will be an opportunity to share information regarding the proposed development and provide I&APs with an opportunity to raise any issues and provide comments. An advertisement was placed in English in the local newspaper (Stellalander) on 6 April 2016 to notify the public of the public meeting. The following key stakeholders were also directly informed of the public meeting via email on 6 April 2016:

  - North West Department of Rural, Environment & Agricultural Development (NWREAD)
  - The Department of Energy
  - The North West Department of Energy
  - The Department of Water Affairs
  - The National Department of Agriculture
  - The North West Department of Agriculture
  - The South African Heritage Resources Agency (SAHRA)
  - The Provincial Heritage Resources Agency (PHRA), North West
  - Passenger Rail Agency of South Africa (PRASA)
  - South African National Roads Agency (SANRAL)
  - SENTECH
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  - Department of Mineral Resources NW
  - Transnet
  - ESKOM
  - National Energy Regulator of South Africa (NERSA)
  - The Wildlife and Environment Society of South Africa (WESSA)
  - The Municipal Manager at the Dr, Ruth Segomotsi Mompati District Municipality

- The Municipal Manager at the Naledi Local Municipality
- The Local Councilor at the Naledi Local Municipality
- The Civil Aviation Authority (CAA)
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- BirdLife SA
- Klondike Beleggings CC
- AMDA Developments – Mr. Charlie Berrington
- Cape EAPrac – Mr. Dale Holder
- Leads 2 Business – Mrs. Marlaine Andersen
- CVV Enviro – Mrs. Carla van der Vyver
- Kabi Solar – Mr. Mike Levington

5.2.2 Consultation process

Regulation 41 requires that the municipality, relevant ward councillor and any organ of state having jurisdiction in respect of any aspect of the activity should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices D and E.

5.2.3 Registered I&APs

I&APs include all stakeholders who deem themselves affected by the proposed activity. According to Regulation 43(1) "*A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application*."

5.2.4 Issues raised by IAPs and consultation bodies

Table 5.1 summarises the comments received from consultation bodies. The full wording and original correspondence is included in Appendix F.

Table 5.1: Issues raised by key consultation bodies

Organisation	Person	Written comment (see Appendix F)
SAHRA	Mr. Phillip Hine	In an email dated 11 November 2015, Mr. Hine confirmed receipt of our email and indicated that he will have limited access to email between 11-13 November

		2015.
Department of Mineral Resources	Mr. Pieter Swart NW Regional Manager	In an email dated 12 November 2015, Mr. Swart asked if we applied for permission in terms of Section 53 of the Mineral and Petroleum Resource Development Act, Act 28 of 2002. He stated that if this is not the case, the Department objects to this application.
PRASA	Mr. Tony Games Communications and stakeholder management	In an email dated 12 November 2015, Mr. Games forwarded the email to his colleagues and asked them to assist us with comments.
Leads 2 Business	Marlaine Andersen Deputy Head of Departments	In an email dated 18 November 2015, Me. Andersen registered as an I&AP, requested BID documents. In an email dated 24 November 2015, Me. Andersen thanked us for the registration and documentation and indicated that she does not have any comments, but requested the developer's contact details.
CVV Enviro	Mrs. Carla van der Vyver	In an email dated 18 November 2015, Mrs. Van der Vyver indicated that she saw our press notices in the Stellalander Newspaper. She further indicated that they are surrounding property owners and that the total amount of MW that are applied for in the area is around 1500 MW from which a 1000 MW is within a 15km radius of their farm. She raised her concern on how the cumulative effect of the PV plant will affect weather patterns in the area as the panels have reflective surfaces and wanted to know how these weather patterns will affect the climate in the region.
NW READ	Mrs. Ellis Thebe	In an email dated 23 November 2015, Mrs. Thebe indicated that the Department has received our notice for comments on 11 November 2015 and that we are requested to submit a hard copy of the draft scoping report to their offices. She also indicated that the case has been assigned to Ms. Sammy Mabula at the Potchefstroom Office and that any further correspondence can be directed to her using the

		reference number: NWP/EIA/37/2015.
Kabi Solar	Mr. Mike Levington	In an email dated 15 January 2016 Mr. Mike Levington asked to be registered as an I&AP on the six projects in the Vryburg area.
AMDA Developments	Mr. Charlie Berrington	In an email dated 1 December 2015, Mr. Berrington Indicated that they are planning to develop three PV facilities on the farm Klondike 670 adjacent to proposed Sonbesie project on the farm Retreat 671. He asked to be registered as an I&AP, together with their EAP, Cape EAPrac (Dave Holder).
Cape EAPrac	Mr. Dale Holder	In an email dated 2 December, Mr. Holder thanked the EAP for registering him as an I&AP, and asked that he be supplied with the relevant contact details to be registered as an I&AP on the three projects on the farm Klondike 670.
BirdLife South Africa	Mr. Simon Gear	In an email dated 05 February 2016, Mr. Simon Gear stated that an avifaunal scoping assessment should be conducted which includes a site visit as well as a six-month survey falling within the wet and dry seasons. He stated that this should be done to determine the key species at risk from solar facilities, details and nature of that risk as well as mitigation measures. Mr. Simon Gear indicated that avian habitats likely to support key raptor nest sites should be surveyed and identified during early stages of monitoring and that any nest sites identified, should be mapped and included in subsequent surveys to determine if any breeding activity is taking place. In order to avoid birds and small animals to get stuck in fences, BirdLife South Africa encouraged that solar energy facilities not to use double fencing around the development area. They also mentioned that evaporation ponds should be designed to provide habitat for some bird species in this arid environment.
South African Civil Aviation Authority	Me. Lizell Stroh	In an email dated 2 March 2016, Me. Stroh stated that the there is a SACAA process whereby permission is applied for with obstacles which could pose an aviation hazard. She further stated what is required for the application, such as a Google earth document reflecting

		the footprint of the proposed development and the assessment fee.
Department of water affairs and sanitation	Mr. Dumisani Mchunu	In an email dated 23 March 2016 Mr. Mchunu stated that the Department of water affairs and sanitation does not have access to the Drop box and kindly requested a hard copy to be couriered.
SAHRA	Me. Kathryn Smuts	In an email dated 29 February 2016 Me. Smuts asked the reports be uploaded to SAHRIS and to be removed from the list of I&AP's as she does not work at SAHRA.
Naledi Local Municipality	Mr. Segapo (Municipal Manager)	In a letter dated 17 December 2015 the Naledi Local Municipality formally informed that they would not be able to collect the construction solid waste and general waste due to the fact that the municipality does not have enough capacity within the current operational fleet, but the licensed Naledi landfill site (Licence No.: NW/WM/DR1/2009/01) has the capacity (1200m3) to accommodate the refuse generated.
NWREAD		To date no comments have been received by NW:READ on the Draft Scoping Report after the site inspection conducted on 15 March 2016. Any comments received will be incorporated into the Draft EIR.

5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE

The following sections provide general information on the biophysical and socio-economic attributed associated with the preferred alternative.

5.3.1 Biophysical environment

The biophysical environment is described with specific reference to geology and soils, vegetation and landscape features, climate, biodiversity and the visual landscape. A number of specialists were consulted to assist with the compilation of this chapter of the report - refer to the Table 1.2. However, due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view apart from scattered Acacia Erioloba on site.

5.3.1.1 Geology and soils and agricultural potential

According to Mucina and Rutherford (2006) the site is located in an area which is characterised by surface limestone of Tertiary to Recent age, and dolomite and chert of the

Campbell Group (Griqualand Wes Supergroup, Vaalian Erathem) support shallow soils (0.1 – 0.25 m) of Misph and Hutton soil forms.

According to the Agriculture and Soils Impact Assessment (attached in Appendix H5) there are two land type across the site, namely Ae36 in the west and Ag10 in the east. Soils of these land types are predominantly shallow, loamy soils on underlying rock or hardpan carbonate. These soils fall into the Lithic and Calcic soil groups according to the classification of Fey (2010). A summary detailing soil data for the land types is provided in Table A1. The field investigation identified a lot of shallow hardpan carbonate across most of the site, with soils of the Coega and Gamoep soil forms. There is also an area of soils on underlying rock (Mispah soil form). The soils are classified as having low susceptibility to water erosion (class 1), and moderate susceptibility to wind erosion (class 3d).

The proposed development is located on a terrain unit of level plains with some relief at an altitude of around 1,210 meters. Slope is less than 2% across the site. A satellite image map of the site is shown in Figure 3. Photographs of site conditions are shown in Figures 4 to 8.

The surface geology is red to flesh-coloured wind-blown sand and surface limestone of Tertiary to Recent age. The underlying geology is dolomite of the Ghaap Group of the Traansvaal Supergroup. This is flat lying and without prominent outcrops. There are no drainage courses on the site.

Land capability is the combination of soil suitability and climate factors. The site and surrounds has a land capability classification, on the 8 category scale, of Class 5 – non-arable, moderate potential grazing land.

The limitations to agriculture are both climate and soil related. The moisture availability class 4 classification, with high variability of rainfall is a severe limitation to cultivation, which is not viable without irrigation. The low water holding capacity of the soils and their limited depth further limits the dryland potential. Potential maize yield on AGIS (Schulz) is given as low at 1.43 tons per hectare and (ISCW) is given as marginal. The grazing capacity is given as 14 to 17 hectares per large stock unit.

Three potential negative impacts of the development on agricultural resources and productivity were identified as:

- Loss of agricultural land use caused by direct occupation of land by the energy facility footprint.
- Loss of topsoil in disturbed areas, causing a decline in soil fertility.
- Soil erosion caused by alteration of the surface characteristics.

One potential positive impact of the development on agricultural resources and productivity was identified as:

- Generation of alternative land use income through rental for energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood.

5.3.1.2 Vegetation and landscape features

In terms of vegetation type the site falls within the Ghaap Platau Vaalbosveld vegetation type, which is described by Mucina and Rutherford (2006) as 'least threatened'. The area is characterised by flat plateau with a well-developed shrub layer with *Tarchonanthus camphorates* and *Acacia karroo.* Much of the south-central part of this unit has remarkably low cover of Acacia species for an arid savanna and is dominated by non-thorny trees.

Camel Thorn Trees

According to the Ecological Fauna & Flora Habitat Survey (refer to Appendix H2) during the initial surveys it was found that *Vachellia erioloba* (= *Acacia erioloba*), Camel Thorn trees, are present at the site. Additional surveys were conducted to indicate the distribution and abundance of *Vachellia eriolobia* at the site. Owing to the relatively low numbers and sparse distribution of *Vachellia erioloba* at the proposed footprint, all the individuals could be counted by carefully searching the total area of the proposed footprint.

Camel Thorn tree occur in low densities and small numbers at the proposed footprint area at an average of 0.028 individuals per hectare and approximately 7 individuals taller than 2 m for the entire footprint area. Very few Camel Thorn trees less than 2 m tall have been seen which points to low recruitment at the footprint area.

Alien Invasive Species

Exotic weeds at the site include *Agremone ochroleuca* (White-flowered Mexican Poppy), *Chenopodium album* (Goosefoot), *Opuntia ficus-indica* (Prickly Pear) and *Schkuhria pinnata* (Dwarf Marigold). Though these exotic weeds easily spring up where disturbances such as overgrazing, scraping of an area and diggings are found, at the present study area no severe infestations such as could often be observed in larger urban areas and surrounds in the North West and Gauteng Provinces, are found. During the initial surveys it was found that *Prosopis glandulosa* (Honey Mesquite tree) thickets occur in some parts of the Naledi Local Municipality and particular consideration has been given to this highly invasive tree species at and near the proposed footprint.

Critical Biodiversity Area

The site however falls within an important habitat feature identified in accordance with the Critical Biodiversity Areas (CBAs) in the North West Province, which includes habitats, springs, and scenic landscapes, as well as a Biodiversity Corridor. Provincial-level biodiversity corridor network is aimed at retaining connectivity between all geographic areas in the province. – refer to Figure 12.

Corridors are important to link ecosystems of high conservation priority. Such corridors or linkages are there to improve the chances of survival of otherwise isolated populations (Samways, 2005). How wide should corridors be? The answer to this question depends on the conservation goal and the focal species (Samways, 2005). Corridors for mammalian species are especially important for migratory species (Mwalyosi, 1991, Pullin 2002). For an African butterfly assemblage this is about 250m when the corridor is for movement as well as being a habitat source (Pryke and Samways 2003). Hill (1995) found a figure of 200m for dung beetles in tropical Australian forest.

In the agricultural context, and at least for some common insects, even small corridors can play a valuable role (Samways, 2005). Much more research remains to be done to find refined answers to the width of grassland corridors in South Africa. The width of corridors will also depend on the type of development, for instance the effects of the shade of multiple story buildings will be quite different from that of small houses. Corridors have a number of advantages related to dispersal and gene flow by avoiding isolation of ecological patches. However, corridors could also have potential drawbacks, for example creating gene flow where none has occurred naturally in the past and also as reservoirs for pathogens or introduced species (Pullin, 2002).

Perhault and Lomolino (2000) studied corridors and mammal community structure in an old-growth forest landscape in the United States of America and their data suggest that each corridor should be valued individually. A lot of research remains to be conducted to have a better idea of the value of corridors, but in general corridors would be of considerable value. It appears that a network of wetland corridors and rocky ridges is highly likely to be of considerable benefit in environmental management and planning. Though proper management plans for habitats are not in place, setting aside special ecosystems is in line with the resent Biodiversity Act (2004) of the Republic of South Africa.

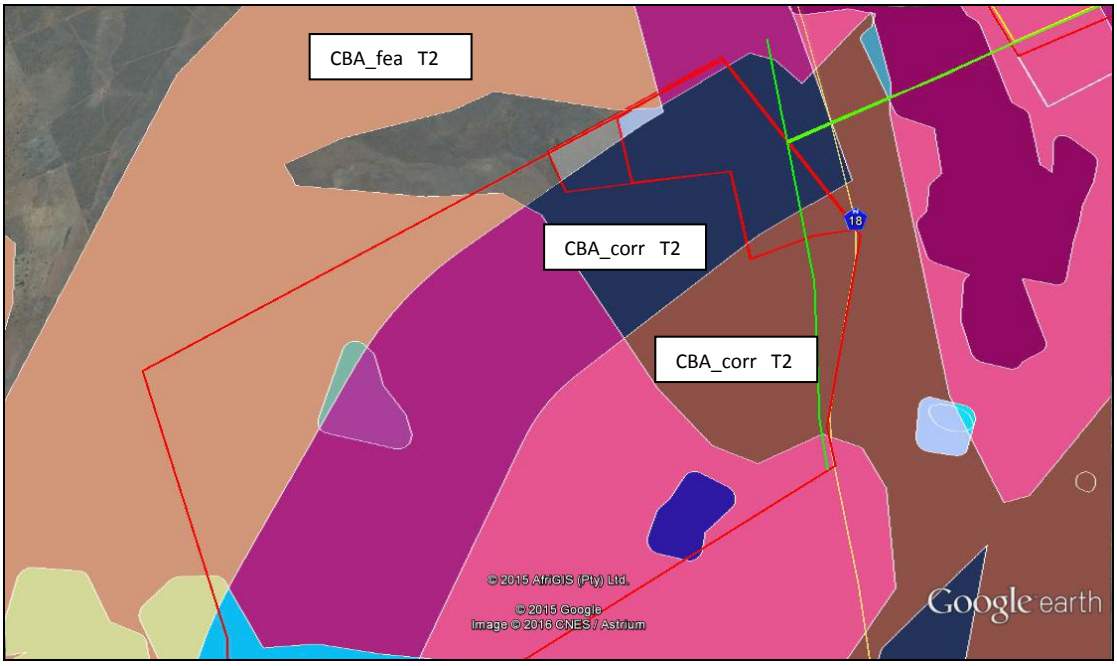

Figure 12: Critical biodiversity areas located on the site

5.3.1.3 Climate

According to Mucina and Rutherford (2006) rainfall peaks in summer and autumn with very dry winters. The mean annual precipitation (MAP) ranges from 300 mm in the southwest to about 500 mm in the northeast with frequent to very frequent frost in winter. Mean maximum and minimum temperatures for the area in question are 36.6°C in December and -5.5°C in July, respectively.

Fthenakis and Yu (2014) published a paper on the *Analysis of the Potential for a Heat Island Effect in large Solar Farms.* The study focused on the effect on global climate due to the albedo change from widespread installations of solar panels and found that the air temperature at 2.5m of the ground in the centre of the simulated solar farm selection was 1.9°C higher than the ambient air temperature, but that it declined to the ambient temperature at the height of 5 to 18m of the ground. The data also showed a clear decline in air temperature (within 0.3°C) 300m away from the solar farm. The solar panels also cool completely at night, and it is thus unlikely that a heat island effect could occur. The simulations also showed that the access roads between the solar fields allow for substantial cooling, and therefore, it is unlikely that an increase of size of the solar farm will affect the temperature of the surroundings.

5.3.1.4 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life on site. The following section will discuss the state of biodiversity on the site in more detail.

5.3.1.4.1 Avifaunal

According to the Avifaunal Study (refer to Appendix H4) The site proposed for the Protea SPP is a relatively flat area. There are two dominant types of habitat – dry shrubland and, where this has been cleared, grassland (Figs. 1 & 2). The low physical diversity of the grassland supports fewer species than the taller shrubland which provides more diverse foraging, roosting and breeding sites for birds. Thus, although a wider range of species may make use of the habitat, the number of species that are directly dependent for food and breeding upon the habitat to be destroyed is small. These primarily affected bird species all have wide ranges and none are considered threatened. There are extensive areas of similar habitat in areas adjacent to the proposed SPP into which the displaced birds can move. Assuming that the adjoining habitat is already occupied to saturation, displaced birds will have to compete with established residents and the result is likely to be a reduction in the regional population of each species. However, due to the low productivity of the affected habitats the number of individuals per concerned species is small and the overall effect is considered negligible.

It is likely that red listed species may sometimes occur on or over the site in its current condition. However, in the absence of any particular feature to attract them, these species will be at most only transient users of the area to be developed. Thus the development of

the proposed SPP will have no marked effect on red-listed species. The species most likely to be negatively impacted is the Northern Black Korhaan. These are ground foragers and may feed, and probably breed, in local habitat including that to be developed. Although the population that may be displaced is minimal, disturbance during construction may deter these, and other birds, from breeding in adjacent habitat. A single Kori Bustard flying across the site was the only red-listed species recorded.

A feature of potential concern is the possibility that polarized light from the PV panels, which at night gives the impression that there is a waterbody, may cause night-flying birds to descend and die from collision with the structures. It is recommended that bird monitoring is carried out through the first year of the post-construction phase.

5.1.3.4.2 Ecological

The Ecological Fauna and Flora Habitat Survey (refer to Appendix H2) confirms that Most of the site consists of vegetation at the site is in fairly natural condition for the vegetation type, but in general the vegetation appears disturbed with some bare areas, apparent bush encroachment where conspicuously dense cover of *Tarchonanthus camphoratus* is observed and a rectangular area of the site had been cleared in the past and secondary savanna is present at this area. Pioneer grass species are conspicuous at this disturbed area and also shrublets that often favour disturbed conditions such as *Hertia pallens* (Springbokbos) which is less visible elsewhere in the study area. Most of the vegetation at the site is a savanna characterised by a shrub-height layer of indigenous woody plant species with Tarchonanthus camphoratus (Camphor Bush) and Grewia flava (Wild Raisin) in particular conspicuous at many parts of the proposed footprint.

No loss of particularly sensitive or localised habitat type of particular conservation importance is anticipated if the site is developed. No loss of corridors or connectivity of ecosystems is anticipated if the sites are developed. Ecological sensitivity at the site is medium to low: There are no indications of any particular ecosystems of conservation importance, any particular conservation corridors or a significant impact on any plant, mammal, reptile, amphibian or invertebrate species of particular conservation concern if the site is developed.

5.3.1.5 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 establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low, electrical infrastructure such as power lines are already located in close proximity to the site and the technology considered for this development will be non-reflective. However due to the extent of the proposed development (~240 hectares) a visual impact study is being conducted to determine to what extent the proposed development will be visible to observers and whether the landscape provides any significant visual absorption capacity.

According to the Visual Impact Assessment (attached as Appendix H4) The proposed development is not located in close proximity to any major rivers or dams. A non-perennial river, the Korobela, is located on the property but approximately 5km south west from the proposed development. The site drains to the south and to the west towards the Korobela River. The proposed development is located in an area with relatively low significance in elevation. The site is located at an above mean sea level (amsl) of approximately 1213m at the highest elevation and at an amsl of 1189m at the lowest elevation. The town of Vryburg's lowest elevation is approximately 1193m amsl and 1231m amsl at the highest elevation.

The industrial development is likely to be sensitive to the proposed development. Eskom staff doing maintenance work on the power lines will be most sensitive to the development due to the close proximity of the lines to site. Vryburg's industrial zone is 11km to the north with a high level of existing screening between the zone and proposed development. The town of Vryburg is a clear screening mechanism between the industrial zone and the proposed development.

The main town of Vryburg is located within a basin like landform and 11km from the proposed development, thus limited visibility. Huhudi, one of Vryburg's low cost residential areas will be the most sensitive area of Vryburg. It is located approximately 8km from the proposed development with an amsl of approximately 1206m.

Regarding service development, the N18 national road, the Cape to Cairo railway line and Tiger Kloof Educational Institution will be most sensitive to the proposed development due to close proximity to site.

The majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period (~14 Months) as well as the lifespan of the development (25 years).

5.3.1.6 Traffic consideration

Access to the facility will be obtained from the N18 national road. The road is currently underutilised and can accommodate grater volumes of traffic.

None of the new services that will be installed will be crossing any National Road Reserves. However, as the main access to the proposed facility is on a National Route, a wayleave application to the South African National Roads Agency SOC Ltd. (SANRAL SOC Ltd) will be needed. The access itself will also need to be formalised to a standard specified by the agency.

The photovoltaic equipment and all its components will be transported to the Retreat farm over a distance of 840km or 1180km from either Durban or Cape Town harbours. The vehicles used to transport the photo voltaic equipment are standard container trucks and

not oversize vehicles. As this route is travelled by the same type of vehicle throughout, no obstacles (e.g. Low overhead services, cattle grids, narrow bridges etc.) are expected.

The following traffic load figures are expected during the construction period:

Table 5.2: Trip Summary for Long Distance Route

Route Description	Delivery trips (None peak)	Construction Vehicle Trips (None peak)	Cumulative trips for six SPPs
Durban to Vryburg via R34	9 vpd	5 vpd	84 vpd
Cape Town to Vryburg via N18	9 vpd	5 vpd	84 vpd

Table 5.3: Trip Summary with delivery from Durban

Destinations	On N14	On N18	On R34
Current ADT on Route (vpd)	1860	1700	1600
Delivery & Construction Trips (vpd)	42	14	28
Commuter Trips (vpd)	135	45	90
Pass-by Trips (vpd) (Delivery & construction trips)	0	0	84
Total Expected Trips	**2037**	**1759**	**1802**

Table 5.4: Trip Summary with delivery from Cape Town

Destinations	On N14	On N18	On R34
Current ADT on Route (vpd)	1860	1700	1600
Delivery & Construction Trips (vpd)	42	14	28
Commuter Trips (vpd)	135	45	90
Pass-by Trips (vpd) (Delivery & construction trips)	0	84	0
Total Expected Trips	**2037**	**1843**	**1718**

The *HCM 2010 Chapter 15: Two lane Highways* was consulted as the greatest portion of the route to be travelled by the delivery trucks are rural two lane highways of Class I, II or III. The trips generated by this development were evaluated in relation to the quantum of trips needed to change the Level of Service (LOS) on a portion of the rural highway and the ultimate capacity of two lane highways. The projected truck trips per day are deemed to be

of no consequence to the LOS of the travelled route from Durban to Vryburg or Cape Town to Vryburg.

When considering the sections of the routes that are multilane facilities like the N3 from Durban, the projected number of daily trips expected, must be compared to a current Average Annual Daily Traffic (AADT) of approximately 40 000vpd. Again the trips generated by the delivery of equipment to site is insignificant when compared to the AADT.

The ultimate accepted capacity of a two lane highway is 3200 vehicles per hour. From historic traffic count data, it was observed that the roadways around Vryburg have an abundance of spare capacity, (specifically along the N14, R34 and N18) as the current AADT along these roadways are between 1800vpd and 2000vpd. This therefore indicates that the estimated additional traffic generated by the construction staff travelling to and from site, can be accommodated on the existing roadways. Adequate traffic accommodation signage must be erected and maintained on either side of the access on National Route 18 throughout the construction period.

The development of a solar farm on the Remaining Extent of the farm Hartsboom 730 in the North-West Province is supported from a traffic engineering perspective.

5.3.2 Description of the socio-economic environment

The socio-economic environment is described with specific reference to social, economic, heritage and cultural aspects.

5.3.2.1 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, 2012-2017: 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, 2012-2017).

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, 2012-2017). 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 is so as street traders, retailers and marketers (NLM, 2012-2017).

5.3.2.2 Cultural and heritage aspects

Special attention was given to the identification of possible cultural or heritage resources on site. The initial site investigation concluded that there are no obvious heritage resources located on the site earmarked for development. However, a Heritage Impact Assessment has been conducted to ensure that there would be no impact on cultural or historical features as a result of the proposed activity.

According to the Heritage Impact Assessment (attached as Appendix H6) the cultural landscape qualities of the region essentially consist of a two components. The first is a rural area in which the human occupation is made up of a pre-colonial (Stone Age and Iron Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less.

Early history

Very little habitation of the central Highveld area took place during Stone Age times. Tools dating to the Early Stone Age period are mostly found in the vicinity of larger watercourses, e.g. the Vaal River or the Harts River and especially in sheltered areas such as at the Taung fossil site. During Middle Stone Age (MSA) times (c. 150 000 – 30 000 BP), people became more mobile, occupying areas formerly avoided. In many cases, tools dating to this period are found on the banks of the many pans that occur all over. The MSA is a technological stage characterized by flakes and flake-blades with faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology.

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These are mostly open sites located near river and pans. For the first time we also get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA.

The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual believes. Some of the farms in the Vryburg region known to

have rock engravings are Bernauw, Content, Gemsbok Laagte, Klipfontein, Kinderdam, Melalarig, Schatkist, Verdwaal Vlakte and Wonderfontein, to mention but a few.

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area. Because of their specific technology and economy, Iron Age people preferred to settle on the alluvial soils near rivers for agricultural purposes, but also for firewood and water.

The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating condition that allowed Late Iron Age (LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State and North West Province.

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959).

Historic period

Many early travellers, hunters and missionaries (Burchell 1824, Campbell 1822, Smith 1834-1836 (Lye 1975), Moffat 1842 and Harris 1852) either passed through the area or close to it. Their writings leave us a tantalising description of what life was in these communities before large-scale interaction with white settles took place. Some of the first whites to settle here were the missionaries Samuel Broadbent and Thomas Hodgson, who settled some distance to the east of what later became known as Wolmaransstad.

White settlers moved into the area during the first half of the 19th century. They were largely self-sufficient, basing their survival on cattle/sheep farming and hunting. Few towns were established and it remained an undeveloped area.

During the 1880s the white settlers exploited conflict between the different Tswana chiefdoms to obtain more land (Legassick 2010). Chief David Massouw gave some land to some whites in recognition for their help in his fight against the Batlhapin chief Mankoroane Molehabanque. From this developed the Republic of Stellaland, which was named for a comet ("stella" in Latin) that was visible in 1882. The town of Vryburg was to be the capital of the republic. However, due to British intervention in the area as a result of the discovery of diamonds, the republic was very short-lived.

The last chapter in the history of the region was its incorporation under the policy of homeland development, into the Republic of Bophuthatswana. This was a very fragmented 'State' and it would have needed permanent support by the central government to keep it in place. Since 1994, this has fallen away and the people and the region were reincorporated into the larger Republic of South Africa.

Vryburg

This town was founded in 1883 as the capital of the Republic of Stellaland, an independent Boer republic. The Boers that inhabited the area styled themselves as free citizens, or vryburgers, in Dutch, from which the name of the town was derived. The town achieved municipal status in 1896.

According to available data bases this town has 5 buildings listed as of provincial significance. In addition, some cemeteries and monuments also occur. During the Anglo Boer War (1899-1902) a large concentration camp was established on the outskirts of the town.

The Tierkloof Institute, located to the south of Vryburg, on the farm Waterloo, was established in 1904 and served as centre for higher education for Tswana-speaking people, especially for children of the various royal families. Table 5.5 below summarises the identified heritage resources in the area of the proposed development.

Table 5.5: Summary of identified heritage resources in the area

Identified heritage resources			
General protection (NHRA)	**Coordinates**		**Description**
Archaelogical sites or material (Section 35)	S 27.07247	E 24.73808	A small pan area where tools and flakes dating to both the Middle Stone Age and Later Stone Age were identified. They were made either from hardened shale (MSA) or fine- grained silicates. The density is approximately one tool/flake per 20m^2.

According to the Paleaontological Heritage Assessment, (refer to Appendix H6) The Protea Solar Power Plant study area is underlain at depth by Permo-Carboniferous glacial sediments of the Dwyka Group (Karoo Supergroup) that are of low palaeontological sensitivity and are very poorly exposed at surface. These ancient bedrocks are largely mantled by much younger, Late Caenozoic calcrete hardpans, sandy soils of possible aeolian origin and possible relict alluvial gravels related to the Dröe Harts River. Both the Palaeozoic bedrocks and the overlying superficial sediments are generally of low palaeontological sensitivity.

Given the generally low palaeontological sensitivity of the Dwyka Group as well as its poor surface exposure within the study area, significant impacts on fossils in these bedrocks are not anticipated here.

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 plan, submitted with the EIA report, that SAHRA will be informed immediately should any artefacts be exposed during construction. Training of contractors on heritage issues will also form part of the contractor's brief.

5.4 SITE SELECTION MATRIX

From an environmental perspective the proposed site is considered highly desirable due to its high irradiation value (i.e. energy generation), site access (i.e. to facilitate the movement of construction vehicles during the construction phase), environmental conditions (i.e. geology, soils, agricultural potential, and ecological and archaeology sensitivity) – refer to Table 5.6 for the site selection matrix. Two other alternatives of 204 hectares each exist on the Remaining Extent of the farm Hartsboom 734. The site selection criteria were utalised by Subsolar and from a location, geological, heritage and ecological point of view the site has no significant issues where evident, low – medium agricultural potential exists, the site is easily accessible and is preferred due to its proximity to a grid connection and high irradiation values.

Table 5.6: Site selection matrix

Site selection criteria	**Site Alternative 1**	**Site Alternative 2**	**Site Alternative 3**
Location	√	√	√
Site access	√	√	√
Geology & soils	√	√	√
Vegetation & landscape features	√	√	√
Agricultural potential	√	√	√
Biodiversity	√	√	√
Cultural & heritage features	√	√	√

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

In conclusion the preferred alternative entails the following:

- The development of the 115MW Protea Photovoltaic Solar Energy facility on the Remaining Extent of the farm Hartsboom 734, Registration IN, North West Province - refer to Section 2 of this report.

The preferred layout alternatives on the Remaining Extent of the farm Hartsboom 734, are included in the attached Figures – refer to figure 7. It may be concluded that 2 other alternatives will be considered during the next phase of the EIA process.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 2. (2) A scoping report (...) must include-

(v) the impacts and risks identified for each alternative, including the nature, significance,

consequence, extent, duration and probability of the impacts, including the degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

(vii) positive and negative impacts that the proposed activity and alternatives will have on

the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) the possible mitigation measures that could be applied and level of residual risk;

6.1 SCOPING METHODOLOGY

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

- Checklist (see section 6.1.1): 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 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, 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 activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 26 October 2015. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the study area. Table 6.1 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 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	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	✕			The site falls within a Critical Biodiversity area as described in relevant bioregional plans.
III. An area that is of cultural importance		✕		None.
IV. Site of geological significance		✕		None.
V. Areas of outstanding natural beauty		✕		None.
VI. Highly productive agricultural land		✕		None.
VII. Floodplain		✕		None.
VIII. Indigenous forest		✕		None.
IX. Grass land		✕		None.
X. Bird nesting sites		✕		None.
XI. Red data species	✕			None.
XII. Tourist resort		✕		None.
2. Will the project potentially result in potential?				
I. Removal of people		✕		None.
II. Visual Impacts	✕			The VIA (refer to Appendix H4) confirmed that the visual impact of a low-lying PV facility is not expected to be significant as the number of sensitive receptors in the area is very low.
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 will be obtained via the N18.

V. Risk to human or valuable ecosystems due to explosion/fire/ discharge of waste into water or air.		✕		None.
VI. Accumulation of large workforce (>50 manual workers) into the site.	✕			Approximately 300 employment opportunities will be created during the construction phase of the project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	✕			The estimated maximum amount of water required during the facility's 20 years of production is approximately 3 880m³ per annum.
VIII. Job creation	✕			Approximately 350 employment opportunities will be created during the construction and operational phases.
IX. Traffic generation	✕			64 trips per day over the 12 Month construction period.
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		✕		None.
II. A conservation or open space area	✕			The site falls within a Critical Biodiversity area as described in bioregional plans.
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	✕			An unnamed informal settlement is located approximately 8km north of the proposed site.

6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in depth assessment during the EIA process. An indication is provided of the specialist studies which is being conducted and that informed the initial assessment. 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.

In order to conceptualise the different impacts, the matrix specify the following:

- **Stressor**: Indicates the aspect of the proposed activity, 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.

Please refer to **Annexure G** for a more in-depth assessment of the potential environmental impacts.

Table 6.2: Matrix analysis

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
Activity 11(i) (Regulation 983): *"The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* Activity 1 (Regulation 984): *"The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."* *Activity 15 (Regulation 984): "The clearance of an area of 20 hectare or more of indigenous vegetation..."* *Activity 4 (Regulation 985): "The development of a road wider than 4 metres with a reserve less than 13.5 metres (e) in North West (i) outside urban areas, in (ee) critical biodiversity areas as identified in bioregional plans.."* *Activity 12 (Regulation 985):*	Site clearing and preparation Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis. • Construction of access and inside roads/paths – existing paths will be used were reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration. • Trenching – all Direct Current (DC) and	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss or fragmentation of indigenous natural vegetation. • Loss of sensitive species. • Loss or fragmentation of habitats.		-	P	L	D	I	M	Yes	- Site clearing must take place in a phased manner, as and when required. - The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be confined to the fenced off area and minimised where possible. - No trapping or snaring to fauna on the construction site should be allowed.	L	Ecological Fauna and Flora Habitat Survey & Avifaunal Study
			Air	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Soil	• Soil degradation, including erosion.		-	S	S	Pr	PR	M	Yes	- Areas which are not to be constructed on within	M	Soil, Land Capability and

"The clearance of an area of 300 square metres or more of indigenous vegetation…(a) in North West (ii) within critical biodiversity areas identified in bioregional plans."	Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass. <u>Transportation and installation of PV panels into an Array</u> The panels are assembled at the supplier's premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep seated screw. Wiring to the Central Inverters Sections of the PV array would be wired to central inverters which have a maximum rated power of 2000kW each. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.			• Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills). • Loss of topsoil.								two months must not be cleared to reduce erosion risks. - The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. - Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.		Agricultural Potential Study
			Geology	• Collapsible soil. • Seepage • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.		-	S	S	Pr	CR	NL	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. - If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. - Retention of vegetation where possible to avoid soil erosion.	L	Geotechnical Study
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that		-	L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality

				need to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.											
			Ground water	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. Full construction details of monitoring boreholes must be recorded when they are drilled (e.g. screen and casing lengths, diameters, total depth, etc). Sampling of monitoring boreholes should be done according to recognised standards.	L	-
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion.		-	L	S	Pr	PR	ML	Yes	- Silt fences should be used to prevent any soil entering the stormwater drains - New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. - Any hazardous substances must be stored at least 20m from	M	-

													any of the water bodies on site.		
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- Where reasonable and practical, Protea's service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories	L	EAP to assess Social Impacts
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility.	-		L	S	D	CR	NL	Yes	-	L	-
			Traffic volumes	• Increase in construction vehicles.		-	P	S	Pr	CR	NL	Yes	The development may commence without influencing the levels-of-service for the local road network. However, some remedial work is recommended on the gravel road leading to the site. Remedial work on the road network should take place before the construction phase starts.	L	Traffic Study
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the		-	L	S	Pr	PR	ML	Yes	- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. - It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the	M	EAP to assess Social Impacts

				site. • Increased risk of veld fires.									site		
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• Removal or destruction of archaeological and/or paleontological sites. • Removal or destruction of buildings, structures, places and equipment of cultural significance. • Removal or destruction of graves, cemeteries and burial grounds.		-	S	S	Po	I	ML	Yes	- Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.	L	Heritage Impact Assessment & Palaeontological Assessment
OPERATIONAL PHASE															
	The key components of the proposed project are described below:	CAL ENVIRON	Fauna & Flora	• Fragmentation of habitats. • Establishment and spread of declared weeds and alien		-	P	L	Po	PR	ML	Yes	- Indigenous vegetation must be maintained and all exotics removed as	M	Ecological Fauna and Flora Habitat

	• PV Panel Array - To produce 115MW, 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 northern angle in order to capture the most sun. • Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. 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 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be			invader plants (operations). • Impact on avifauna.									they appear and disposed off appropriately. - Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. - Implement a Avifauna Monitoring plan.		Survey & Avifaunal Study
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Loss of agricultural potential (low significance relative to agricultural potential of the site).		-	L	L	D	PR	SL	Yes	- An effective system of run-off control should be implemented, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. - 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.	M	Soil, Land Capability and Agricultural Potential Study
			Geology	• Collapsible soil. • Seepage (shallow water table). • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If		-	S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological	L	Geotechnical Study included as part of soil study

	required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Protea Solar Power Plant has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with Mookodi-Mogopela power line. The Project will inject up to 100MW into the Substation. The installed capacity will be up to approximately 115MW. • <u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 820m². Other supporting infrastructure includes voltage and current regulators and protection circuitry. • <u>Roads</u> – Access will be obtained the N18. An internal site road network will also be required to provide access to the solar field and associated infrastructure. All site roads will require a width of approximately 5-6m. • <u>Fencing</u> - For health, safety			the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.								investigation should be implemented.		
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increased consumption of water. Approximately 3 880 000 liters of water per annum will be required for the operation of the solar plant.		-	P	L	D	I	ML	Yes	- Waste has to be accommodated at a licensed landfill site. - Water saving devices will be implemented	M	Confirmation from the Local Municipality
			Ground water	• Leakage of hazardous materials. The 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.	-		L	L	Po	PR	ML	Yes	- All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.	L	-
			Surface water	• Increase in storm water runoff. The development will potentially result in an		-	L	L	Pr	PR	ML	Yes	- The storm water management plan must include the construction	L	-

	and security reasons, the facility will be required to be fenced off from the surrounding farm.			increase in storm water run-off that needs to be managed to prevent soil erosion. • Leakage of hazardous materials. The 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.								of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.		
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. Security guards will be required for 24 hours every day of the week and general laborers will also be required for the cleaning of the panels. • Skills development.		+	L	L	D	I	N/A	Yes	- Where reasonable and practical, Protea's service providers should implement a 'locals first' policy, especially for semi and low-skilled job categories	N/A	EAP to assess Social Impacts
			Visual landscape	• Change in land-use/sense of place. The site is characterized by open veldt with a rural agricultural sense of place. 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. • Potential visual impact on residents of farmsteads and travellers in close proximity to proposed facility.		-	L	L	D	PR	ML	Yes	- Screening should be implemented by means of vegetation in conjunction with security fencing. - Security lighting should make use of down-lights to minimise light spill, and motion detectors where possible so that lighting at night is minimised. - Care should be taken with the layout of the security lights to prevent motorists on the dirt road from being blinded by lights at the approach to the site.	M	Visual Impact Assessment

			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	Po	CR	NL	Yes	-	L	Traffic Study
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tourism industry	• Enhance tourism in the area. The facility may become an attraction or a landmark within the region that people would want to come and see.	+		P	L	Po	I	N/A	Yes	-	N/A	-
			Heritage resources	• It is not foreseen that the proposed activity will impact on heritage resources or vice versa.	-		S	L	Po	PR	ML	Yes	-	L	-
			Electricity supply	• Generation of additional electricity. The facility will generate electricity that will be fed into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Local community	• The establishment of a Community Trust.		+	L	L	Pr	I	N/A	Yes	- Protea, in consultation with the NLM, should investigate the options for the establishment of a Community Development Trust.	N/A	EAP to assess Social Impacts
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE																
-	<u>Dismantlement of infrastructure</u>	E	Fauna & Flora	• Re-vegetation of exposed	+		S	L	Po	N/A	N/A	Yes	- Re-vegetation of	N/A	-

	During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled. <u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.			soil surfaces to ensure no erosion in these areas.									affected areas must be made a priority to avoid erosion.		
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills).		-	S	S	Pr	PR	M	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion.	M	-
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.		-	L	S	D	I	NL	Yes	-	L	-
			Ground water	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion. • Destruction of watercourses (non-perennial streams).		-	L	S	Pr	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination	M	-

														risks. - Removal of all substances which can result in groundwater (or surface water) contamination.		
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Loss of employment.		-	L	L	Po	PR	NL	Yes	- Protea should ensure that retrenchment packages are provided for all staff retrenched when the facility is decommissioned.	M	EAP to assess Social Impacts
			Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility.	-		L	S	D	CR	NL	Yes	- Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas.	L	-
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	-
			Health & Safety	• Air/dust pollution. • Road safety. • 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	-		L	S	Pr	PR	ML	Yes	- Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes.	L	-

				area.										- Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. - Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.		
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		L	S	D	CR	NL	Yes	- The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.		-	S	S	Pr	PR	ML	Yes	-	L	Heritage Impact Assessment & Palaeontological Heritage Assessment

Nature of the impact:	(N/A) No impact	(+) Positive Impact (-)	Negative Impact		
Geographical extent:	(S) Site;	(L) Local/District;	(P) Province/Region;	(I) International and National	
Probability:	(U) Unlikely;	(Po) Possible;	(Pr) Probable;	(D) Definite	
Duration:	(S) Short Term;	(M) Medium Term;	(L) Long Term;	(P) Permanent	
Intensity / Magnitude:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	
Reversibility:	(CR) Completely Reversible;	(PR) Partly Reversible;	(BR) Barely Reversible;	-	
Irreplaceable loss of resources:	(IR) Irreversible	(NL) No Loss;	(ML) Marginal Loss;	(SL) Significant Loss;	(CL) Complete Loss
Level of residual risk:	(L) Low;	(M) Medium;	(H) High;	(VH) Very High	-

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which should be addressed in more detail in the EIA report.

6.2.1 Impacts during the construction phase

During the construction phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (Regulation 983): *"The development 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 28(ii) (Regulation 983): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 1 (Regulation 984): *"The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more."*
- Activity 15 (Regulation 984): *"The clearance of an area of 20 hectare or more of indigenous vegetation..."*
- *Activity 4(e)(i)(ee) (GN.R. 985):* *"The development of a road wider than 4 metres with a reserve less than 13.5 metres (e) in North West (i) outside urban areas, in (ee) critical biodiversity areas as identified in bioregional plans..."*
- *Activity 12(a)(ii))(GN.R. 985):* *"The clearance of an area of 300 square metres or more of indigenous vegetation…(a) in North West (ii) within critical biodiversity areas identified in bioregional plans."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The potentially most significant impacts relate to the impacts on the fauna and flora, soils, geology, existing services infrastructure, traffic impacts, socio-economic impacts such as the provision of temporary employment and other economic benefits, and the impacts on health and safety and heritage resources.

6.2.2 Impacts during the operational phase

During the operational phase the study area will serve as a solar plant . The potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the fauna and flora, soils, geology, the pressure on existing services infrastructure, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the

provision of employment opportunities for its duration, and the generation of income to the local community.

6.2.3 Impacts during the decommissioning phase

The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state. The decommissioning phase will however potentially result in impact on soils, surface water, heritage objects and the loss of permanent employment. Skilled staff will be eminently employable and a number of temporary jobs will also be created in the process.

7 CUMULATIVE EFFECTS ASSESSMENT

This section aims to address the requirements of Section 2 of the NEMA to consider cumulative impacts as part of any environmental assessment process.

7.1 Introduction

The EIA Regulations (2014) determine that cumulative impacts, "in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities." 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 Scoping Report 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 – refer to Appendix G. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the Project itself, and the overall effects on the ecosystem of the Project Area that can be attributed to the Project and other existing and planned future projects.

7.2 Geographic Area of Evaluation

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis

generally includes an area of a 120km radius surrounding the proposed development – refer to figure 13 below.

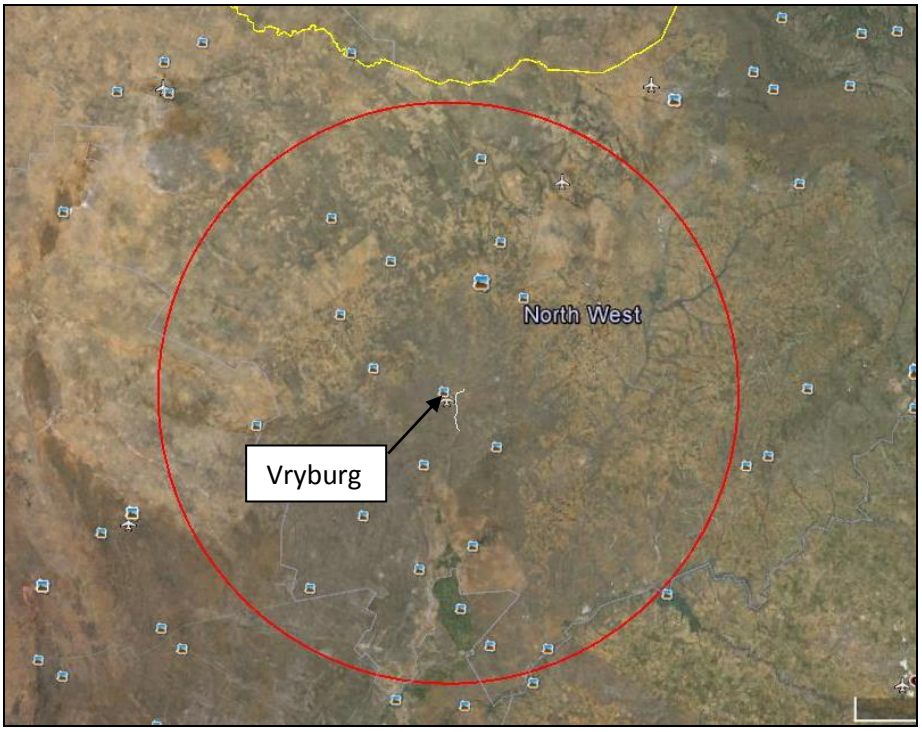

Figure 13: Geographic area of evaluation

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 120km would generally confine the potential for cumulative effects within this particular environmental landscape. This is also the approximate distance to the border of the North West Province, where only one PV project has received preferred bidder status. The geographic area therefore only includes a projects located within the North West Province. A larger geographic area may be used to analyse cumulative impacts based on a resource 's specific temporal or spatial impacts. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the Proposed Project, beginning in 2019 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where appropriate, particular focus is paid to near-term cumulative impacts of overlapping construction schedules for proposed projects in the area of evaluation.

7.4 OTHER PROJECTS IN THE AREA

7.4.1 Existing projects in the area

According to the Energy Blog's database only one solar PV plant has been granted preferred bidders status within the geographic area of investigation – refer to figure 14 below. The following plant has yet to commence with construction:

- Waterloo Solar Park with a capacity of 75MW near Vryburg, North West Province (Approvals, planning and financing phase).

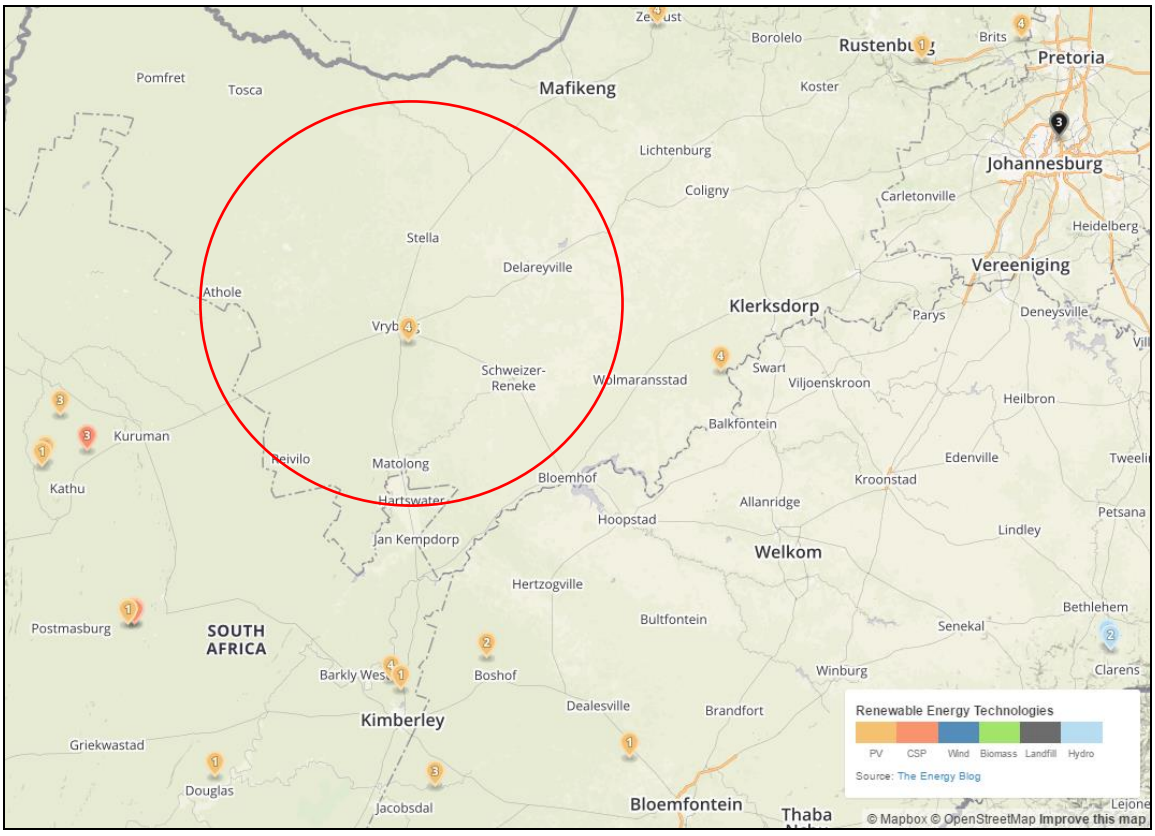

Figure 14: Utility-scale Renewable Energy Generation Sites

It is unclear whether other projects not related to renewable energy is or has been constructed in this area. In general, development activity in the area is focused on agriculture. Agriculture in the area is primarily associated with cattle grazing.

It is quite possible that future solar farm development may take place within the general area. The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

7.4.2 Projects in the foreseeable future

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DEA mapped the location of all EIA application submitted within South Africa – refer to figure 15 below. According to this database approximately 15 applications have been submitted for

renewable energy projects within the geographical area of investigation. The majority of these (~8) projects are located in close proximity to Vryburg.

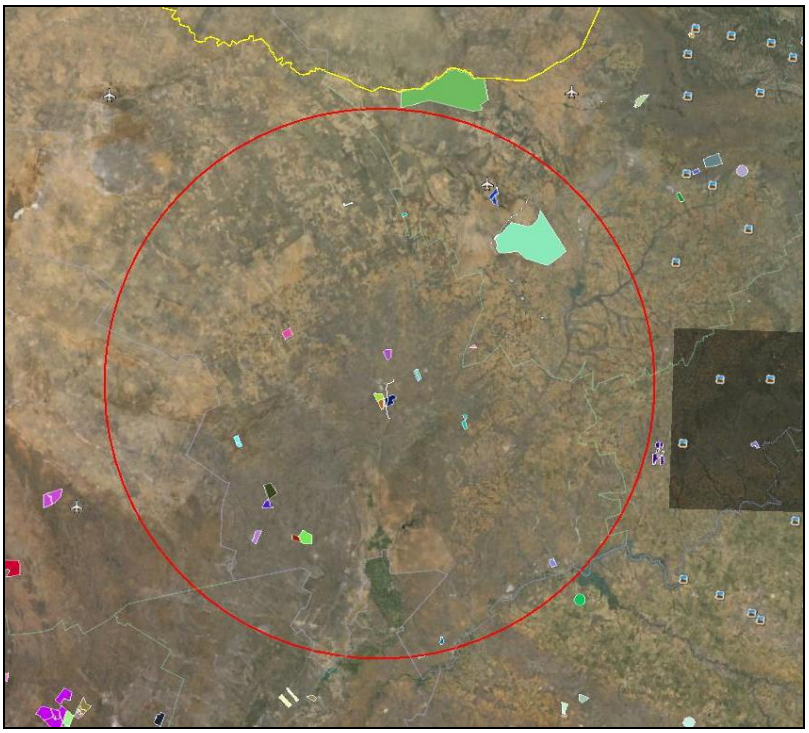

Figure 15: National Wind and Solar PV SEA: Renewable Energy EIA Application Received before Dec. 2014

Environamics and other environmental consultants are also in the process of applying for Environmental Authorisation for ten (10) PV projects in the area, namely:

- The proposed Gamma Solar Power Plant near Vryburg, North West Province.
- The proposed Khubu Solar Power Plant near Vryburg, North West Province.
- The proposed Alpha Solar Power Plant near Vryburg, North West Province.
- The proposed Meerkat Solar Power Plant near Vryburg, North West Province.
- The proposed Sonbesie Solar Power Plant near Vryburg, North West Province.
- Three PV Solar Energy facilities on the farm Klondike - AMDA Developments.
- The proposed Sendawo Solar Photovoltaic (PV) Plant, near Vryburg, North West.
- The proposed Woodhouse 1 and 2 PV plants, near Vryburg North West.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area. The following sections present their findings.

7.5.1 Geology

The desk top geotechnical study (refer to Appendix H1) confirmed that large parts of the site are covered by shallow hardpan carbonate, which is likely to be approximately 1-meter-thick, and likely to be underlain by dolomite. The loamy, unconsolidated soil cover overlying the hardpan varies between 0 and 60 cm. In places, there is no hardpan carbonate and the loamy soil is underlain directly by dolomite at a depth of 20-40cm. The foundations for mounting structures will therefore need to be erected in unconsolidated, loamy material at the surface with underlying hardpan or rock at between 0 and 70 cm below surface. According to the specialist the site should be regarded as suitable for the proposed development

7.5.2 Soil, Land Capability and Agricultural Potential

The major limitation to agriculture is the limited climatic moisture availability, but the shallow soils are also a serious limitation. The land capability is classified as Class 6 -non-arable, low to moderate potential grazing land. The site has a grazing capacity of 14-17 hectares per large stock unit.

Three potential negative impacts of the development on agricultural resources and productivity were identified as:

- Loss of agricultural land use caused by direct occupation of land by the energy facility footprint.
- Loss of topsoil in disturbed areas, causing a decline in soil fertility.
- Soil Erosion caused by alteration of the surface characteristics.

One potential positive impact of the development on agricultural resources and productivity was identified as:

- Generation of alternative land use income through rental for energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood.

The Soil, Land Capability and Agricultural Potential Study (refer to Appendix H5) confirmed that these potential impacts will be localised within the site boundary area and that the measurable effect of the potential impacts may be reduced significantly with the proposed mitigation measures. However, these impacts may become significant when considered cumulatively for all the projects proposed in the area.

7.5.3 Hydrology

The ecological habitat survey (refer to Appendix H2) confirmed that there are no water features found on the site. For this reason, it is not foreseen that there will be any significant impacts on the hydrology of the site.

7.5.4 Ecology

The ecological impact assessment (refer to Appendix H2) confirmed that most of the site consists of vegetation at the site is in fairly natural condition for the vegetation type, but in general the vegetation appears distubed with some bare areas, apparent bush encroachment where conspicuously dense cover of *Tarchonanthus camphoratus* is observed and a rectangular area of the site had been cleared in the past and secondary savanna is present at this area. Pioneer grass species are conspicuous at this disturbed area and also shrublets that often favour disturbed conditions such as *Hertia pallens* (Springbokbos) which is less visible elsewhere in the study area. Most of the vegetation at the site is a savanna characterised by a shrub-height layer of indigenous woody plant species with *Tarchonanthus camphoratus* (Camphor Bush) and *Grewia flava* (Wild Raisin) in particular conspicuous at many parts of the proposed footprint. The ecological habitat survey (refer to Appendix H2) confirmed no loss of particularly sensitive or localised habitat type of particular conservation importance is anticipated if the site is developed. No loss of corridors or connectivity of ecosystems is anticipated if the proposed footprint is developed. Ecological sensitivity at the site is medium to low. Camel Thorn tree occur in low densities and small numbers at the proposed footprint area.

No threatened or near-threatened plant species are likely to occur on the site. Apart from one Declining plant species (Poison bulb) and a Protected Tree species (Camel Thorn) (also listed as Declining), none of the other plant species of particular conservation priority are likely to occur on the footprint proposed for development.

Camel Thorn tree occur in low densities and small numbers at the proposed footprint area at an average of 0.028 individuals per hectare and approximately 7 individuals taller than 2 m for the entire footprint area. Very few Camel Thorn trees less than 2 m tall have been seen which points to low recruitment at the footprint area.

Cumulative effects of solar power plants are considered with special reference to habitat loss and fragmentation. Habitat loss and fragmentation are known to be the main threats to biodiversity (Fahrig, 2003; Wilcove *et al*., 1998; IUCN, 2004; Primack, 2006). Because some fragmentation will take place if the developments are approved the focus of assessing cumulative effects of solar power plants could be on how the different projects allow for enough corridors and linkages in between the locations of solar power plants to enhance connectivity of biodiversity.

Therefore, the cumulative impact of the proposed development is considered to be medium if all the *Vachellia erioloba* trees have to be removed.

7.5.5 Birds

The immediate, and most important, impact on birds of the development of solar arrays is transformation of the area through the destruction of all vegetation. This removes almost all resources for birds and forces them to leave the area.

It is generally assumed that birds occupy areas at a level close to carrying capacity in terms of current local resources. Birds that are displaced from the array area must then compete with birds already occupying the areas in which they try to relocate. Whether the displaced birds or the residents survive the result is likely to be mortality of individuals and a depletion of the local population of the affected species. In terms of numbers of individuals, the species most affected will be the smaller bodied species which have larger population densities. However, these are usually "commoner" and widespread species. Provided there are ample areas of suitable vegetation these species are of relatively low conservation concern. Only when the affected species has a small global, national, or in some instances provincial, distribution or has very specialised habitat requirements, is there conservation concern for these smaller birds. The effect of displacement is generally greater on the larger bodied species which require larger areas and so have lower overall populations. These larger birds are also generally being more impacted by wider human related activities – disturbance, hunting, collision with structures etc.

Though no red data listed bird species were observed at the site it is likely that individuals of red-listed species may sometimes occur on or over the site in its current condition. However, in the absence of any particular feature to attract them, these individuals will be at most only transient users of the area to be developed. Thus the development of the proposed SPP will have no marked effect on red-listed species.

It was concluded that based on the observations of both habitats for birds and of bird's species observed there is no reason to raise opposition, from an avifaunal perspective, to the proposed development of a solar array on the designated Protea site. However, this is an intermediary conclusion. Only after the BirdLife-required second, late rainy season, period of observations –scheduled for April 2016 - will a final avifaunal conclusion be available. The final avifaunal study and EIR will be made available for comments in May/June 2016.

7.5.6 Social Impact Assessment

The social impact point of view the project represents an important development opportunity for the communities surrounding Protea PV. Should it be approved, it will not only supply the national grid with much needed clean power, but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report. The most significant cumulative social impacts are summarised in Table 7.1 below.

7.5.7 Visual

The Visual Impact Assessment (refer to Appendix H5) confirmed that the proposed development is located in a close proximity of existing Eskom power line infrastructure and agricultural infrastructure and might have a cumulative impact on viewers. In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and the majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period and the lifespan of the development. However, taking into account all positive factors of such a development including economic factors, social factors and

sustainability factors, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view.

7.5.8 Heritage

The Heritage Impact Assessment (refer to Appendix H6) concluded that a small pan area where tools and flakes dating to both the Middle Stone Age and Later Stone Age were identified. They were made either from hardened shale (MSA) or fine- grained silicates. The density is approximately one tool/flake per 20m^2. According to the Paleaontological Heritage Assessment, (refer to Appendix H7) Field assessment suggests that Given the generally low palaeontological sensitivity of the Dwyka Group as well as its poor surface exposure within the study area, significant impacts on fossils in these bedrocks are not anticipated here

No fossil remains were recorded from the surface rocks during field assessment and it is inferred that they are of low cumulative palaeontological sensitivity.

7.5.9 Traffic

The impact of the construction traffic on the general traffic and the surrounding communities along the haulage route is considered to be low. All the components will be transported by truck from Durban or Cape Town to the site using the routes as defined. Both these routes are of acceptable standard and should not impede travel from a riding quality perspective. No abnormal loads will be transported to the site. The access to the site is off road N18. Temporary traffic accommodation signage must be erected and maintained on either side of the access on road N18 throughout the construction period. The development of a solar farm on the Remaining Extent of the farm Hartsboom 730 in the North West Province is therefore supported from a traffic engineering perspective, but may result in cumulative impacts if other projects in the area are approved.

7.6 IMPACT ASSESSMENT

Following the definitions of the term, the “residual effects on the environment”, i.e. effects after mitigation measures have been put in place, combined with the environmental effects of past, present and future projects and activities will be considered in this assessment. Also, a “combination of different individual environmental effects of the project acting on the same environmental component” can result in cumulative effects.

7.6.1 Potential Cumulative Effects

The receptors (hereafter referred to as Valued Ecosystem Components (VECs) presented in Section 6 (refer to the matrix analysis) have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 7.1. There have been 14 specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.1 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.1: Potential Cumulative Effects for the proposed project

Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase		
Loss or fragmentation of indigenous natural fauna and flora	The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on avifauna. However, the condition of the natural vegetation appears to be moderate.	- Medium
Avifauna	Development of multiple solar energy facilities in this region may have cumulative impacts on birds, however limited due to the species which occur in the area.	- Low
Loss or fragmentation of habitats	The developments are not located in an ecological sensitive area.	- Medium
Soil erosion	The largest risk factor for soil erosion will be during the operational phase when storm water run-off from the surfaces of the photovoltaic panels could cause erosion. Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area.	- Low
Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills)	Should these impacts occur, there may be a cumulative impact on soils in the study area. Soil pollution within and outside the site boundary can be prevented through mitigation.	- Low
Disturbance of soils and existing land use (soil compaction)	Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area. However, the effect of compaction mitigation will be localised within the area and will only have an effect during the construction and operational years.	- Low
Impacts of the geology on the proposed development	a fatal flaw cannot be identified that may prematurely terminate the development of	N/A

	the proposed solar farm.	
Hydrology	It was concluded that no water features have been found on the site. For this reason, it is not foreseen that there will be any significant impacts on the hydrology of the site.	N/A
Generation of waste	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.	- Medium
Employment opportunities	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.	+ Medium
Visual intrusion	The construction of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads adjacent to site. Dust will be the main factor to take into account.	- Low
Increase in construction vehicles	If damage to roads is not repaired, then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage. However, no local roads will be used.	- Negligible
Impact of construction workers on local communities & influx of job seekers	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their	- Medium

	families and the community.	
Risk to safety, livestock and farm infrastructure.	If fire spreads to neighbouring properties, the effects will be compounded. Negligible cumulative effects, provided losses are compensated for.	- Negligible
Increased risks of grass fires.	The risk of grass fires can be mitigated and managed.	- Negligible
Heritage resources	Due to its low significance, the potential for cumulative impact is also considered to be minimal.	- Negligible
Impact on traffic	If other projects in the area are approved, this may result in having a cumulative effect on the traffic on the transportations routs to Vryburg.	-Medium
Operational Phase		
Soil erosion	Should these impacts occur, there will be a cumulative impact on the water resources in the study area in terms of pollution.	- Medium
Change in land use	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.	- Low
Visual intrusion	The operation of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with the existing Eskom power infrastructure and agricultural infrastructure.	- Low
Consumption of water	An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water.	- Medium
Generation of additional electricity	The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area). In combination, the six projects being proposed by Subsolar energy around	+ Low

	Vryburg will potentially add 600MW to the grid.	
Establishment of a community trust	Promotion of social and economic development and improvement in the overall well-being of the community.	+ Medium
Change in the sense of place	The construction of the solar plant and associated infrastructure will increase the cumulative change in the sense of place due to industrial type infrastructure that is being proposed in the region.	- Low
Development of infrastructure for the generation of clean, renewable energy	Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.	+ Medium
Decommissioning Phase		
Visual intrusion	The decommissioning of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads Protea PV adjacent to site. Dust and housekeeping will be the main factors to take into account.	- Low
Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the EIR addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:

- Loss or fragmentation of indigenous natural fauna and flora (- Medium)

- Loss or fragmentation of habitats (- Medium)
- Generation of waste (- Medium)
- Temporary employment (+ Medium)
- Impact of construction workers on local communities & influx of job seekers (- Medium)
- Traffic impacts (- Medium)

➢ Cumulative effects during the operational phase:

- Soil erosion (- Medium)
- Consumption of water (- Medium)
- Establishment of a community trust (+ Medium)
- Development of infrastructure for the generation of clean, renewable energy (+ Medium)

➢ Cumulative effects during the decommissioning phase:

  - Generation of waste (- Medium)

8 PLAN OF STUDY FOR EIA

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

Appendix 2. (2) A scoping report (...) must include -

(i) a plan of study for undertaking the EIA process to be undertaken, including-

(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;

(ii) a description of the aspects to be assessed as part of the EIA process;

(iii) aspects to be assessed by specialists;

(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;

(v) a description of the proposed method of assessing duration and significance;

(vi) an indication of the stages at which the competent authority will be consulted;

(vii) particulars of the public participation process that will be conducted during the EIA process; and

(viii) a description of the tasks that will be undertaken as part of the EIA process;

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

8.1 INTRODUCTION

This section gives a brief outline of the Plan of Study for EIA (PoSEIA) and the tasks that will be undertaken and the anticipated process to meet the objectives for the EIA phase. The approach to the EIA is to focus on those key issues identified for the preferred alternative. This will ensure that the EIA focus on the most significant impacts and in the process save time and resources.

8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE

The purpose of the EIA phase is to assess issues identified in the scoping phase and will include an environmental management programme (EMPr). The EMPr will provide information on the proposed activity and the manner in which potential impacts will be minimized or mitigated. The EIA report will comply with Appendix 3 and will:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- Determine the—
    - (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    - (ii) degree to which these impacts-
        - (aa) can be reversed;
        - (bb) may cause irreplaceable loss of resources, and
        - (cc) can be avoided, managed or mitigated;
- Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- Identify suitable measures to avoid, manage or mitigate identified impacts; and
- Identify residual risks that need to be managed and monitored.

8.3 TASKS TO BE UNDERTAKEN

The following sections describe the tasks that will be undertaken as part of the EIA process.

8.3.1 Project Description

Further technical and supporting information will be gathered to provide a more detailed project description. This will include a detailed site layout plan that will be compiled once the low – medium areas of sensitivity have been indicated by the specialists.

8.3.2 Consideration of alternatives

The following project alternatives will be investigated in the EIR:

- Design/Layout alternatives: In terms of the actual layout of the proposed PV plant which will only be assessed for the preferred site alternative.

8.3.3 Compilation of Environmental Impact Report

A Draft EIR will be compiled to meet the content requirements as per Appendix 3 of GNR982 of the EIA Regulations (4 December 2014) and will also include a draft Environmental Management Programme containing the aspects contemplated in Appendix 4 of GNR982.

8.3.4 Public participation

All registered I&APs and relevant State Departments will be given the opportunity to review the Draft Environmental Impact Report in accordance with Regulation R982. A minimum of 30 days commenting period will be allowed and all stakeholders and I&APs will be given an opportunity to forward their written comments within that period. All issues identified during this public review period will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR to be submitted to the National Department of Environmental Affairs (DEA).

8.4 ASPECTS TO BE ASSESSED

Table 8.1 below provides a summary of the aspects that have been assessed. The aspects are also linked to specialist information obtained.

Table 8.1: Aspects to be assessed

Aspects	Potential impacts	Description of the impact	Specialist studies / technical information
Construction of the PV Solar facility	• Impacts on the fauna and flora	Refer to table 6.2	Ecological Fauna and Flora Habitat Survey & Avifauna study
	• Impacts on agricultural potential (soils)	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	• Impacts associated with the geology of the site	Refer to table 6.2	Geotechnical study
	• Impacts on existing services infrastructure	Refer to table 6.2	Confirmation from the Local Municipality
	• Temporary employment, impacts on health and safety	Refer to table 6.2	EAP to assess the social impacts
	• Impacts on heritage resources	Refer to table 6.2	Heritage Impact Assessment & Palaeontological Heritage Assessment

	• Impacts on Traffic	Refer to Table 6.2	Traffic Impact Study
Operation of the PV Solar facility	• Impacts on the fauna and flora	Refer to table 6.2	Ecological Fauna and Flora Habitat Survey & Avifauna study
	• Impacts on agricultural potential (soils)	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	• Impacts associated with the geology of the site	Refer to table 6.2	Geotechnical study as part of soil study
	• Increased consumption of water	Refer to table 6.2	EAP assessment
	• Pressure on existing services infrastructure	Refer to table 6.2	Confirmation from the Local Municipality
	• Visual Impact	Refer to table 6.2	Visual Impact Assessment
	• Provision of employment & generation of income for the local community	Refer to table 6.2	EAP assessment
Decommissioning of the PV Solar facility	• Impacts on agricultural potential (soil)	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	• Socio-economic impacts (loss of employment)	Refer to table 6.2	EAP to assess the social impacts
Cumulative Impacts	• Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.	Refer to table 6.2	EAP assessment

8.4.1 Specialist studies

Based on the initial descriptions of potential environmental impacts or aspects (refer to Table 8.1), specialists have been subcontracted to assess the potential impacts that may be significant. The specialist studies assess impacts on both the social and the biophysical environment and also help in identifying ways that can help to mitigate the envisaged impacts. The following specialist studies have been included to address the potentially most significant impact as identified during the scoping phase – refer to Table 6.2:

- Geotechnical report as part of the soil study: To determine whether the geotechnical conditions at the site are favorable for the development and construction of a solar PV plant.
- Heritage report: To determine whether the proposed activity will impact on any heritage or archeological artifacts.
- Ecological fauna and flora habitat survey: To determine what the impact of the proposed activity will be on the ecology (fauna and flora) in the area.
- Avifaunal Study: To determine what the impacts of the proposed activity will have on the bird (Avifauna) in the area.
- Visual Impact Assessment: To determine to what extent the proposed activity will be visually intrusive to the surrounding communities or other receptors.
- Soil, Land Capability and Agricultural Potential Study: To determine how the proposed activity will impact on soil and agricultural resources.
- Social Impact Assessment: To determine how the proposed activity will impact on the socio-economic environment.
- Paleontological Assessment: To determine the impacts on paleontological resources.
- Traffic Assessment Study: To determine the potential impacts related to traffic generation as a result of the proposed development.

8.4.2 Terms of reference for specialist studies

Specialists in their field of expertise have considered baseline data and identified and assessed impacts according to predefined rating scales. Specialists have also suggested optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists have, where possible, taken into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area.

The results of these specialist studies have been integrated into the Draft Scoping Report (DSR). The Terms of Reference (ToR) or general requirements proposed for the inputs are presented below and stakeholders are encouraged to comment and provide input on these.

8.4.2.1 General Requirements

Specialists' reports must comply with Appendix 6 of GNR982 published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included:

- The details of-

- the specialist who prepared the report; and
- the expertise of that specialist to compile a specialist report including a curriculum vitae;

- A declaration that the specialist is independent in a form as may be specified by the competent authority;
- An indication of the scope of, and the purpose for which, the report was prepared;
- The date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- A description of the methodology adopted in preparing the report or carrying out the specialised process; the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
- An identification of any areas to be avoided, including buffers;
- A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;
- Any mitigation measures for inclusion in the EMPr;
- Any conditions for inclusion in the environmental authorisation;
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation;
- A reasoned opinion-
  - as to whether the proposed activity or portions thereof should be authorised; and
  - if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
- A description of any consultation process that was undertaken during the course of preparing the specialist report;
- A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

- Review the Scoping Report, with specific reference to the Comments and Response Report to familiarize with all relevant issues or concerns relevant to their field of expertise;
- In addition to the impacts listed in this Scoping Report, identify any issue or aspect that needs to be assessed and provide expert opinion on any issue in their field of expertise that they deem necessary in order to avoid potential detrimental impacts;
- Assess the degree and extent of all identified impacts (including cumulative impacts) that the preferred project activity and its proposed alternatives, including that of the no-go alternative, may have;
- Identify and list all legislation and permit requirements that are relevant to the development proposal in context of the study;
- Reference all sources of information and literature consulted; and
- Include an executive summary to the report.

8.4.2.2 Proposed ToR for the geotechnical study

The geotechnical study will present the findings of a preliminary evaluation of the geotechnical conditions at the proposed Protea solar farm project, the investigation should be carried according to standard practice codes and guidelines. The aims of the investigation will be to:

- Verify the underlying geology and soil cover by means of limited surface mapping.
- Assessing the suitability of the area with regard to the proposed development, based on the available geological- and geotechnical information.
- Identify the general constraints and required precautionary measures that may be required for the proposed development from a planning perspective.
- Make recommendations on the most-, intermediately- and least suitable portions of the project area with regard to the proposed development.

It must be noted that this investigation is requested for planning purposes only and will not be utilized for detailed design and construction. The following actions will be excluded from this investigation:

- Detailed flood line delineation.
- Detailed slope analysis.
- Soil mechanical analysis and sampling for laboratory analysis.

8.4.2.3 Proposed ToR for the heritage assessment

A Heritage Impact assessment will be undertaken for the site in accordance with the requirements of Section 38(3) of the NHRA. The scope of work for this study will consist of:

- A desk-top investigation of the area, in which all available literature, reports, databases and maps were studied; and
- A visit to the proposed development area.

The objectives will be to:

- Identify possible archaeological, cultural and historic sites within the proposed development area;
- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and
- Consider relevant guidelines.

8.4.2.4 Proposed ToR for the ecological fauna and flora habitat survey

The proposed ToR for the ecological fauna and flora habitat survey is as follows:

- Provide a detailed fauna and flora habitat survey;
- Provide a detailed habitat survey of possible threatened or localised plant species, vertebrates and invertebrates;
- Take count and map the location (and provide coordinates) of any protected species or sensitive habitats found on site.
- Record possible host plants or food plants of fauna such as butterflies;
- Evaluate the conservation importance and significance of the site with special emphasis on the current status of threatened species;
- Conduct a literature investigation of possible species that may occur on site;
- Identify potential ecological impacts on fauna and flora that could occur as a result of the development;
- An assessment of the potential direct and indirect impacts resulting from the proposed development during the construction, operation and decommission phases; and
- Make recommendations to reduce or minimise impacts, should the development be approved.

8.4.2.5 Proposed ToR for the visual impact assessment

The proposed ToR for this Visual Impact Assessment is as follows:

- Conduct a desktop review of available information that can support and inform the specialist study;
- Describe the receiving environment and the visual absorption for the proposed project;
- Conduct a field survey to determine the actual or practical extent of potential visibility of the proposed development;
- Conduct a photographic survey of the landscape surrounding the development;
- Identify issues and potential visual impacts for the proposed project, to be considered in combination with any additional relevant issues that may be raised through the public consultation process;
- Identify possible cumulative impacts related to the visual aspects for the proposed project;
- Assess the potential impacts, both positive and negative, associated with the proposed project for the construction, operation and decommissioning phases;
- Identify management actions to avoid or reduce negative visual impacts; and to enhance positive benefits of the project; and
- Use mapping and photo-montage techniques as appropriate.

8.4.2.6 Proposed ToR for the soil, land capability and agricultural potential study

The purpose of the soil, land capability and agricultural potential study will be to determine the soil forms and current land capability of the area where the proposed project will be situated. The objectives of this study will be to:

- Describe the soils (distribution, types, depth, surface features, suitability for agriculture, physical and chemical characteristics, fertility, erodability, dry land production potential and irrigation potential);
- Determine the pre-development land capability;
- Determine the present land use;
- Conduct an Impact Assessment for the soils and land capability which will feed into the overall Environmental Impact Assessment;
- Propose mitigation measures for the impacts to form part of the Environmental Management Program; and
- Compile a soil, land capability and agricultural potential report to meet the Department of Agriculture's requirements and to encompass the findings of the desktop assessment, soil survey, agricultural evaluation and impact assessment.

The soil assessment must include the following as per DEAs requirements:

- Identification of the soil forms present on site;
- The size of the area where a particular soil form is found;
- GPS reading of soil survey points;
- The depth of the soil at each survey point;
- Soil colour;
- Limiting factors;
- Clay content; and
- Slope of the site.

8.4.2.7 Proposed ToR for avifaunal study

The Avifaunal Study should include the following:

- Desktop analysis of existing literature and data;
- Site visit during dry season;
- Site visit during wet season;
- Identification of high risk species, particularly Red listed and other priority species that might be impacted by the proposed activity;
- Description of assessment of the significance of likely impacts on priority avifauna;
- Mitigation measures to reduce the envisaged impacts on birds.

7.4.2.10 Proposed ToR for the Paleontological Assessment

The scope of work for this study will consist of:

- A desktop investigation of the area, in which all geological maps, published scientific literature, previous paleontological impact studies in the same region and the author's field of experience (consultation with professional colleagues as well as examination of institutional fossil collections and data) should be studied and used.
- Based on the outcome of the desktop study and the comments obtained from SAHRA, the need for a field assessment must be determined. The desktop investigation must be supplemented with a field assessment if required.
- Assess the potential impacts, based on a supplied methodology.
- Describe mitigation measures to address impacts during the construction, operation and decommissioning stages.

- Describe cumulative impacts of the project on paleontological resources in both the local study area regional study area and the proponent's plans to manage those effects.
- Supply the client with geo-referenced GIS shape files of any sensitive areas.

8.4.7.11 Proposed ToR for the Traffic Study

The scope of work for this study will consist of:

- Location of the Site (Nearest numbered road indicated)
- Trip generation during construction and operation of the plant
- Probable Haulage Routes (National and Provincial Roads will be utilised)
- Site Access Route (from a National roadway)
- Affected Communities

8.4.2.8 Expected deliverables

The specialist is expected to prepare a report that addresses the scope of the work as set out above. The report should be prepared in a suitable font (such as Arial 12) and submitted to Environamics in draft form. If accepted by Environamics and the client an electronic copy should be provided for submission to the Department.

8.5 METHOD OF ENVIRONMENTAL ASSESSMENT

The environmental assessment aims to identify the various possible environmental impacts that could results from the proposed activity. 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 8.2.

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

8.5.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

Table 8.2: The rating system

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.

8.6 CONSULTATION WITH THE COMPETENT AUTHORITY

Consultation with the competent and commenting authorities will continue throughout the duration of impact assessment phase. The authorities will also comment on whether they deem it necessary to conduct additional specialist studies other than what is proposed already in this PoSEIA. On-going consultation will include:

- Submission of the EIR following a 30-day public review period (and consideration of comments received).
- Arrangements will be made to discuss the report with the Environmental Officer responsible for the project during the review period.
- An opportunity to visit and inspect the site.

9 CONCLUSION

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

- The scoping phase complied with the specifications set out in Regulations 21 and Appendix 2 of GNR982.
- All key consultees have been consulted as required by the Regulations 39 to 44.

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

- Impacts during construction phase:
- Impacts during construction phase:
    - Impacts on the fauna and flora
    - Impacts on soil
    - Impacts associated with the geology of the site
    - Impacts on existing services infrastructure
    - Temporary employment and other economic benefits
    - Impacts on heritage resources
- Impacts during the operational phase:
    - Impacts on the fauna and flora
    - Impacts associated with the soil
    - Impacts associated with the geology of the site
    - Increased consumption of water (3880m³ per annum)
    - Increase in employment and other economic benefits
    - Visual impacts
    - Generation of income to the Local Community
    - Pressure on existing services infrastructure and water sources.
    - Impacts on heritage resources
    - Additional electricity generation
- Impacts during the decommissioning phase:

- Loss of permanent employment & the creation of temporary employment
- Impacts on heritage resources

➢ Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

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

The scoping report be approved after which the EIA process, as required by Regulations 23 to 24 may commence.

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

Ms. Marelie Griesel
Environamics Environmental Consultants

10 REFERENCES

ACTS *see* SOUTH AFRICA

ALMOND J. E. 2016. Palaeontological Heritage Assessment: Combined Desktop & Field Based Study. Proposed Protea Solar Power Plant on the Remaining Extent of Farm Hartsboom 734 near Vryburg, North-West Province.

BOTHA, A. J. 2016. The proposed Protea Solar Power Plant near Vryburg, North West Province. Visual Impact Assessment.

CONSTITUTION *see* SOUTH AFRICA. 1996.

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

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

DR RUTH SEGOMOTSI MOMPATI DISTRICT MUNICIPALITY. 2014/2015 Integrated Development Plan (IDP).

ENERGY BLOG. 2015. Energy Blog – Project Database. [Web:] http://www.energy.org.za/knowledge-tools/project-database?search=project lookup&task=search [Date of assess: 28 September 2015].

FIRST SOLAR. 2011. PV Technology comparison.

NW PROVINCIAL GOVERNMENT. 2004-2014. North West Province Growth and Development Strategy. Pretoria: Government Printer.

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

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

LANZ, J. 2016. Agricultural and Soils Impact Assessment for Proposed Protea Solar Power Plant near Vryburg North West Province. EIA Phase Report.

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

NALEDI LOCAL MUNICIPALITY. 2012-2017. Integrated Development Plan (IDP).

NALEDI LOCAL MUNICIPALITY. Spatial Development Framework (SDF).

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

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

SOLARGIS. 2011. Global Horizontal Irradiation (GHI). [Web:] http://solargis.info/doc/71 [Date of access: 7 May 2014].

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

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

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

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

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

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

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

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

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

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

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

TERBLANCHE. R. F. 2016. Ecological Fauna & Flora Habitat Survey. Remaining Extent of the Farm Retreat 671, situated in the Dr Ruth S Mompati District Municipality, IN Registration Division, Province of the North-West, measuring 297,4480 (two hundred and ninety seven comma four four eight zero) hectares, Title Deed No. 2676/2009.

VAN DER MERWE, D. 2016. Traffic Impact Study for the Transport of Solar Energy Equipment – Sonbesie SPP Vryburg.

VAN SCHALKWYK, J. 2016. Cultural Heritage Impact Assessment for the Development of the Proposed Sonbesie Solar Power Plant on a Portion of the farm Retreat 67, IN, Vryburg Region, North West Province.

WILLIAMS, A. J. 2015. Bird report for the proposed Sonbesie Solar Power Plant.

WORLD BANK GROUP. 2006. The Equator Principles.