FINAL ENVIRONMENTAL IMPACT REPORT

7 October 2016

THE PROPOSED LUTZBURG SOLAR PLANT NEAR POSTMASBURG, NORTHERN CAPE PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DEA Reference No.	**:**	14/12/16/3/3/2/938
Project Title	**:**	Proposed Lutzburg Solar Plant near Olifantshoek, Northern Cape Province
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Client	**:**	Lutzburg Solar (RF) (Pty) Ltd.
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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
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
TLM	Tsantsabane 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
SPP	Solar Power Plant
VU	Vegetation Unit

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, Lutzburg Solar (RF) (Pty) Ltd. is proposing the development of a photovoltaic solar facility and associated infrastructure for the purpose of commercial electricity generation on an identified site located on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266, Registration Division Gordonia, Northern Cape 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 around 2378 kWh/m²/annum.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Tsantsabane Local Municipality faces a number of challenges in addressing the needs and improving the lives of the community (IDP, 2014-15). The Tsantsabane Local Municipality's (TLM) Integrated Development Plan (IDP, 2015-16) identifies the mission of the municipality as: to commit themselves to ensure better service delivery, facilitate local economic development, ensure financial sustainability within the local municipality, strive towards good governance and public participation and to realise the potential and direction of growth in terms of spatial development of the municipality. The IDP does not explicitly deal with renewable energy development, but the Tsantsabane IDP does however have development imperatives that relate to the proposed project that will produce sufficient energy to support industry at competitive prices and investment in public infrastructure focusing on transport, energy and water.

In response to the above Lutzburg Solar (RF) (Pty) Ltd. intends to develop a 115MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266, Registration Division Gordonia, Northern Cape Province situated within the Tsantsabane Local Municipality area of jurisdiction. The town of Postmasnurg is located approximately 46km east and the town of Olifantshoek is located approximately 35km north-

northeast of the proposed development (refer to figure 1 and 2 for the locality and regional map). The total footprint of the project will approximately be 300 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 via a main road (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..."*

Being listed under Listing Notice 1 and 2 (Regulation 983 & 984) 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 Lutzburg Solar's behalf.

Appendix 3 to GNR982 requires that the EIA process be undertaken in line with the approved plan of study for EIA and that the environmental impacts, mitigation as well as the residual risks of the proposed activity be set out in the environmental impact assessment report (EIR). The potential positive and negative impacts associated with the proposed development have been assessed and the potentially most significant environmental impacts associated with the development are briefly summarised below:

Impacts during the construction phase:

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

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 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.

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, pressure on existing service infrastructure, 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.

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Energy Blog's database no other solar PV plants have been granted preferred bidder status within a radius of 30km of the proposed Lutzburg PV plant. And, according to the Department's database one (1) solar plant has been proposed in relative close proximity to the proposed activity, however, this site, namely Jasper Solar Company is incorrectly portrayed on the database and is in effect situated between Postmasburg and Danielskuil. Environamics is also in the process of applying for Environmental Authorisation for one (1) additional PV project in the surrounding area.

The potential for cumulative impacts may therefore exist. The Final EIR 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 being 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 contains information that is necessary for the competent authority to consider the application and to reach a decision contemplated in the EIA Regulations.

1. INTRODUCTION

This section aims to introduce the Environmental Impact Report (EIR) and specifically to address the following requirements of the regulations:

Appendix 3. (3) A environmental impact assessment report contains the information that is necessary for the competent authority to consider and come to a decision on the application, and 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 and 984 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 electricity of 132 kilovolts outside an urban area.
GNR. 983, 4 December	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or*

[1] Please refer to table 6.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

2014		*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 portions of the farm has been previously cultivated and the property will be rezoned to "special" land 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 115 MW 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 preferred site falls within the Gordonia Plains Shrubland (SVk16) and Olifantshoek Plains Thornveld (SVk13), both of which are described by Mucina and Rutherford (2006) as 'least threatened'. However,activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed.

Being listed under Listing Notices 1 and 2 (Regulation 983 & 984) 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 3 of Regulation 982 the objective of the EIR is to, through a consultative process:

- 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—

- nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
- degree to which these impacts-
  - can be reversed;
  - may cause irreplaceable loss of resources, and
  - 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.

This report is the Final Environmental Impact Report (EIR) 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 reports. The draft EIR was made available to registered I&APs and all relevant State Departments. They were requested to provide written comments on the draft EIR within 30 days of receiving it. All issues identified during this review period are documented and compiled into a Comments and Response Report as part of the Final EIR.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person:	Marélie Griesel		
Postal Address:	PO Box 6484, Baillie Park, 2526		
Telephone:	018-290 8228 (w)	086 762 8336 (f)	081 477 9545 (Cell)
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 the 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 reports.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Geotechnical Study	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
Avifaunal Study	Birds & Bats Unlimited	Dr. Rob Simmons	Constantia Cape Town 8010	Tel: 021 794 8671 Cell: 082 780 0133	rob.simmons@uct.ac.za
Ecological Fauna and Flora Habitat Survey	Environmental Research Consulting	A. Götze	P. O. Box 20640 Noordbrug 2522	Cell: 082 789 4669	albie.erc@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	Paleo Field Services	Dr. Lloyd Rossouw	P. O. Box 38806 Langenhovenpark 9330	Cell: 084 250 5992	lloyd.rossouw@gmail.com
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
Social Impact Assessment	Leandri Kruger Research & SIA Consultant	Mrs. L. Kruger	27 Tuscan Views Ditedu Ave 51 Potchefstroom, 2520	Cell: 082 447 1455	leandrihildebrandt@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Dirk van der Merwe	Edison Square, 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 1.3 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 with the developer on 29 February 2016 to discuss the proposed development and assess the site.
- The public participation process was initiated on 17 March 2016 and all I&APs were requested to submit their comments by 20 April 2016.
- A fully completed application form and Draft Scoping report was submitted to the Department on 20 May 2016.
- The Draft Scoping Report was made available to all registered I&APs and relevant State Departments on 19 May 2016 and they were requested to provide their comments on the report within 30 days of the notification (19 June 2016).
- A Public Meeting was held on 31 May 2016 and all registered I&APs were invited to attend though emails, sent on 25 May 2016 and a newspaper advertisement placed on 20 May 2016.
- The Final Scoping Report (FSR) was submitted to the Department of environmental Affairs on 28 June 2016.
- The Department of Environmental Affairs accepted the final scoping report in a letter dated 10 August 2016.
- The Draft EIR Report was submitted to the Department of Environmental Affairs on 2 September 2016.

It is envisaged that the EIA process should be completed within approximately five months of submitting the Final EIR, i.e. by February 2017 – see Table 1.3.

Table 1.3: Project schedule

Activity	**Prescribed timeframe**	**Timeframe**
Site visit		29 Feb. 2016
Appoint Avifaunal Specialist	6 Months	Feb. – Aug. 2016
Public participation (BID)	30 Days	17 Mar. – 20 April 2016
Conduct specialist studies	-	Feb. – April 2016

Submit application form and DSR	-	20 May 2016
Public participation (DSR)	30 Days	20 May – 21 June 2016
Submit FSR	-	July 2016
Department acknowledges receipt	10 Days	July 2016
Department approves/reject	43 Days	10 August 2016
Public participation (DEIR)	30 Days	2 Sept. 2016
Submission of FEIR & EMPr	-	7 October 2016
Department acknowledges receipt	10 Days	October 2016
Decision	107 Days	Oct.-Feb. 2017
Department notifies of decision	5 Days	Feb./March 2017
Registered I&APs notified of decision	14 Days	March 2017
Appeal	20 Days	March 2017

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 3 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 an EIR as specified in the Regulations		Section in report	Pages
Appendix 3. (3) - An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-			
(a)	details of -	1	14-23
	(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	24-34
	(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 as well as the associated structures and infrastructure 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 and being applied for; and		
	(ii) a description of the associated structures and infrastructure related to the development.		
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.	3	35-49
(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	50-53
(g)	A motivation for the preferred development footprint within the approved site.	5	54-87
(h)	a full description of the process followed to reach the proposed development footprint within the approved site, including –		
	(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and		
	(x) a concluding statement indicating the preferred alternative development location within the approved site.		
	(v) the impacts and risks identified 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	6	88-119

	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;		
	(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;		
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-		
	(i) a description of all environmental issues and risks that were identified during the EIA process; and		
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.		
(j)	an assessment of each identified potentially significant impact and risk, including-		
	(i) cumulative impacts;		
	(ii) the nature, significance and consequences of the impact and risk;		
	(iii) the extent and duration of the impact and risk;		
	(iv) the probability of the impact and risk occurring;		
	(v) the degree to which the impact and risk can be reversed;		
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and		
	(vii) the degree to which the impact and risk can be mitigated;		
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;		
(l)	an environmental impact statement which contains-	8	135-137
	(i) a summary of the key findings of the environmental impact assessment:		
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and		
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;		

(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;		
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Not applicable	
(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation	Not applicable	
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8	135-137
(q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;		
(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Not applicable	
(s)	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 (I&APs);		
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and		
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;		
(t)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable	
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including-	Not applicable	
	(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and		
	(ii) a motivation for the deviation;		
(v)	any specific information that may be required by the CA; and	Not applicable	
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable	

2 ACTIVITY DESCRIPTION

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

Appendix 3. (3) An EIR (...) 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 or activities applied for as well as the associated structures and infrastructure 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 and being applied for;

(ii) a description of the associated structures and infrastructure related to the development.

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 Portion 2 of the farm Ruby Vale No. 266, Registration Division Gordonia, Northern Cape Province situated within the Tsantsabane Local Municipality area of jurisdiction. The proposed development is located in the Northern Cape Province in the northern central interior of South-Africa (refer to figure 2 for the regional map). The town of Olifantshoek is located approximately 35km north-northeast 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 footprint of the project will approximately be 300 hectares at the preferred site or 300 hectares on the alternative site (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 Lutzburg Solar (RF) (Pty) Ltd. from the property owner, Wilhelm Uys Trust, for the lifespan of the project (minimum of 20 years).

Table 2.1: General site information

Description of affected farm portion	The Remaining Extent of Portion 2 of the farm Ruby Vale No. 266, Registration Division Gordonia, Northern Cape Province.
Description of affected farm portion (powerline)	The Remaining Extent of Portion 2 of the farm Ruby Vale No. 266, Registration Division Gordonia, Northern Cape Province.
21 Digit Surveyor General codes	C02800000000026600002
Title Deed	T1919/1998
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 300 ha (Preferred and Alternative site)
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 300 hectares
Generation capacity	115MW
Expected production	130-160 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 cattle, sheep and goats– refer to plates 1-22 for photographs of the development area. The property on which the development is to be established is owned by Wilhelm Uys Trust (Pty) Ltd.

2.2 ACTIVITY DESRIPTION

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. 983, 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 rezoned to "special".
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 115 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 preferred site falls within the Gordonia Plains Shrubland (SVk16) and Olifantshoek Plains Thornveld (SVk13), both of which are described by Mucina and Rutherford (2006) as 'least threatened'. However, activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares 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:

[2] Please refer to table 6.2 for a detailed description of the relevant aspects of the development that will apply to each specific listed activity.

- 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. A short access road will be constructed to link the site with the R31 Provincial Road. 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 modules will be required to form the solar PV array which will comprise the PV facility. The PV modules will either be tilted at a fixed angle, or mounted on trackers tracking from east to west during the day in order to capture the most solar energy.

- 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 Lutzburg Solar (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 Lewensaar 275/50kV Substation. The Project will inject up to 100MW into the National Grid. 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 D3300 gravel road off the R385 Provincial Road. 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 between 8m & 10m.

- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm. Cochrane Clearvu fencing with a height of 2.5 meters will be used.

2.4 LAYOUT DESCRIPTION

The layout plan follows the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site are considered – refer to figure 9 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). Limited features of environmental significance exist on site. A final layout plan is included as an Appendix under Layout Plans in the report.

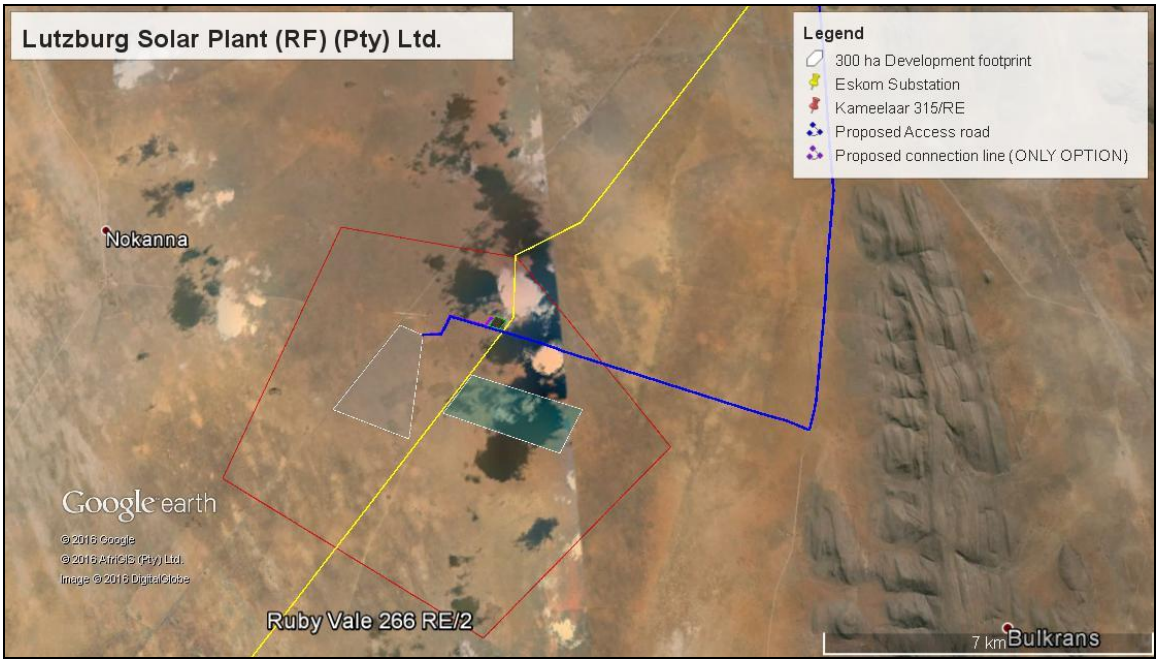


Figure 9: Proposed layout on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266

Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DEA specifications.

Table 2.3: Technical details for the proposed facility

Component	Description / dimensions
Height of PV panels	3.5 meters
Area of PV Array	300 Hectares
Number of inverters required	Minimum 34
Area occupied by inverter / transformer stations / substations	Inverter Transformer Station: 2.5 x 7.6 meters (19m^2) Substation: 3 000m^2
Capacity of on-site substation	132kV
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 300 Hectares Construction Laydown Area: 713.11 m^2
Area occupied by buildings	Security Room: 66.74 m^2 Office: 157.6 m^2 Staff Locker and Changing Room: 213.745 m^2
Length of internal roads	Approximately 13 km
Width of internal roads	Between 8 & 10meters
Proximity to grid connection	Approximately 780 meters
Height of fencing	Approximately 2.5 meters
Type of fencing	Cochrane Clearvu

Table 2.4 and figure 10 provide and illustrate the corner coordinate points for the proposed development site as well as start, middle and end point coordinates for linear activities.

Table 2.4: Coordinates

Coordinates			
EIA Footprint	1	28°12'37.43"S	22°34'16.75"E
	2	28°12'47.01"S	22°34'36.25"E
	3	28°14'5.96"S	22°34'19.98"E
	4	28°13'38.29"S	22°33'17.06"E
Access Road	1	28°12'47.53"S	22°34'35.65"E
	2	28°12'47.71"S	22°34'36.47"E
	3	28°12'47.04"S	22°34'36.57"E
	4	28°12'47.89"S	22°34'51.78"E
	5	28°12'38.83"S	22°34'57.92"E
	6	28°12'34.21"S	22°35'0.29"E
Power Line	1	28°12'47.11"S	22°34'35.76"E
	2	28°12'46.72"S	22°34'35.92"E
	3	28°12'47.60"S	22°34'51.63"E
	4	28°12'38.74"S	22°34'57.62"E
	5	28°12'33.87"S	22°35'0.20"E
	6	28°12'44.64"S	22°35'30.19"E
	7	28°12'38.76"S	22°35'35.28"E
	8	28°12'39.88"S	22°35'37.64"E

Figure 10: Map indicating coordinate points

2.5 SERVICES PROVISION

The following sections provides information on services required on the site e.g. water, sewage, refuse removal, and electricity.

2.5.1 Water

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 D73C quaternary drainage region, this drainage region falls under Zone A, 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 A indicates that no 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 200m³ per month during the 12 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 3880m³ 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 Tsansabane 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.

2.5.2 Storm water

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. It will also be good practice to design storm water canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Storm water management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix I.

2.5.3 Sanitation and waste removal

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 Kathu, Hotazel, Kuruman, Aggeneys, Britstown or Upington). 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 requested in a letter dated, 18 April 2015 to formally confirm that it has the capacity to provide the proposed development with these services for the life time of the project (20 years). To date no feedback has been received - refer to Appendix E for proof of correspondence with the TLM.

2.5.4 Electricity

Electricity use will be limited, and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sources by the photovoltaic plant, and from the electricity connection at night.

2.6 Decommissioning of the facility

The operating period will be 20 years from the commencement date. Thereafter two rights of renewal periods of 40 years and 20 years will be relevant. It is anticipated that new PV technologies and equipment will be implemented, within the scope of the Environmental Authorisation, when influencing the profitability of the solar facility.

A likely extension of the plant's lifetime would involve putting new, more efficient, solar panels on the existing structures. The specifications of these new panels will be the same as the current one, but for that the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that the same, but faster and more efficient). If, for whatever reason the plant halts operations, the Environmental Authorisation and contract with the landowner will be respected during the decommissioning phase. The following clauses are an extract from the contract indicating the commitment to the rehabilitation of the area.

Lessee's obligation on termination:

Subject to any Environmental Approval being required and subject to any condition attaching to an existing Environmental Approval, if any, the Lessee shall upon the termination of this Agreement be entitled to remove any Project Equipment, which equipment shall at all times be regarded as movable, notwithstanding the manner and method by which it is affixed or shall otherwise have acceded to the Leased Premises. If the Lessee fails to remove any Project Equipment within a period of 6 (six) months of this Agreement terminating, the same shall become the property of the Lessor (as far as permitted in Law) and the Lessee shall not have any claim against the Lessor for compensation or otherwise in respect of any Project Equipment not removed. However, if the Lessee fails to remove any Project Equipment despite being requested to do so, in writing, the Lessor may remove the same and restore the Leased Premises at the expense of the Lessee.

Notwithstanding the provisions of the clause above and subject to compliance with Environmental Law, the Lessee shall take such measures to rehabilitate the Leased Premises as the Lessor directs, in writing, for the purpose of restoring the Leased Premises to the condition in which it was before the commencement of any Works, including amongst others, decommissioning the Energy Facility. The Lessee undertakes to complete any such rehabilitation or decommissioning within 6 (six) months after the Termination Date.

As security for the above and to the extent required by the Lessor, the Lessee shall furnish to, or in favour of, the Lessor, such security (and for such amount) as is acceptable to the Lessor. The Parties specifically agree that the amount of security required by the Lessor should at all times be reasonable and should under no circumstances whatsoever exceed an amount reasonably deemed acceptable and appropriate to cover the total cost of rehabilitation of the Leased Premises.

The decommissioning process will consist of the following steps:

- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.

- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.

- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

The rehabilitation of the site would form part of the decommissioning phase. The aim would be to restore the land to its original form (or as close as possible). The rehabilitation activities would include the following:

- Removal of all structures and rubble,

- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil,

- The surface will be restored to the original contours and hydro seeding will take place.

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 3. (3) An EIR (...) must include-

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context.

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 and their applicability to the proposed development 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)
- Northern Cape Provincial Development and Resource Management Plan/ Provincial Spatial Development Framework (PSDF) (2012)

- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- ZF Mgcawu District Municipality Final Integrated Development Plan for 2012 – 2017
- Tsansabane Local Municipality Integrated Development Plan Review for 2014 – 2015

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 country's environment. It compels government to pass legislation and use other measures to protect the environment, to prevent pollution and ecological degradation, promote conservation and secure sustainable development.
The National Environmental Management Act (Act No. 107 of 1998)	National and Provincial Department of Environmental Affairs	1998	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 and activities 1 and 15 listed in Regulation R984 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 D73C quaternary drainage region, this drainage region falls under Zone A, 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 no water may be abstracted from a ground water resource without applying for a Water Use License.

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 Heritage Resources Act (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999	The Act aims to introduce an integrated and interactive system for the management of the heritage resources, to promote good government at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and

			promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. 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 photovoltaic solar 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 Energy Efficiency Demand-Side Management (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 Integrated Energy Plan (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; and • 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 43renewable; 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 44 renewables were brought forward in order to accelerate a local industry; • To account for the uncertainties associated with the costs of 44renewable 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 44renewable. 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 44renewable; and 8,9GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from 44renewable from 11,4 GW to 17,8 GW.
Northern Cape Provincial Development and Resource Management Plan	Northern Cape Provincial Government	2012	The Northern Cape Provincial Spatial Development Framework (further referred to as the PSDF) of 2012 in compliance with the Northern Cape Planning and Development Act 7 of 1998 (Chapter IV, Section 14), aims to "*ensure that the use and allocation of the province's resources, both renewable and non-renewable, are informed by a set of integrated and coordinated policies, objectives, implementation strategies, programmes and, where appropriate, projects aimed at:* • *setting and monitoring, where appropriate, measurable standards with regard to, amongst other, public access to health, safety, amenities, education and economic opportunity;* • *ensuring that the supply of public infrastructure is directed towards meeting the required standards in a prioritised, coordinated, sustainable and cost-effective way, in terms of capital and maintenance expenditure;* • *ensuring the protection and sustainable utilisation of land, water and air where these are important for the maintenance of ecologically-sensitive systems or processes, areas of biological diversity, public health or public amenities;* • *providing an investment and expenditure programme coordinated with budgetary cycles and*

capable of securing financial and other resources from National Government and any other funding agencies as well as public/private sector partnerships; and

- *informing and guiding the preparation and implementation of district and local municipal infrastructure management plans and land development plans*" (PSDF 2012:4).

The PSDF mainly aims to build a prosperous, sustainable growing provincial economy to firstly improve social development and to eradicate poverty. The PSDF adopted the International Union for Conservation of Nature's (IUCN) mission as their main goal. This goal states that essential ecological processes are being maintained, that natural resources are being preserved and utilised in a sustainable manner, that the use of the biosphere are managed while also maintaining its potential for future generations.

The PSDF of 2012 highlights that renewable energy sources such as solar thermal and wind, comprise 25% of the Northern Cape's energy generation capacity by the year 2020, and should be progressively phased in as appropriate into the province. The PSDF further sets out energy objectives, which include the following:

- To promote the development of renewable energy supply schemes;
- To enhance the efficiency of Eskom's power station at the Vanderkloof power station;
- Reinforce additional electricity supply especially renewable energy projects; and
- Develop and implement innovative energy technologies to improve access to reliable, sustainable and affordable energy services. Also recognize that the objective should be to obtain sustainable economic growth.

Lastly, the PSDF notes that the Northern Cape need to develop large-scale renewable energy supply schemes in order to address the growing demand in energy and to promote a green economy in the province.

Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	Department of Environmental Affairs	2014	The Department of Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is thus likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit. The proposed site does not fall within a REDZs.
ZF Mgcawu District Municipality Final Integrated Development Plan (IDP)	ZF Mgcawu District Municipality	2012 - 2017	It is the mission of the ZF Mgcawu District Municipality IDP of 2012 – 2017 (further referred to as the Plan) to enhance economic development for the district by creating and maintaining an effective administration and a safe environment for the community. According to the plan the strategic objectives of the District are as follows: • To monitor and determine the housing backlogs in the district as well as to inform the public on housing information; • To assess and provide targeted support improving institutional capacity and service delivery

			capabilities of category B-municipalities; • To promote environmental health and safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of environmental health services, fire and disaster risks; • To promote safety of communities in the ZF Mgcawu District through the proactive prevention, mitigation, identification and management of fire and disaster risks; • To facilitate the development of sustainable regional land use, economic, spatial and environmental planning frameworks that will support and guide the development of a diversified, resilient and sustainable district economy; • To market, develop and co-ordinate tourism in the ZF Mgcawu District by promoting a green Kalahari tourism brand; • To assess and monitor the status of infrastructure needs and requirements of Category B-municipalities; and • To ensure efficient business operations and to fulfill the assurance statutory requirements of the ZF Mgcawu District Municipality. The strategic objectives above guided the priority issues identified for each are given in the Plan. The issues that were highlighted that relates to the proposed project is firstly the development of infrastructure and secondly the possibility of renewable energy for the development of new buildings.
Tsansabane Local Municipality Integrated Development Plan (IDP) Review	Tsansabane Local Municipality	2015-2016	The Tsantsabane Local Municipality Integrated Development Plan for 2014 – 2015 (further referred to as the Plan) is a strategic document that outlines the community's development objectives. It also includes a policy framework which guides management in the decision making process of the financial planning for the municipal area. The Plan identifies six performance areas, which have to be aligned to the strategic objectives of the municipal area. The first key performance area identified below, is the area, which relates to the proposed Lutzburg SPP. The six (6) key performance areas (KPA) are: • <u>KPA 1 - Service Delivery</u>: This KPA refers to the physical infrastructure and energy efficiency in order to ensure efficient infrastructure and energy supply that will contribute to the

	improvement of quality of Lutzburg for all citizens of the Tsantsabane local municipality. • KPA 2 - Local Economic Development: KPA 2 refers to Economic Growth and Development in order to facilitate sustainable economic empowerment for all communities within the Tsantsabane local municipality and enabling a viable and conducive economic environment through the development of related initiatives including job creation and skills development. • KPA 3 - Financial Viability: This KPA refers to financial sustainability in order to ensure the financial sustainability of the municipality in order to adhere to statutory requirements. • KPA 4 - Institutional Arrangements and PMS: This KPA refers to institutional transformation in order to provide an effective and efficient workforce by aligning our institutional arrangements to our overall strategy in order to deliver quality services. • KPA 5: Good Governance and Public Participation • KPA 5 refers to governance and stakeholder participation in order to promote proper governance and public participation. • KPA 6 - Spatial Development: This KPA gives direction for the municipality in terms of its land use and its potential and direction for growth.

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

[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.

4 THE NEED AND DESIRABILITY

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

Appendix 3. (3) An EIR (...) must include-

(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;

4.1 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 environmentally responsible development, the impacts of climate change and the need for sustainable development.

Over 90% of South Africa's electricity generation is coal based, the Word bank estimates that this results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO_2 emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13th largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011).

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 Tsansabane Local Municipality's Integrated Development Plan such as ensuring economic growth in the region and creating long term employment.

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 Northern Cape 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 453 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.
- Effective use of resources - Because of predominantly the climate limitations, the site has limited suitability for cultivated crops, and viable agricultural land use is limited to grazing only. The moisture availability class 7 classification, with high variability of rainfall is a very severe limitation to agriculture, which makes any cultivation without irrigation completely non-viable. The very sandy soils, with very limited water holding capacity are a further limitation. The grazing capacity on AGIS is classified almost entirely across the site as 22-25 hectares per large stock unit, although the very northern part of it borders on the category above this, 18-21 hectares per large stock unit. The proposed development in this specific area will generate alternative land use income through rental for energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Cumulative impacts of low to medium significance - No solar PV plants have been granted preferred bidder status within proximity radius of 30km to the proposed Lutzburg PV plant. The Final EIR includes a detailed assessment of the potential cumulative impacts associated with the proposed development – refer to Section 7 of the report. No cumulative impacts with a high residual risk have been identified.

In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

Appendix 3. (3) An EIR (...) must include-

(g) A motivation for the preferred development footprint within the approved site (i) details of all the alternatives considered;

(h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –

(i) details of all the development footprint 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 development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(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 alternative development location within the approved site.

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 G1) was conducted by the developer on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266 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 less suitable for the proposed development such as areas with a high density of protected tree species. These factors were then taken into consideration and avoided as far as possible. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site. Two alternative sites on the farm has been identified (Subsolar, 2016).

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 cattle, sheep and goats (refer to the photographs of the site). However, the potential opportunity costs in terms of alternative land use income through rental for energy facility and 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 Lutzburg Solar (RF) (Pty) Ltd. in the Olifantshoek/Postmasburg area to potentially establish solar facilities. From a local perspective, the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266 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 7 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 possible sites were identified on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266. These sites are referred to as the alternative and the preferred site. Some limited sensitive features occur on both sites – refer to figure 11. Each of these portions are more than 250ha in extent. The areas identified are as follow:

Preferred development site (white portion): This area also has a regular terrain and the vegetation here also seems less dense. This area would however require a longer power line route but it is situated close to the public road for site access.

Alternative 1 (blue portion): This area also contains dense vegetation and a slightly steeper terrain. This area would also require a much longer power line route and would require longer new roads to be constructed for site access.

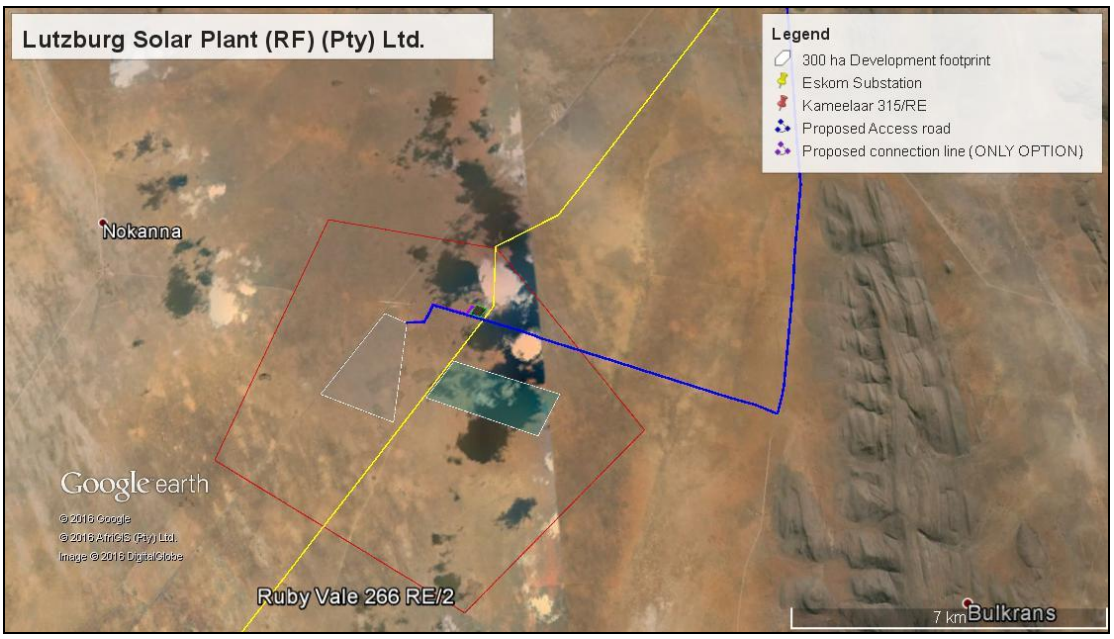


Figure 11: Location alternatives on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266

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 – Lutzburg Solar (RF) (Pty) Ltd. is part of a portfolio of solar PV projects throughout South Africa. Lutzburg Solar (RF) (Pty) Ltd. is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Olifantshoek/Postmasburg area – refer to figure 12.

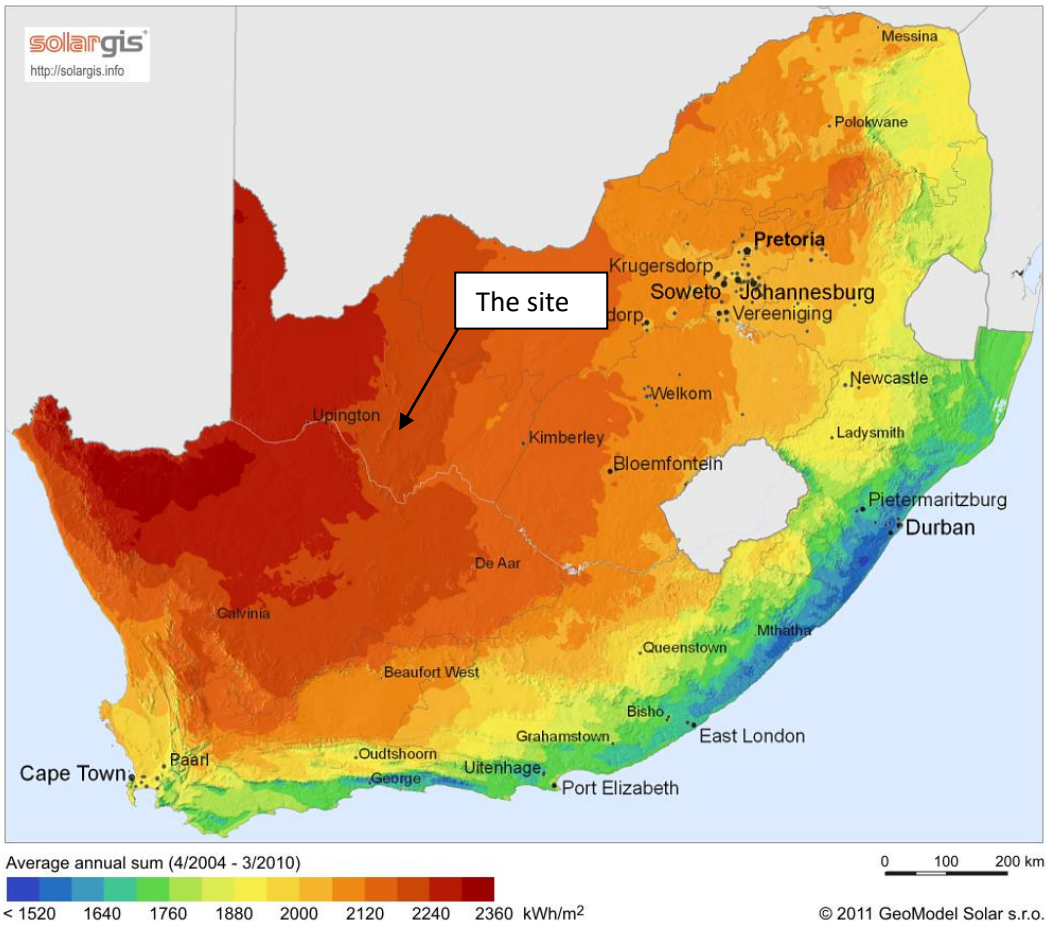


Figure 12: Horizontal irradiation for South Africa (SolarGIS, 2011)

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 Lewensaar 275/50kV Substation. A transmission line will be constructed within 52m wide servitude corridor towards the power line. This is the only alternative that is being considered for the power

line since it follows the shortest route. 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 Northern Cape 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).

The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions and decided on a suitable structure which meets the prescribed technical requirements. The choice of structures to be used will not have any adverse impacts on the environment. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

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.

Single Circuit Overhead Power Line

The use of single circuit overhead power lines to distribute electricity is considered the most appropriate technology and has been designed over may years for the existing environmental conditions and terrain as specified by Eskom Specifications and best international practice. Based on all current technologies available, single circuit overhead power lines are considered the most environmentally practicable technology available for the distribution of power. This option is considered appropriate for the following reasons:

- More cost effective installation costs
- Less environmental damage during installation
- More effective and cheaper maintenance costs over the lifetime of the power line.

Double Circuit Overhead Power Line

Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the

same tower structure) to minimize impacts. However, the use of double-circuiting has a number of technical disadvantages:

- Faults or problems on one power line may mean that the other power line is also disabled during maintenance, and this will affect the quality of supply to an area. Larger and taller towers as well as more towers are required for double-circuit power lines.

The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be off line as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

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 is included as an Appendix under Layout Plans.

The following environmental features were considered:

- Any protected tree or plant species.

For the layout of the Life Solar Plant – refer to Figure 13 and Layout Plans included as an Appendix to the report.

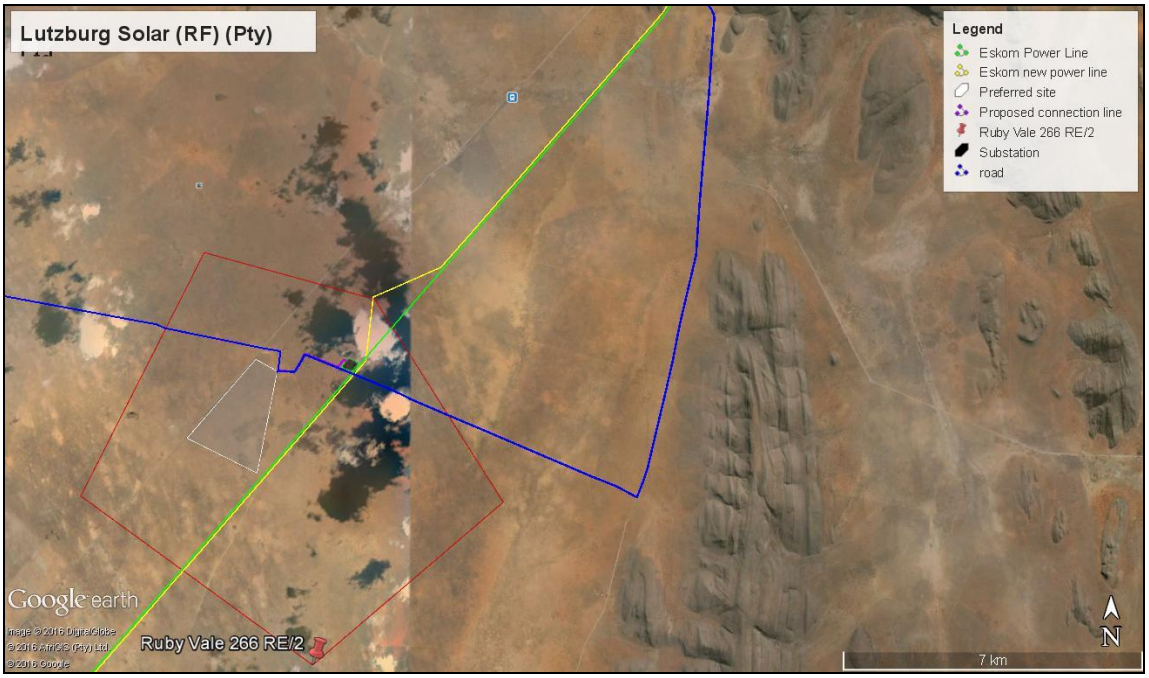


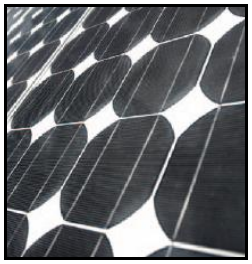
Figure 13: Preferred site on the Remaining Extent of the farm Ruby Vale No. 266

5.1.6 Technology alternatives

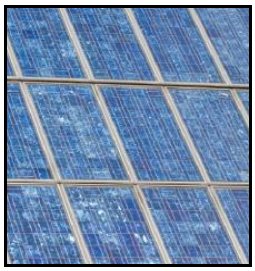
There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon and thin film. These technologies are discussed in more detail below:

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.



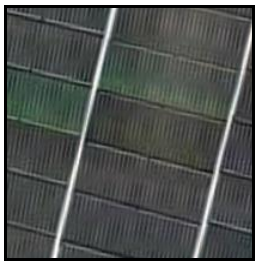
- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than 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:

- Newspaper advertisement

  Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Kalahari Bulletin) on the 17 March 2016 (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.

- Site notices

  Site notices were placed on site in English on 29 February 2016 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 18 April 2016. 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 17 March 2016 and were requested to submit comments by 20 April 2016. For a complete list of stakeholder details see Appendix D and for proof of registered post see Appendix E. The consultees included:

  - Northern Cape Department of Environmental Affairs and Nature Conservation
  - The Department of Energy
  - The Department of Agriculture
  - The Department of Water Affairs and Sanitation
  - The South African Heritage Resources Agency (SAHRA)
  - The Provincial Heritage Resources Agency (PHRA), Northern Cape
  - Passenger Rail Agency of South Africa (PRASA)
  - South African National Roads Agency (SANRAL)
  - SENTECH
  - Northern Cape Chamber of Commerce and Industry (NOCCI)
  - Department of Communications
  - The Northern Cape Department of Mineral Resources
  - Transnet
  - ESKOM
  - Square Kilometer Array (SKA)
  - National Energy Regulator of South Africa (NERSA)
  - The Wildlife and Environment Society of South Africa (WESSA)
  - The Municipal Manager at the John ZF Mgcawu District Municipality

- The Municipal Manager at the Tsansabane Local Municipality
- The Local Councilor at the Tsansabane Local Municipality
- The Civil Aviation Authority (CAA)
- The Northern Cape Department of Public Works, Roads and Transport
- AMDA Develeopments – Mr. Charlie Berrington
- Land Owner – Mr. H. Uys
- Kalkpan 639 RE – G. Maritz
- Ruby Vale 266 portion 1 – B. Bredenkamp
- Nokanna - T. Rhyneke
- Meidekop – K. Booysen
- Hoekplaats 641 RE – T. G. Rossouw

It was expected from I&APs to provide their inputs and comments by 20 April 2016. To date comments have been received from Leads 2 Business.

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

Written notices were also provided to all surrounding land owners and occupiers on 17 March 2016. The Tsansabane Local Municipality and other local property owners were contacted to obtain the contact details of the surrounding land owners. Six farmer's contact details could be obtained – refer to figure 14. The surrounding land owners were given the opportunity to raise comments by 20 April 2016. To date no comments have been received from surrounding land owners. For a list of surrounding land owners see Appendix D.

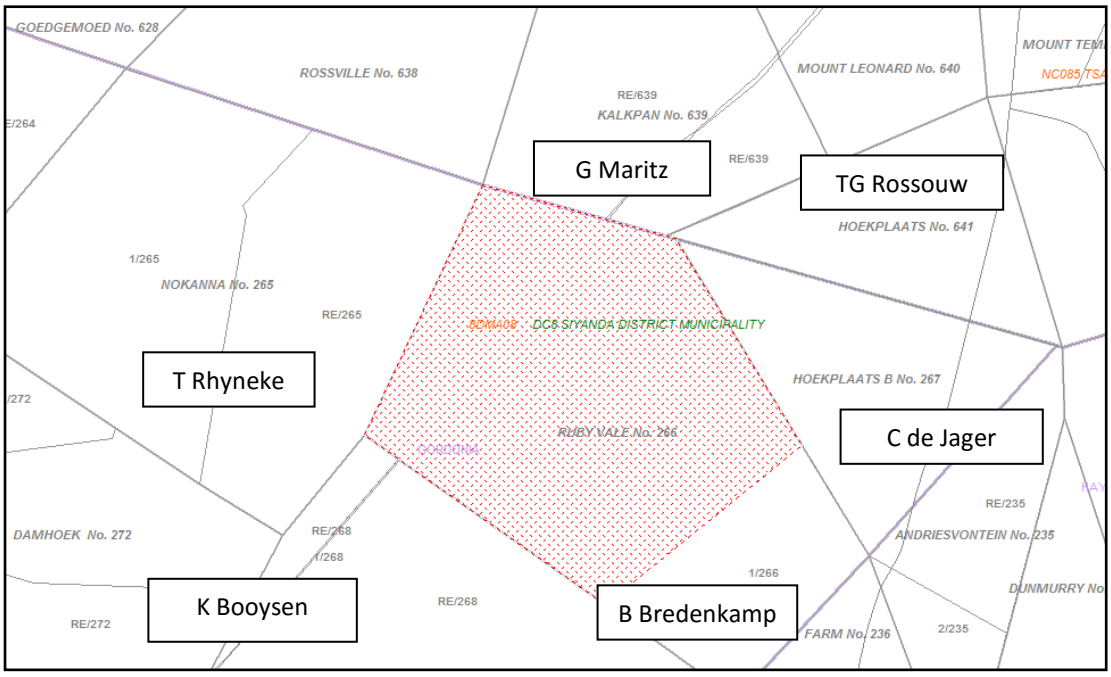


Figure 14: Surrounding Land Owners

➢ <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 May 2016.

- Northern Cape Department of Environmental Affairs and Nature Conservation
- The Department of Energy
- The Department of Agriculture
- The Department of Water Affairs and Sanitation
- The South African Heritage Resources Agency (SAHRA)
- The Provincial Heritage Resources Agency (PHRA), Northern Cape
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Northern Cape Chamber of Commerce and Industry (NOCCI)
- Department of Communications
- The Northern Cape Department of Mineral Resources
- Transnet
- ESKOM
- Square Kilometer Array (SKA)
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the John ZF Mgcawu District Municipality
- The Municipal Manager at the Tsansabane Local Municipality
- The Civil Aviation Authority (CAA)
- The Northern Cape Department of Public Works, Roads and Transport
- Leads2Business – Melanie Miles
- AMDA Develeopments – Mr. Charlie Berrington
- Land Owner – Mr. H. Uys
- Kalkpan 639 RE – G. Maritz
- Ruby Vale 266 portion 1 – B. Bredenkamp
- Nokanna - T. Rhyneke

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 Scoping Report (20 June 2016). To date comments have been received from SAHRA (see Appendix F for written comments).

- <u>Public participation meeting</u>

All I&AP's were invited to attend the public meeting held at La Postma House in Postmasburg on 31 May 2016 at 13:00 PM. The public meeting was 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 (Ghaap) on 20 May 2016 to notify the public of the public meeting. The following key stakeholders were also directly informed of the public meeting via email 25 May 2016:

- Northern Cape Department of Environmental Affairs and Nature Conservation

- The Department of Energy
- The Department of Agriculture
- The Department of Water Affairs and Sanitation
- The South African Heritage Resources Agency (SAHRA)
- The Provincial Heritage Resources Agency (PHRA), Northern Cape
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Northern Cape Chamber of Commerce and Industry (NOCCI)
- Department of Communications
- The Northern Cape Department of Mineral Resources
- Transnet
- ESKOM
- Square Kilometer Array (SKA)
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the John ZF Mgcawu District Municipality
- The Municipal Manager at the Tsansabane Local Municipality
- The Civil Aviation Authority (CAA)
- Northern Cape Chamber of Commerce and Industry (NOCCI)
- The Northern Cape Department of Public Works, Roads and Transport
- Leads2Business – Melanie Miles
- AMDA Develeopments – Mr. Charlie Berrington
- Land Owner – Mr. H. Uys
- Kalkpan 639 RE – G. Maritz
- Ruby Vale 266 portion 1 – B. Bredenkamp
- Nokanna - T. Rhyneke

The attendance register for the public meeting is attached as Appendix J.

- <u>Circulation of the Draft Environmental Impact Assessment Report</u>

  The following registered I&APs and State Department were informed of the availability of the Draft EIR on 2 September 2016 (refer to Appendix E):

  - Northern Cape Department of Environmental Affairs and Nature Conservation
  - The Department of Energy
  - The Department of Water Affairs and Sanitation
  - The National Department of Agriculture
  - The South African Heritage Resources Agency (SAHRA)
  - The Provincial Heritage Resources Agency (PHRA), Northern Cape
  - Passenger Rail Agency of South Africa (PRASA)
  - South African National Roads Agency (SANRAL)
  - SENTECH

- Department of Communications
- The Northern Cape Department of Mineral Resources
- Transnet
- ESKOM
- Square Kilometer Array (SKA)
- National Energy Regulator of South Africa (NERSA)
- The Wildlife and Environment Society of South Africa (WESSA)
- The Municipal Manager at the Joe Morolong Local Municipality
- The Local Councilor at the Joe Morolong Local Municipality
- The Civil Aviation Authority (CAA)
- The Northern Cape Department of Public Works, Roads and Transport
- Leads2Business – Ms. Melanie Miles
- Land owner – Mr. Hendrik Venter
- B Creative – Mrs. Tina Snyman
- Tenant – Mrs. Miemie Swart
- Rete Properties – Tebogo Maake
- Rete Properties – Othutitse Belang
- Northern Cape Occupational Health – Dr. Tidu van der Merwe
- Northern Cape Occupational Health – Sr. Elna van der Merwe
- Northern Cape Occupational Health – Mr. Herman Wagener
- MSG Maintenance Incledon – Mrs. Beverley Smit

To date no feedback was received.

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 I&APs and consultation bodies

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

Table 5.1: Issues raised by consultation bodies

Organisation	Person	Written comment (see Appendix F)
Leads 2 Business	Ms. Melanie Miles	In an email dated 18 March 2016, Ms. Miles inquired whether Environamics was currently conducting an EIA for the Lutzburg Solar Plant and asked whether we could forward her the BID for the application and register her as an I&AP.
Tsantsabane Unemployment Forum	Mr. Shimmy Maroane	In an email dated 20 May 2016, Mr. Maroane expressed his wish to attend the public meeting for the proposed solar plant. He said that his concerns were around unemployment, skills development and transfer, and business opportunities for local people.
AMDA Developments	Mr. Charlie Berrington	On 20 June 2016, in a telephone conversation with the EAP, Ms. Marélie Griesel, Mr. Berrington requested to be listed as an I&AP for all six proposed solar developments in the Northern Cape.
SAHRA	Ms. Natasha Higgitt	In an email dated 20 May 2016, Ms. Higgitt informed the EAP of the procedures required by SAHRA.
SAHRA	Ms. Natasha Higgitt	In an interim comments document, dated 23 June 2016, SAHRA provided comments on the DSR.
Northern Cape Department of Environmental Affairs and Nature Conservation		*To date no comments were received from the Department on the Draft Scoping reports or Draft EIRs – Proof of submission to the Department is included in Appendix E.*

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, soils, agricultural potential, 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 on the site apart from a number of protected tree species.

5.3.1.1 Geology, soils and agricultural potential

The preferred site and the alternative site share underlying geology. According to Mucina and Rutherford (2006) one portion of both sites are located in an area which is characterised by Aeolien sand, underlain by calcrete of the Kalahari Group and deep, loose, sandy soils of the Namib soil form on the flat plain. The other portion of the two alternatives is characterised by red Aeolian sand of tertiary and recent age with silcrete and calcrete and some andesitic and basaltic lava of the Griqualand West Supergroup. Hutton soi forms, deeper than 1.2m are present on the overwhelmingly dominant Ae and to a far lesser extent Ah land types,

According to the Agriculture and Soils Impact Assessment (attached in Appendix H5) There are two land types across the site, namely Ah1, which covers the majority of the preferred site and Ae5 which covers the western part of the alternative site. Soils of both land types are very similar and are almost entirely deep, well-drained, very sandy red and yellow of the Hutton and Clovelly soil forms. These soils fall into the Oxidic soil group according to the classification of Fey (2010). The field investigation confirmed that the entire site comprises deep, very sandy, mostly red soils. The soils are classified as having low to moderate susceptibility to water erosion (class 5), but because of their sandy texture are classified as highly susceptible (class 1a) (land type Ah1) and susceptible (class 2b) (land type Ae5) to wind erosion.

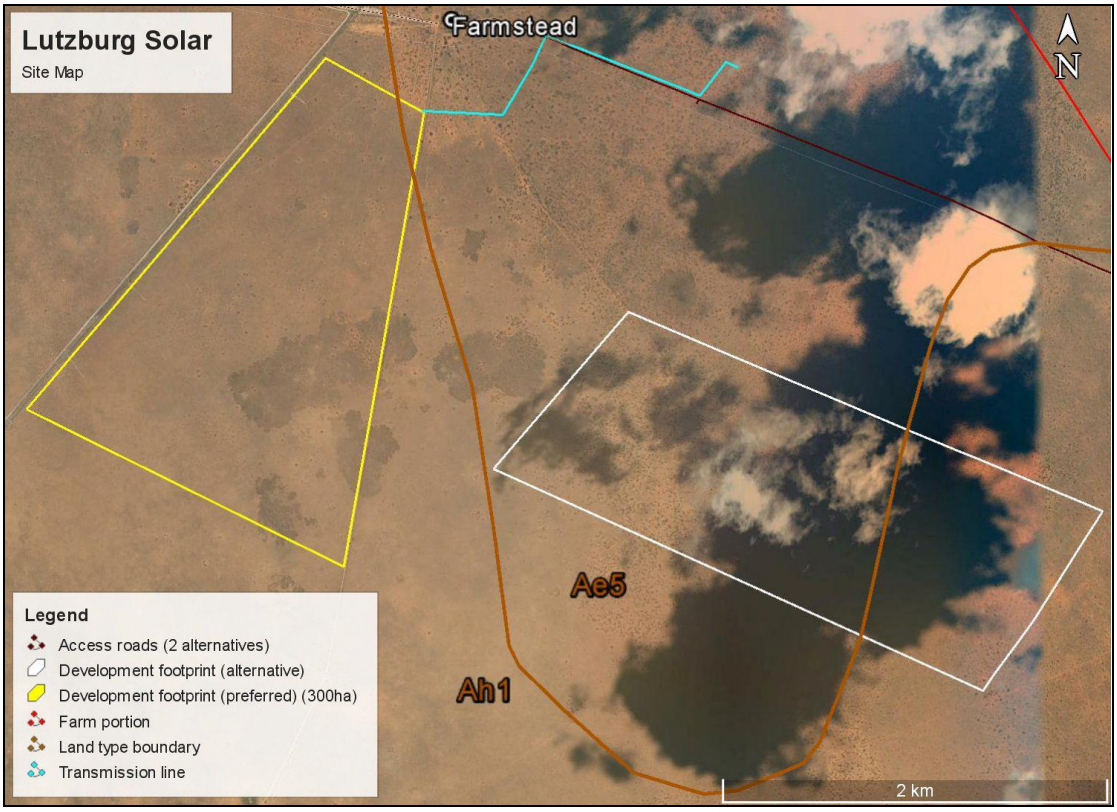


Figure 15: Land types across the site

The significance of all agricultural impacts is influenced by the fact that the site has climate limitations, as well as soil imitations, making it unsuitable for cultivation and the land is solely used for cattle grazing. The limitations to agriculture are predominantly climate related. The moisture availability class 6 classification, with high variability of rainfall is a very severe limitation to agriculture, which makes any cultivation without irrigation completely non-viable. The very sandy soils, with very limited water holding capacity are a further limitation. The site and surrounds has a land capability classification, on the 8 category scale, of Class 7 – non-arable, low potential grazing land. The grazing capacity on AGIS is classified almost entirely across the site as 22-25 hectares per large stock unit, although the very northern part of it borders on the category above this, 18-21 hectares per large stock unit.

The entire site comprises deep, largely unconsolidated sands. It is not known at what depth below surface any other material would be encountered. The foundations for mounting structures will need to be erected in sand. The geotechnical conditions are assessed, in terms of this investigation, as suitable for the development of a solar energy facility. Because soil conditions are fairly uniform across the site, there are no more and less suitable parts of the project area for development.

Underlying geology and air quality

The Asbestos Mountains are a range of hills in the Northern Cape province of South Africa, stretching south, south-west from Kuruman, where the range is known as the Kuruman Hills, to Prieska. The range lies about 150 km west of Kimberley and rises from the Ghaap Plateau. The mountains were named for the asbestos which was mined in the 1900s and is found as a variety of amphibole called crocidolite. Veins occur in slaty rocks and are associated with jaspers and quartzites, rich in magnetite and brown iron-ore.

During the mining process, asbestos would regularly go airborne and spread to nearby towns. When people inhaled the dust, they experienced what is known as environmental exposure. One field study conducted from 1960 to 1962 in the Northern Cape cities of Prieska, Kuruman and Koegas (The Mesotheloma Centre, 2016) confirmed that people living in proximity to these mines and mills faced risks of contracting asbestosis, a noncancerous asbestos-related disease.

The authors also reported that “an alarmingly high number of cases with mesothelioma of the pleura had been discovered among people who have lived in the Northern Cape and that there is evidence that this condition is associated with exposure to asbestos dust inhalation which need not be industrial,” (The Mesothelioma Centre, 2016).

Seeing that the proposed site falls within the Ghaap Platau and is located in relatively close proximity to the Asbestos Mountains, the risk of Asbestos exposure during the construction phase, when vegetation will be removed, soil will be disturbed and excavations will take place, could potentially exist. Special attention should be given to determining soil compositions before the commencement of the construction phase to determine if any asbestos deposits are present at the site. Dust pollution should also be avoided or minimised, to insure the safety of workers on site, and nearby communities at all times.

5.3.1.2 Vegetation and landscape features

The two sites differ slightly in terms of landscape features and habitat characteristics. In terms of vegetation type both the sites fall within the Olifantshoek Plains Thornveld as well as the Gordonia Plains Shrubland vegetation types both of which are described by Mucina and Rutherford (2006) as 'least threatened' – refer to the vegetation map.

The Olifantshoek Plains Thornveld has a very wide and diverse unit on plains with usually open tree and shrub layers with for example *Acacia lurderitzii, Boscia albetrunca* and *Rhus tenuinervis* and usually a sparse grass layer. The Gordonia Plains Shrubland is characterised by plains with open grassland with occasional shrubs *Rhigozum trichotomum* and *Grewia flava*, sometimes including *Acacia haematoxylon* and scattered individuals of *A. erioloba* with virtually no dunes. – refer to Plates.

Red Data, Protected and Endemic Plant Species

According to the Ecological Fauna and Flora Habitat Survey (refer to Appendix H2) Ten plant species of specific conservation significance were recorded in the study area during the study period. One of these species is listed as a Threatened or Protected Species (ToPS) by the National Environmental Management: Biodiversity Act's (Act No. 10 of 2004) list of ToPS as published in Government Gazette no. 36375 of 16 April 2013 (NEMBA ToPS, 2013). One is listed by Raimondo *et al* (2009) in the South African Red Data list as a Declining species. Three trees are included in the protected tree species list as published in the National Forests Act (Act no.84 of 1998) (NFA, 1998), and seven of the ten are listed as protected and one as specially protected by the Northern Cape Nature Conservation Act (Act no. 9 of 2009) (NCNCA, 2009).

Due to the high numbers of nationally protected trees (NFA, 1998) (i.e. Acacia erioloba, A. haematoxylon and Boscia albitrunca) the individual positions of these species were not individually geo-referenced during this study. Instead a number of belt transects were conducted in each different VU to determine the density at which these species occur in the study area and just beyond.

Figure 16: Examples of Boscia albitrunca, Acacia *haematoxylon* and Acacia Erioloba

Twenty-two (22) belt transects of 100 x 40 m (4000 m2) were conducted in the area (7 in VU1, 7 in VU2 and 8 in VU3) and only the numbers of the three nationally protected trees were considered. All specimens of these species within the belt transect were counted and noted together with the height of each specimen. Differentiation was made between

specimens higher than 2 m (> 2 m) and those shorter than 2 m but not less than 1 m (< 2 m = 1 m). Specimens shorter than 1 m were not counted.

The total number of specimens of, for example, *Acacia haematoxylon* in VU2 is 2565. This number of specimens is the sum of the *A. haematoxylon* shrubs (1 to < 2 m) i.e. 570, and the trees (> 2 m) i.e. 1995. The total calculated number of *A. haematoxylon* specimens to occur in the study area (250 ha preferred site + 250 ha alternative site) is 12560. To calculate the number of specimens of any one of the three species for any given surface area, one will take the surface area (in ha) and multiply it with the average species density/ha of the relevant species and VU.

Table 5.2: Protected tree species frequency, density/ha & number of specimens per VU

VU	VU area (ha)	**Average species frequency (as counted on 4000m²)**								
		Acacia erioloba			***Acacia haematoxylon***			***Boscia albitrunca***		
		1 to <2m	**>2m**	**Total**	**1 to <2m**	**>2m**	**Total**	**1 to <2m**	**>2m**	**Total**
1		0.4	1.6	2.0	7.4	20.3	27.7	0.1	0.3	0.4
2		2.4	9.4	11.9	0.9	3.0	3.9	0.1	3.1	3.3
3		3.0	5.5	8.5	2,0	5.1	7.1	0.0	0.1	0.1
Average species density / ha										
1		1.28	4.68	5.96	22.13	60.43	82.55	0.43	0.85	1.28
2		6.07	23.57	29.64	2.14	7.50	9.64	0.36	7.86	8.21
3		7.50	13.75	21.25	5.00	12.81	17.81	0.0	0.31	0.31
Number of species per VU										
1	83	106	389	536	1837	5015	7430	35	71	106
2	164	996	3866	7885	351	1230	2565	59	1289	1347
3	253	1898	3479	3060	1265	3242	2565	0	79	79
	Total:			10732			12940			1532

The preferred site has approximately 5 704 and the alternative site 19 869 trees on protected tree species on site. It is strongly advised that once the exact position of development activities and infrastructure has been planned and finalized that a full population study of each affected area be done to determine the population size and extent of these and possibly other protected species within the study area and the relevant appropriate action is then taken.

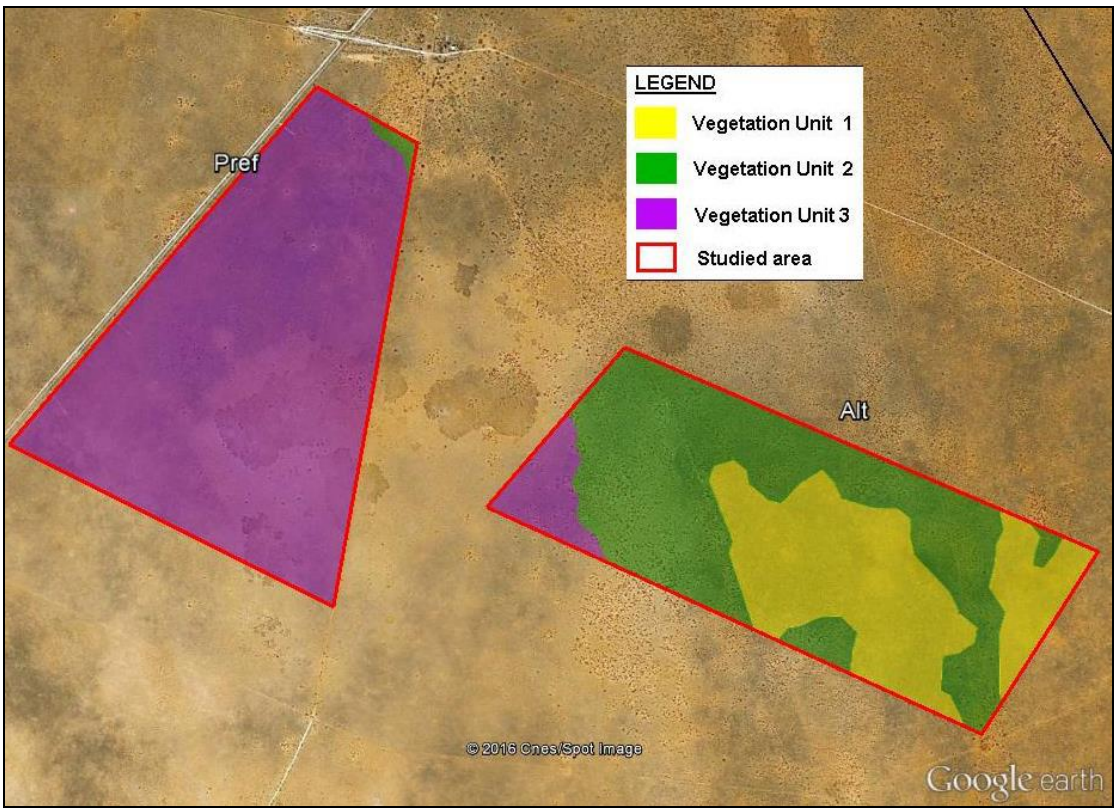


Figure 17: Image depicting the three vegetation units recorded in the study area

Exotic Plant Species

During the study the alien invasive woody species *Prosopis glandulosa* var. *torreyana* was recorded in the study area. According to Hoffman *et al* (1999) (in Mucina & Rutherford, 2006) *P. glandulosa* is one of the 12 agriculturally most important invasive alien plants in South Africa. According to the Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA, 1983) in Henderson (2001) and the National Environmental Management Biodiversity Act's 2014 list of proposed weeds and invaders (NEMBA, 2014), this species is classified as an alien invader species. One other exotic species was recorded in the study area, i.e. *Chenopodium carinatum*, a non-categorized, non-invasive herbaceous weed.

Threatened and Protected Ecosystems

No ecosystems that are threatened and in need of protection according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) was recorded in or in the vicinity of the study area.

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 of 344 mm with frequent to frost in winter. Mean maximum and minimum temperatures for the area in question are 35.9°C in December and -3.3°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 Lutzburg and birds 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 H3) indicate that the site is observed as a well-grazed habitat, dominated by Acacia trees and Rhigozum shrubs in the Eastern Kalahari Bioregion had 44 avian species recorded in or around Ruby Vale farm of which 5 were collision-prone (Cape Vulture Gyps coprotheres, White-backed Vulture G. africanus, Kori Bustard Ardeotis kori, Black-chested Snake-Eagle Circaetus pectoralis, and Pale Chanting Goshawk); the first three species are also red-listed.

Bird habitat in the region consists mainly of bush-thickened Acacia melLutzburgra, Camelthorn Acacia erioloba and less often Shepherd trees Boscia albitrunca. Open ground was sometimes grassland (and grazed) and sometimes supported dense patches of Rhigozum shrubs. Taller trees and those growing near farm reservoirs are regularly used by passerine birds as nest sites, for perch sites (for foraging) and for shade and roosting in the hottest times of day. Two studies in the Kalahari have indicated that taller trees add significantly to the avian species richness of an area (because of the diverse niches they offer) and their removal therefore can reduce species richness (Seymour and Simmons 2008, Seymour and Dean 2010). Mature Camelthorn trees are favoured by Sociable Weavers to construct their nests in and this species occurred on site.

Artificial habitats are provided by land owners in the form of windmills, farm reservoirs and the transmission line and pylons that bisect the site. The pylons provide perch sites for both vultures and raptors, and nest sites for Sociable Weavers Philetairus socius. No pans were found in the study area.

During the surveys a relatively healthy species richness of smaller birds at an average of 17.0 species km-1 and 53.5 birds km-1 were recorded. The Passage rate of larger collision-prone birds was 0.5 birds per hour of observation, comprised mainly of vultures. Other species that

may be attracted to the panels such as wetland birds and sandgrouse were not recorded. Territorial pairs of Yellow-billed Hornbills Tockus leucomelas that may pose a risk to the panels by attacking their own reflections were recorded on site in low numbers. Sociable Weavers that nest on the pylons bisecting the site may build their nests on the structures supporting the PV panels.

At the preferred and the alternate sites, we recorded similar numbers of species (20 spp km-1 at each site) but more birds (82 km-1) in the alternative than the preferred (35 km -1). The latter was a reflection of the greater number of mature camel thorn and Boscia trees in the alternative site.

The Vantage Point observations totaling 12 hours at each site on 16 and 17 March revealed 12 collision-prone birds inside the borders: seven White-backed Vultures perched, then soaring, over the site, a Black-chested Snake-Eagle acting similarly and one Pale Chanting. The 12 birds in 24 h of observation represent a Passage Rate for the collision-prone species of 0.5 birds h^{-1}.

The only other species of note that may create some issues for the developers is the Sociable Weaver Philetairus soceus that occurs on site. They typically target mature trees but here they have learned to build on the metal pylons that bisect the site. They may try to nest on the structures supporting the PV panels and nests would have to be cleared on a regular basis.

The avifauna of the area may be affected by the infrastructure of the Solar Power (PV) plant and the analysis of the number of birds on the two sites suggests the impact will be minimised if the PV solar farm is constructed on the Preferred (western) site based on higher bird densities in the Alternative site in this wet season visit.

The avifaunal study, conducted during a wet-period, identified 44 resident species that could be displaced by habitat destruction. At the preferred site more species and twice as many individual birds per kliometer were recorded than on the alternative site. The latter was a reflection of the greater number of mature camel thorn and *Boscia* trees in the preferred site. Destruction of this vegetation, especially the taller trees will cause displacement of most birds that currently use the area. 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 differences in vegetation on the two sites, if the alternative site were to be developed, the impact may be minimized and fewer birds will be displaced.

The Avifaunal Study (refer to Appendix H3) concluded that if these recommendations can be followed and prove effective, it is believed that the Lutzburg PV solar park can be allowed to proceed with minimal impact to the avifauna of the area.

5.3.1.4.2 Ecological

The Ecological Fauna and Flora Habitat Survey (refer to Appendix H2) confirms that the sites fall within the Eastern Kalahari Bushveld Bioregion of the Savanna Biome (Rutherford et al.

2006). Livestock and wildLutzburg ranching dominate the immediate surrounds and human habitations are few and far between. Neither permanent nor semi-permanent water bodies were identified from satellite images or after ground-truthing the sites. Topography is more or less homogeneous throughout the study site with no radical changes in slope. The area is visibly transformed with clearer signs of overgrazing on the preferred- than on the alternative site. The soil remains sandy for the most part with apparent absence of rockiness. The preferred site has less ground cover and more karroid shrub compared to the alternative site.

Literature research revealed that no animals were restricted or endemic to the area. Species with a low likelihood of occurring within the site are nonetheless listed if their habits and habitat requirements overlap with the study findings. No physical records of the protected butterflies occurring in the site exist but have been listed as their entire distribution ranges have not yet been confirmed.

Sixty-six (76) plant species are recorded on the POSA data base of SANBI for the relevant QDS 2822BA, the study area is situated in. This list contains species at least two or three different vegetation types. A total of only 101 plant species (from 38 plant families and 82 genera) were recorded in the study area during the time of the study and indicates moderate species diversity.

The low faunal and moderate floristic species richness and density recorded would equate to an insignificant impact to the regional diversity of plants, mammals, reptiles and amphibians. Although the number of protected faunal species possibly occurring on or in close proximity to the site is low, these deserve consideration.

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 (~250 & ~300 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.

Landform and drainage

According to the Visual Impact Assessment (attached as Appendix H4) the proposed development is located in an area with relatively low significance in elevation, meaning that the site is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation, except to the east where the Langeberge mountain range

can be seen. The preferred site is located at an above mean sea level (amsl) of approximately 1188m at the highest elevation and at an amsl of 1175m at the lowest

elevation. The alternative site is located at an above mean sea level (amsl) of approximately 1234m at the highest elevation and at an amsl of 1186m at the lowest elevation. Refer to figures 18-20 for cross section profiles.

The landform described above is unlikely to limit visibility. Areas within 5km from the proposed development might have a clear view of the proposed development without taking existing screening into account.

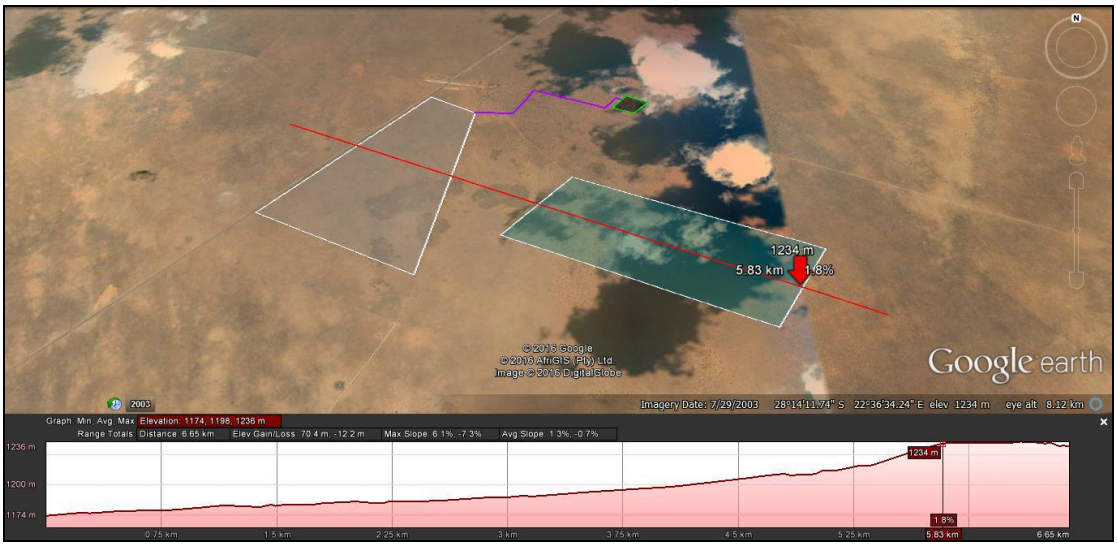


Figure 18: Cross section profile taken to indicate the slope of both sites

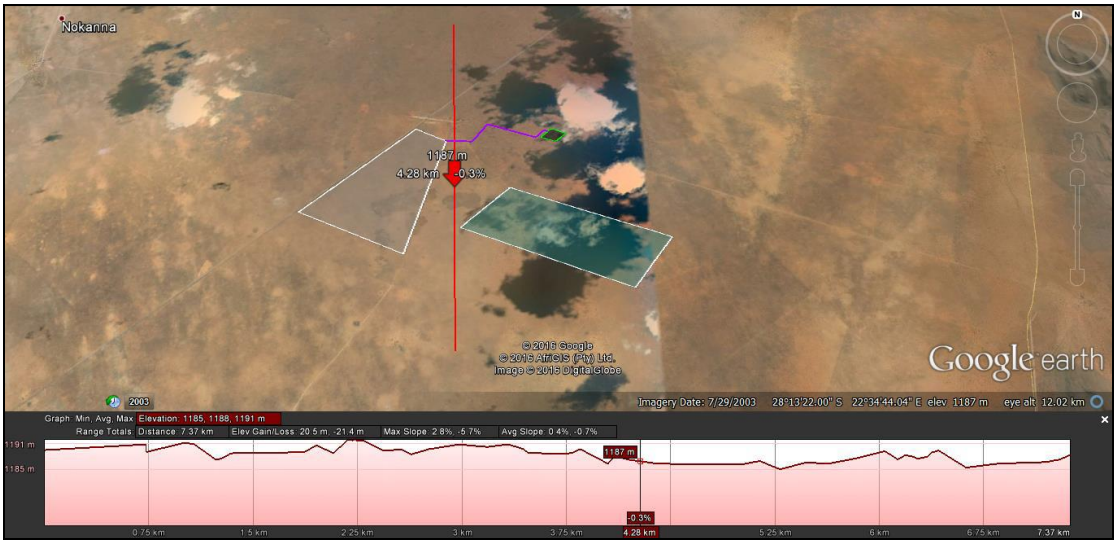


Figure 19: Cross section profile taken from north to south

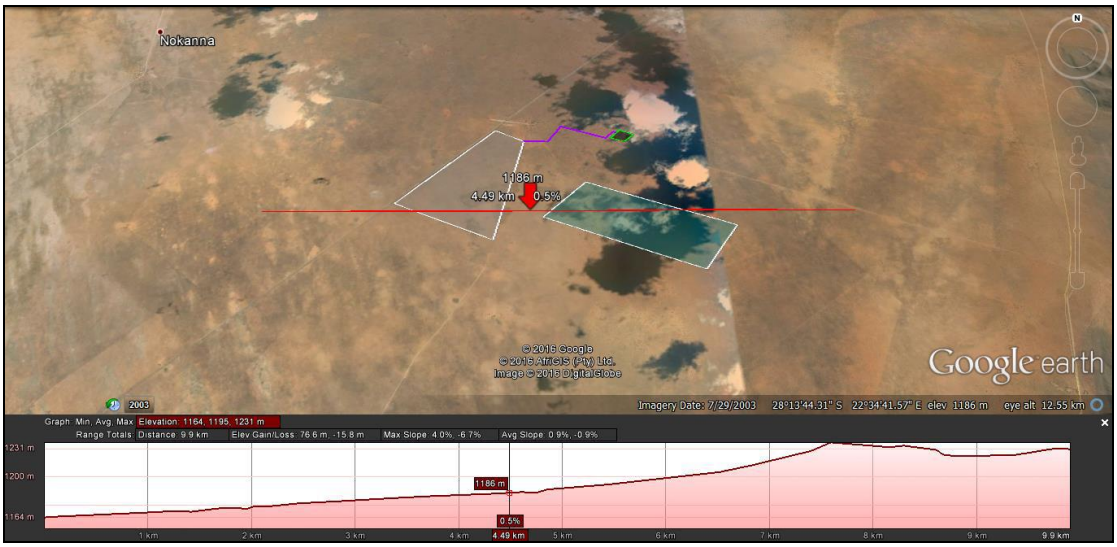


Figure 20: Cross section profile taken from west to east

In terms of possible landscape degradation, the landscape does appear to have excellent existing screening mainly provided by Camel thorn trees. Where line connections are concerned, the preferred line connection will have the least negative visual impact on viewers and will form part of the preferred site. The line is short in distance where it connects to the Lewensaar substation.

5.3.1.6 Traffic consideration

The site is located in the Northern Cape Province approximately 50km south of the town of Olifantshoek. The photovoltaic equipment will be delivered to site from two possible locations, either from Durban Harbour, 1090km from site, or Cape Town Harbour, 980km from site – refer to figure 21. The site identified for this development is located off National Route N14 where an existing gravel road will be used to access the farm, Ruby Vale.

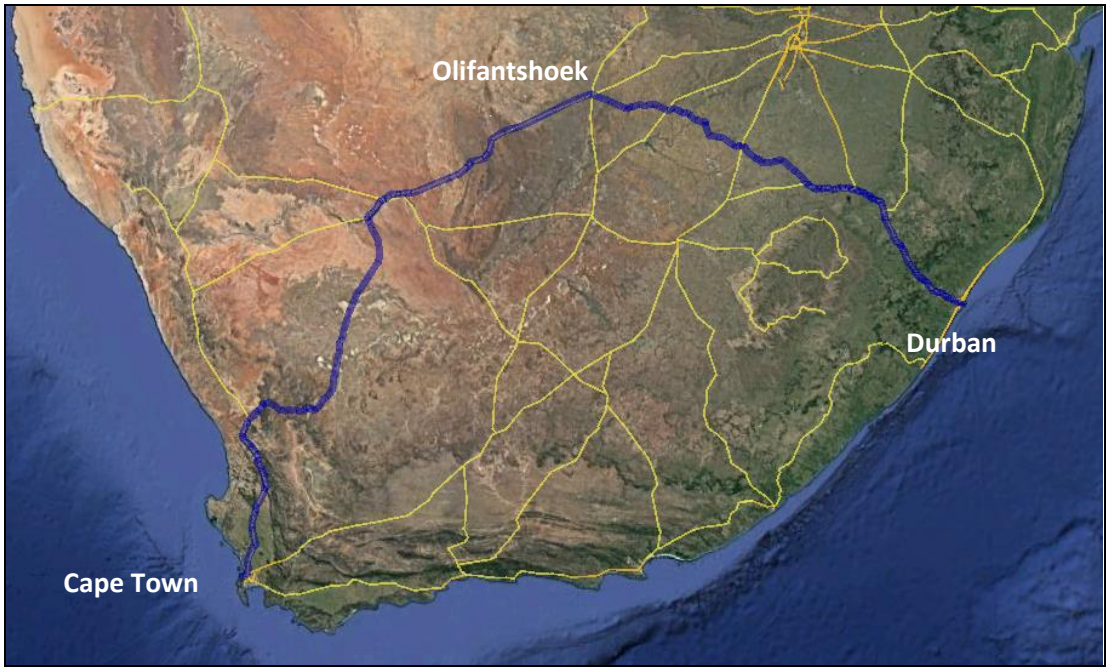


Figure 21: Transportation Routes

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 Provincial Route, a formal access application was applied for with the Northern Cape Department of Roads and Public Works, which has been approved in principle – Refer to Appendix K.

The vehicles used to transport the photovoltaic equipment are standard container trucks and not Abnormal Load 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. Additionally, the local traffic during construction generated by commuting staff is estimated as follow (expected to be peak hour trips):

- Approximately 300 staff will be transported to site, most probably from Olifantshoek on a daily basis. It is expected that minibus transport will be used for this.
- This translates to approximately 60 minibus vehicles travelling to and from site daily.

The following traffic figures are expected during the operational period:

- Average of 6 light vehicles per day with a maximum of 15 vehicles per day.
- Four mini-bus trips per day for permanent staff transport.

The ultimate accepted capacity of a two lane highway is 3 200 vehicles per hour (vph). From historic traffic count data, it was observed that the roadways around Olifantshoek have an abundance of spare capacity, (specifically along the N14 and R325) as the current ADT along these roadways are between 1 000 vpd and 2 000 vpd. 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.

Table 5.3: Trip Summary for Long Distance Route

Route Description	Delivery trips (None peak)	Construction Vehicle Trips (None peak)	Cumulative trips for six SPPs
Durban to Kuruman via N14	22 vpd	10 vpd	192 vpd
Cape Town to Kuruman via N14	22 vpd	10 vpd	192 vpd
Commuter traffic	-	-	360 vpd

It is expected that the community of Olifantshoek will participate in the construction phase of this development. The development of the solar farms in the surrounding area, creates an opportunity for temporary employment and economic upliftment of the surrounding communities. The following traffic load figures are expected during the construction period. From a traffic point of view, the total daily construction traffic is deemed to be very low and will not significantly impact these communities.

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 development of the Lutzburg Solar Plant (SP) has a variety of associated socio-economic benefits. In terms of employment the construction phase will employ approximately 60 new skilled, 220 low-skilled and 120 semi-skilled employment opportunities over a period of 18 – 24 months. The operational phase however, will employ approximately 3 new skilled, 40 low-skilled and 10 semi-skilled employment opportunities over a period of 20 years.

The Tsansabane Local Municipality IDP (2014/2015) indicates that a high number of learners enrolled for primary school and a very low number of students completed their matric. This can be regarded as the very low probability for employment in this municipal area. The IDP further states that the level of education is further negatively affected by the urbanization of the population.

Furthermore, the unemployment level has drastically reduced from 4466 in 2001 to 3795 in 2011.

In terms of the main economic sectors of this municipal area, the mining activities in this area have rapidly increased the past couple of years. According to the IDP the agriculture sector has never been a key feature of the local economy of this area. The retail and services sector has also been a growing sector towards the local economy. There have been investments made towards the tourism sector, but this sector is not sufficient to act as a driver of the economy. The Tsantsabane Local Municipality has however developed a Local Economic Development (LED) Strategy in order to provide a more sustainable local economy.

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 (HIA) 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 HIA (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) 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.

Stone Age

Occupation of the region took place during the Stone Age. Most of this, however, seems to date to the Early Stone Age and centres in the areas where there are hills, e.g. to the east

and south. For example, in the vicinity of Kathu, Beaumont & Morris (1990) and Dreyer (2007) identified to occurrence of extensive Early Stone Age occupation.

Less obvious in its presence are the Later Stone Age sites, some of which are indicated by Beaumont & Vogel (1984). They equate these sites, some which occur in the larger region, with Cape Coastal pottery associated with amorphous LSA (herders) or Wilton (hunter-gatherers) in the period 100 BC to AD 1900.

Iron Age

Early Iron Age occupation did not take place in the region and seems as if the earliest people to live settled lives here were those of Tswana-speaking origin (Tlhaping and Tlharo) that settled mostly to the north and a bit to the west of Kuruman. However, they continued spreading westward and by the late 18th century some groups occupied the Langeberg region. With the annexation of the Tswana areas by the British in 1885, the area became known as British Betchuana Land. A number of reserves were set up for these people to stay in. In 1895 the Tswana-speakers rose up in resistance to the British authority as represented by the government of the Cape Colony. They were quickly subjected and their land was taken away, divided up into farms and given out to white farmers to settle on (Snyman 1986).

Historic period

Many early explorers, hunters, traders and missionaries travelled through the area on their way to Kuruman on what was to become known as the “missionary road”. Anderson, Burchell, Harris, Holub, Lichtenstein and Moffat are but a few of the better-known names to pass through here.

In 1902 Olifatnshoek got its first permanent inhabitant, Edward Finnis and in 1903 Michael Colley opened a shop. The slow growth of Olifantshoek can be attributed to the fact that for many years Deben (Dibeng) was the main seat of the church in the region and local people preferred to go there.

Although prospecting for minerals, especially diamonds occurred in the area and some knowledge was available on the iron deposits, it was only during the 1940s that the extent of the iron and manganese deposits were established, this was followed by the establishment of towns such as Sishen (1952) and Kathu in 1972.

The site was visited in March and August 2016. The area was investigated by travelling transects across it, giving special attention to features such as hills, outcrops and clumps of trees – refer to figure 22 below.

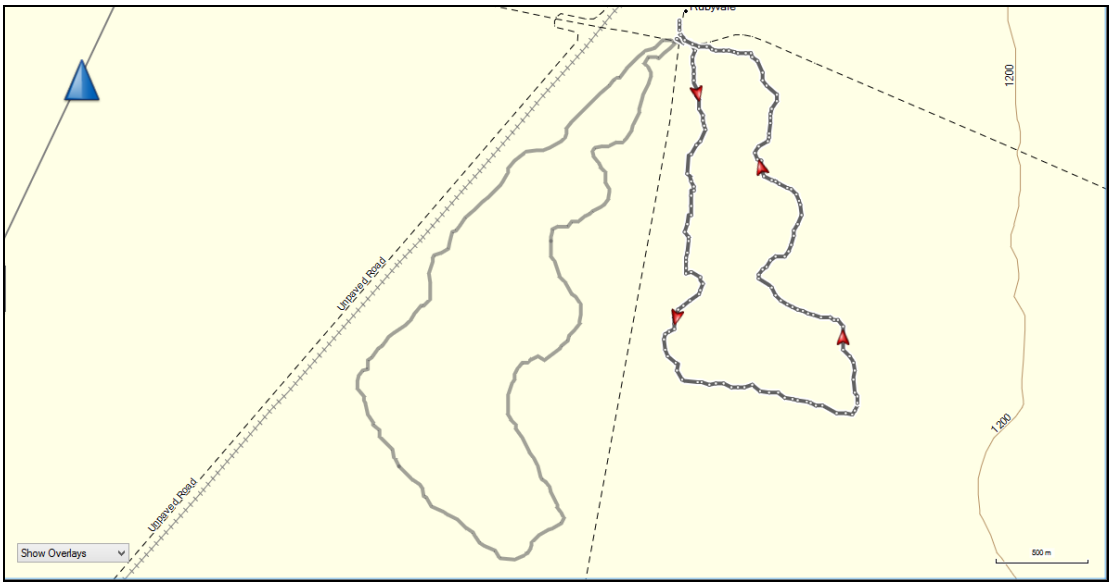


Figure 22: Map indicating the track log of the field survey

Identified sites

According to Mr Uys, the farm owner, oral traditional has it that some graves occur at the point illustrated in figure 19. This tradition is largely based on the fact that this is one of the very few places where few large pieces of stone occur on the farm. As this locality is outside of the development area, there would be no impact on it as a result of the proposed development.

As no sites, features or objects of cultural significance are known to exist in the study area, there would be no impact as a result of the proposed development.

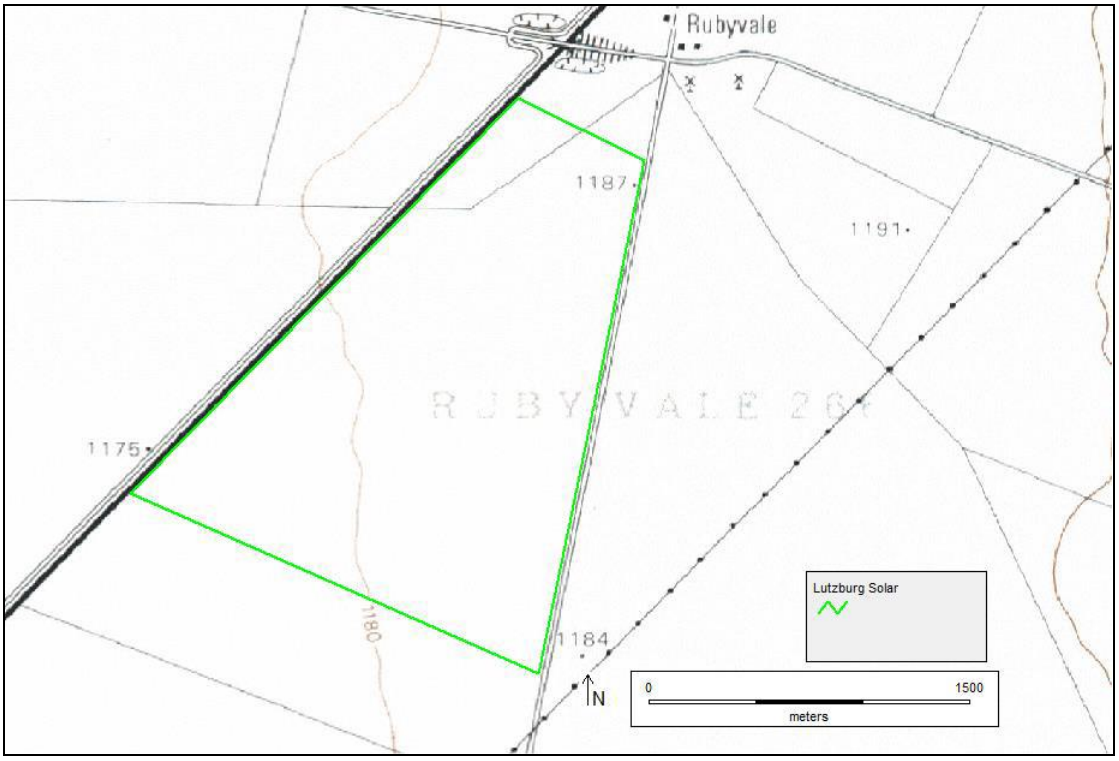


Figure 23: Location of identified sites

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.

Palaeontology

The proposed Lutzburg SPP development footprint, including both the preferred and alternative sites, is underlain by well-developed superficial deposits (surface gravels and aeolian sands) of low to very low palaeontological sensitivity. It is expected that the geologically recent overburden will largely buffer any impact on bedrock sediments that will result from the construction of the SPP. Potential impact on palaeontological heritage resources within the proposed Lutzburg SPP footprint (including both the preferred as well as alternative options) is considered low to very low. As far as the palaeontological heritage is concerned, the proposed Lutzburg SPP and associated transmission line development may proceed with no further palaeontological assessments required.

5.4 SITE SELECTION MATRIX

Due to the nature of the proposed development, the location of the facility is largely dependent on technical and environmental factors such as solar irradiation, climatic conditions, topography of the site, access to the grid and capacity of the grid. Studies of solar irradiation worldwide indicate that the Northern Cape has a huge potential for the generation of power from solar.

The receptiveness of the site to PV Development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. Portion 2 of the farm Ruby Vale No. 266 where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The Northern Cape receives the highest average of direct normal and global horizontal irradiation in the country, daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of ~2378 kWh/m^2/year is relevant in the area.

- Topographic conditions: The surface are on which the proposed facility will be located has a favourable level topography, which facilitates work involved with construction and maintenance of the facility and ensures that shadowing on the panels do not occur.

- Extent of the site: A significant portion of land is required to evacuate the prescribed 115MW and space is a constraining factor in PV facility installations. Provision was made to assess a larger area than is required for the facility to make provision for any other environmental or technical constraints that may arise and avoiding those areas. Larger farms are sought after to make provision for any constraints imposed by the Department of Agriculture on the extent of land that may be used for such facilities per farm. The Remaining Extent of Portion 2 of the Farm Ruby Vale No. 266 is 5735,5192 hectares in extent.

- Site availability and access: The land is available for lease by the developer. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be easily obtained from theD3300 gravel road.

- Grid connection: In order for the PV facility to connect to the national grid (Lewensaar 275/50kV Substation) the facility will have to construct an on-site substation, Eskom switching station and a power line from the project site to connect to the Eskom grid. Available grid connections are becoming scarce and play a huge role when selecting a viable site.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 off this report. Nothing of note was identified from an ecological or conservation point of view on the site apart from a number of protected trees on site.

It is evident from the discussion above Portion 2 of the farm Ruby Vale No. 266 may be considered favourable and suitable in terms of these site characteristics. The challenge was therefore to identify the preferred location for the proposed development within the boundaries of the farm. Table 5.4 presents the site selection matrix with a comparison between the two alternative locations on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266 based on the information provided by the specialists.

Table 5.4: Site selection matrix

For ease of reference the favourability of the sites are colour-coded as follow:

Favourable	**A**	Mostly favourable	**B**	Mostly not favourable	**C**	Not favourable	**D**

Site selection criteria	Preferred site	Alternative site	Comments / Discussion
Location	A	A	• Both sites are located in an area with a Global Horizontal Radiation of ~2378 kWh/m2/year.
Grid connection	A	A	• Both sites are able to connect to the Lewensaar 275/50kV Substation. • The preferred and alternative site will be able to connect to the Lewensaar 275/50kV Substation next to the site and both will require a short power line to be constructed.
Site access	A	A	• Access to both alternatives will be easily obtained from the D3300 Gravel Road.
Geology & soils	A	A	• The field investigation confirmed that the entire site comprises deep, very sandy, mostly red soils. Because soil conditions are fairly uniform across the site, there are no more and less suitable parts of the project area for development.
Landscape features	A	B	• The preferred site is located at an above mean sea level (amsl) of approximately 1188m at the highest elevation and at an amsl of 1175m at the lowest elevation. The alternative site is located at an above mean sea level (amsl) of approximately 1234m at the highest elevation and at an amsl of 1186m at the lowest elevation. • The preferred alternative has a slope of less than 1%.

Visual impacts	A	B	• According to the Visual Impact Assessment (attached as Appendix H4) the proposed development is located in an area with relatively low significance in elevation. • However, the alternative site has more of an incline and is visible from a distance, which is not the case for the preferred.
Agricultural potential	A	A	• The site has climate limitations, as well as soil limitations, making it unsuitable for cultivation and the land is solely used for cattle grazing. The land capability is classified as Class 7 -non-arable, low potential grazing land.
Cultural & heritage features	A	A	• No sites, features or objects dating to the historic period were identified in the study area.
Vegetation	B	C	• Both sites have a large number of *Boscia albitrunca, Acacia Erioloba and Acacia Erioloba.* • The preferred site has approximately 5 704 and the alternative site 19 869 trees on protected tree species on site.
Water features	A	A	• No water features are present on either of the sites.
Biodiversity	A	B	• The low faunal and moderate floristic species richness and density recorded would equate to an insignificant impact to the regional diversity of plants, mammals, reptiles and amphibians. Observations revealed several mammals on the alternative site (3 Steenbok Raphicerus campestris, 1 Cape Fox Vulpes chama and 1 Yellow Mongoose Cynictis penicillata) but only sheep and cows on the preferred site. Thus in general the biodiversity value of the alternative site appeared to be higher.
Avifaunal	B	C	• The Avifaunal Study (refer to Appendix H3) confirmed that at the preferred site they recorded fewer species (15 spp km-1) than at the alternate site (19 spp km-1) and fewer individual birds (40 vs 67 km-1) per kilometre than in the alternate site.

			• The greater avian diversity in the Alternative site was a reflection of the greater number of mature camel thorn and Boscia trees in that portion of Ruby Vale farm.
Overall RATING	**A**	**B**	

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria and the comparison presented in table 5.4, the preferred site is most suitable due to the fact that potentially significant impacts on vegetation and biodiversity (including avifauna) may be minimised.

In conclusion the preferred alternative entails the development of the 115MW Lutzburg Photovoltaic Solar Energy facility on the following location on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266– refer to figure 24:

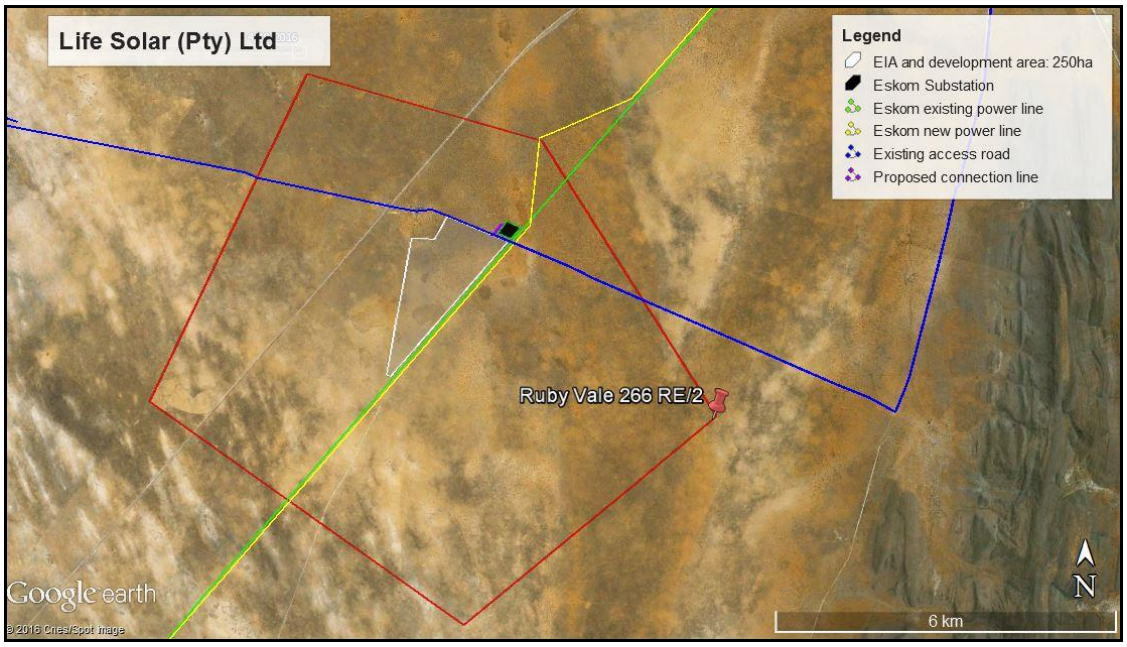


Figure 24: Preferred site on the Remaining Extent of Portion 2 of the farm Ruby Vale No. 266

The preferred layout on the Remaining Extent of the farm London No. 275 is included in the attached figures – refer to figure 8. It may be concluded that no other alternatives are considered during the EIA process.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 3. (3)(h) An EIR (...) must include-

(h) a full description of the process followed to reach the proposed development footprint, within the approved site, including –

(v) the impacts and risks identified, 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;

(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; and

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

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred location through the life of the activity, including-

(i) a description of all environmental issues and risks that were identified during the EIA process; and

(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.

(j) an assessment of each identified potentially significant impact and risk, including-

(i) cumulative impacts;

(ii) the nature, significance and consequences of the impact and risk;

(iii) the extent and duration of the impact and risk;

(iv) the probability of the impact and risk occurring;

(v) the degree to which the impact and risk can be reversed;

(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and

(vii) the degree to which the impact and risk can be mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;

6.1 SCOPING METHODOLOGY

The contents and methodology of the scoping report aimed 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 29 February 2016. 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		✕		None.
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	✕			The Avifaunal Study (refer to Appendix H3) states that taller Acacia trees and those growing near farm reservoirs are regularly used by passerine birds as nest sites (e.g. Sociable Weavers nest in them), and for perch sites for shade and roosting in the hottest times of day.
XI. Red data species	✕			The Avifaunal Study (refer to Appendix H3) identified 3 species White-backed Vulture *Gyps africanus*, and Lappet-faced Vulture *Torgos tracheliotus*.
XII. Tourist resort		✕		None.
2. Will the project potentially result in potential?				
I. Removal of people		✕		None.
II. Visual Impacts	✕			The VIA (refer to Annexure H5) confirmed that the visual impact of a low-lying PV facility post mitigation is a "*Negative Low"* impact.
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 D330 gravel road off the R385.
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 400 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 453 employment opportunities will be created during the construction and operational phases.
IX. Traffic generation	✕			It is estimated that 64 trips per day will be generated 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		✕		None.
III. An area that is of cultural importance		✕		None.
IV. A site of geological significance		✕		None.
V. An area of outstanding natural beauty		✕		None.
VI. Highly productive agricultural land		✕		None.
VII. A tourist resort		✕		None.
VIII. A formal or informal settlement		✕		None.

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. An indication is provided of the specialist studies which were 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

For ease of reference the significance of the impacts is colour-coded as follow:

Low significance	Medium significance	High significance	Positive impact

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															
<u>Activity 11(i) (Regulation 983)</u>: *"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."* <u>Activity 28(ii) (Regulation 983):</u> *"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."* <u>Activity 1 (Regulation 984):</u> *"The development of facilities or infrastructure for the generation of electricity where the electricity output is 20*	<u>Site clearing and preparation</u> Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled. <u>Civil works</u> 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.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss or fragmentation of habitat for faunal and floral species. • Loss of indigenous faunal and floral species diversity. • Loss of faunal and floral species of conservation significance		-	L	L	D	RR	ML	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. - Also refer to the mitigation measures listed in the Ecological Fauna and Flora Habitat Survey & Avifaunal Study.	L	Ecological Fauna and Flora Habitat Survey & Avifaunal Study
			Avifauna	• Collision with PV itself from birds perceiving the panels as open water • disturbance by construction and		-	L	L	Pr	PR	ML	Yes	- Bird scaring techniques including rotating prisms and experimental use of Torri lines are used if birds are found to impact the PV	L	Avifaunal Study

megawatts or more."/ <u>Activity 15 (Regulation 984):</u> *"The clearance of an area of 20 hectare or more of indigenous vegetation..."*	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. <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. <u>Wiring to the Central Inverters</u> 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.			maintenance activities • displacement through habitat removal and construction work • direct collision with the power line network.									panels; - -The solar panels are constructed as far as possible from water points that could attract any wetland species; - All power lines – *present and future* – must be marked with bird diverters to reduce the possible impact risk for the bustards and raptorial species.		
			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	• Loss of topsoil in disturbed areas, causing a decline in soil fertility. • Soil Erosion caused by alteration of the surface characteristics.		-	S	M	Po	PR	ML	Yes	- Areas which are not to be constructed on within 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. - Also refer to the mitigation measures listed in the Agricultural and Soils Impact	M	Agricultural and Soils Impact Assessment

													Assessment (attached as Appendix H5).		
			Geology	• Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • Instability due to soluble rock. • 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.	L	Geotechnical Study
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the local sewage plant. • Increase in construction vehicles on existing roads.		-	L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality
			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	L	-

													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.		
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion.	-		S	S	Pr	BR	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 200m from any of the water bodies on site. - Also refer to the mitigation measures listed in the Ecological Fauna and Flora Habitat Survey & Avifaunal Study.	M	-
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• The creation of local employment and business opportunities, skills development and training; • Technical support to local farmers and municipalities;		+	P	S	D	I	N/A	Yes	- Where reasonable and practical, Lutzburg's service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.	L	Social Impact Assessment
			Visual landscape	• Potential visual impact on residents of farmsteads and	-		L	S	D	CR	NL	Yes	Dust suppression will play an important	L	-

				surrounding informal settlements and motorists in close proximity to proposed facility.										role to minimise the visibility of dust. - Contractors must avoid using roads not relevant to the project. - Good housekeeping should be implemented. - Proper rehabilitation of disturbed areas		
			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.	L	Traffic Impact 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 site. • Increased risk of veld fires.		-	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 site. - Also refer to the mitigation measures listed in the Social Impact Assessment (attached as Appendix H8).	M	Social Impact Assessment
			Noise levels	• The generation of noise as a	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure	L	-

				result of construction vehicles, the use of machinery such as drills and people working on the site.									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.		
			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	• No potential cultural or heritage resources were identified on or around the site.		-	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 Heritage Assessment
OPERATIONAL PHASE															
	The key components of the proposed project are described below: • <u>PV Panel Array</u> - To produce 115MW, the proposed facility will require numerous linked	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss or fragmentation of habitat for faunal and floral species. • Loss of indigenous faunal and floral species diversity. • Loss of faunal and floral species of conservation significance. • Loss or fragmentation of habitats.		-	S	L	D	PR	ML	Yes	- Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately. - Re-vegetation of the disturbed site is aimed at	M	Ecological Fauna and Flora Habitat Survey & Avifaunal Study

	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. • <u>Wiring to Central Inverters</u> - 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. • <u>Connection to the grid</u> - 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.												approximating as near as possible the natural vegetative conditions prevailing prior to construction. - Implement an Avifauna Monitoring plan. - Also refer to the mitigation measures listed in the Ecological Fauna and Flora Habitat 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	• 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.		-	L	L	D	PR	ML	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. - Also refer to the mitigation measures listed in the Agricultural and Soils Impact Assessment (attached as Appendix H5).	M	Agricultural and Soils Impact Assessment
			Geology	• Collapsible soil.		-	S	S	Po	PR	ML	Yes	- Surface drainage should	L	Geotechnical

	Whilst Lutzburg 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 Lewensaar 275/50kV substation. 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 via the D3300 local gravel road. 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 and security reasons, the facility will be required to be fenced off from the			• 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. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.								be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.		Study
			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 increase in storm water run-off that needs to be managed to prevent soil erosion. • Leakage of hazardous materials. The development will comprise	-		L	L	Pr	PR	ML	Yes	- The storm water management plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along	L	-

	surrounding farm.			of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.									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, Lutzburg's's service providers should implement a 'locals first' policy, especially for semi and low-skilled job categories.	N/A	Social Impact Assessment
			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 impact 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	N/A
			Noise levels	• The proposed development will	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

				not result in any noise pollution during the operational phase.											
			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	- Lutzburg, in consultation with the TLM, should investigate the options for the establishment of a Community Development Trust.	N/A	Social Impact Assessment
			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>Dismantling of infrastructure</u> 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.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Re-vegetation of exposed soil surfaces to ensure no erosion in these areas.	+		S	L	Po	N/A	N/A	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion.	N/A	-
			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		-	S	S	Pr	PR	M	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion.	M	Soil, Land Capability and Agricultural Potential Study

				degradation of the soils by construction vehicles (hydrocarbon spills).											
			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.	-		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 risks. - Removal of all substances which can result in groundwater (or surface water) contamination.	M	-
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Loss of employment.		-	L	L	Po	PR	NL	Yes	- Lutzburg should ensure that retrenchment packages are provided for all staff retrenched when the facility is decommissioned.	M	Social Impact Assessment
			Visual landscape	• Potential visual impact on visual receptors in close proximity to	-		L	S	D	CR	NL	Yes	- Locate laydown and storage areas in zones of	L	Visual Impact Assessment

				proposed facility.									low visibility i.e. behind tall trees or in lower lying areas.		
			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	traffic impact study
			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 area.	-		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. - 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.	L	-
			Noise levels	• The generation of noise as a	-		L	S	D	CR	NL	Yes	- The decommissioning	L	-

				result of construction vehicles, the use of machinery and people working on the site.									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.		
			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 & Palaeontological Impact 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	-

An Environmental Awareness and Fire Management Plan is included in Appendix I as part of the EMPr

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 are 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..."*

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 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.

6.3 ASPECTS TO BE ASSESSED

Table 6.3 below provides a summary of the aspects that need to be assessed as part of the EIR. The aspects are also linked to specialist information that has been obtained. Refer to Table 6.2 for a description of the potential impacts.

Table 6.3: Aspects to be assessed

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

	• Increased consumption of water	EAP assessment
	• Pressure on existing services infrastructure	Confirmation from the Local Municipality
	• Visual Impact	Visual Impact Assessment
	• Provision of employment & generation of income for the local community	Social Impact Assessment
Decommissioning of the PV Solar facility	• Impacts on agricultural potential (soil)	Soil, Land Capability and Agricultural Potential Study
	• Impacts on heritage resources	Heritage Impact Assessment & Palaeontological Heritage Assessment
	• Socio-economic impacts (loss of employment)	Social Impact Assessment
Cumulative Impacts	• Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.	EAP assessment & Specialist Assessment (All specialists)

6.4 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- A Geotechnical Assessment – conducted by Johann Lanz (see Appendix H1).
- Ecological Habitat Fauna and Flora Study – Environmental Research Consulting (see Appendix H2).
- Avifaunal Study – Birds & Bats Unlimited (see Appendix H3).
- A Visual impact assessment - conducted by Phala Environmental Consultants (Pty) Ltd. (see Appendix H4).
- Agricultural and Soils Assessment – conducted by Johann Lanz (see Appendix H5).

- A Heritage Impact Assessment - conducted by Mr. J.A. van Schalkwyk (see Appendix H6).
- Paleontological Study – conducted by Dr. Lloyd Rossouw (see Appendix H7).
- Social Impact Assessment - conducted by Leandri Kruger (see Appendix H8).
- Traffic Study – conducted by BVi Consulting Engineers (see Appendix H9).
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics in conjunction with the project specialists (refer to Section 7 of this report and Appendix L).

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

6.4.1 Issue 1: Geotechnical suitability

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

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

According to the Geotechnical Study (Appendix H1) the entire site comprises deep, largely unconsolidated sands. It is not known at what depth below surface any other material would be encountered. The foundations for mounting structures will therefore need to be erected in the sand.

None of the following occur on the site:

- Shallow water table (less than 1.5m deep)
- Sinkhole or doline areas.
- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil
- Dispersive soils (soils that dissolve in water)
- Soils with high clay content (clay fraction more than 40%)
- Any other unstable soil or geological feature

Soils across the site are susceptible to wind erosion. The geotechnical conditions are assessed, in terms of this investigation, as suitable for the development of a solar energy facility. Because soil conditions are fairly uniform across the site, there are no more and less suitable parts of the project area for development.

6.4.2 Issue 2: Heritage and archaeological impacts

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

> *"Will the proposed development impact on any heritage or archaeological artefacts?"*

The Heritage Impact Assessment (Refer to Appendix H6) confirmed the following:

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which the development is proposed. The cultural landscape qualities of the region is made up of a pre-colonial element consisting of limited Stone Age occupation, as well as a much later colonial (farmer) component, which gave rise to an urban component.

According to Mr Uys, the farm owner, oral traditional has it that some graves occur at a specific site on the farm. This tradition is largely based on the fact that this is one of the very few places where few large pieces of stone occur on the farm. As this locality is outside of the development area, there would be no impact on it as a result of the proposed development.

Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development. As no sites, features or objects of cultural significance are known to exist in the development area, there would be no impact as a result of the proposed development. From a heritage point of view it is recommended that the proposed development be allowed to continue. Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

6.4.3 Issue 3: Ecological Impacts

The potential impact of the proposed development on threatened flora and fauna known to occur in the Northern Cape Province had to be determined. The main question which needs to be addressed is:

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

The fauna and flora ecological study (refer to Appendix H2) confirmed that: The low faunal and moderate floristic species richness and density recorded would equate to an insignificant impact to the regional diversity of plants, mammals, reptiles and amphibians. Although the number of protected faunal species possibly occurring on or in close proximity to the site is low, these deserve consideration. It must be stressed that the short study

period may affect the generation of a representative sample. We are nonetheless confident in the sampling methods employed as the methodology was designed with the study limitations in mind.

The loss of topsoil and fragmentation of natural habitats that is virtually unavoidable with any type of development, has a negative impact on the regional ecosystem as it disrupts the natural flow of ecosystem services and affects all fauna and flora that are dependent on those habitats. Linear ridges, water courses, wetlands, drainage lines, etc. are especially sensitive to and easily fragmented. A high conservation value is attributed to the plant communities and faunal assemblages of these areas as they contribute significantly to the biodiversity of a region. Care should be taken not to unnecessarily clear or destroy natural vegetation and where possible the rehabilitation of transformed areas and restoration of degraded natural veld should take place in order to improve the ecological health of the floristic component on the property. Development should therefore be planned in such a way that totally transformed areas are chosen for major developments and natural veld, even if it is already degraded and/or fragmented, is avoided as far as possible. A legitimate and well-designed rehabilitation plan must be set in place before mining commences and be strictly enforced on an on-going basis throughout the life of the mine and thereafter.

When considering the different sites (preferred and alternative sites) that were investigated during this study it is concluded that the preferred site may be accepted from a faunal, floral and general ecological point of view for the proposed development.

6.4.4 Issue 4: Avifaunal Impacts

The potential impact of the proposed development on birds known to occur in Northern Cape Province had to be determined. The main question which needs to be addressed is:

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

According to the Avifaunal Study (Appendix H3) the avifauna of the area may be affected by the infrastructure of the Solar Power (PV) plant and our analysis of the number of birds on the two sites suggests the impact will be minimised if the PV solar farm is constructed on the Preferred (western) site based on higher bird densities in the Alternative site and the lower density of mature trees there.

More importantly, the area is regularly used by South Africa's most collision prone and highly threatened red-data species – the Cape Vulture. All transmission lines in this area should, therefore, be marked with bird diverters on the earth wires, and employ a bird-friendly pylon design to avoid electrocution of both vultures and the eagles that may perch here. We can apply a high degree of certainty to the avian data we collected because our data matches independent data provided in Phipps et al. (2013). Thus, all lines used by the birds should be marked. The second dry-season visit clarified that most collision-prone species are regular visitors to the area under investigation.

It is unknown whether the collision-prone birds recorded in the area (e.g. the Critically Endangered Cape Vulture and Endangered White-backed Vulture), will continue to forage or roost in the site once the PV panels are in place, and whether wetland birds will be attracted

to them. Visser (2016) research suggests that francolins and possibly korhaans may be most at risk from such developments but too little research in South Africa is presently available to determine that. Therefore, a full 12 months of post-construction monitoring at this site by trained ornithologists (able to distinguish Cape Vultures from White-backed Vultures) is a further recommendation.

It is also recommended that all available precautions are taken to avoid the threatened vultures and raptors being attracted to the panels. If birds are attracted to, and collide with, the panels by mistaking them for open water, and it is also recommended that innovative bird deterrent techniques are used such as the Torri lines mentioned in the avian Scoping Report (Simmons and Martins 2016).

If these recommendations can be followed and prove effective, we believe that the Lutzburg PV solar park can be allowed to proceed with the least impact to the avifauna.

6.4.5 Issue 5: Visual Impacts

Due to the extent of the proposed photovoltaic solar plant it is expected that the plant will result in potential visual impacts. The main question which needs to be addressed is:

> *"To what extent will the proposed development be visible to observers and to will the landscape provides any significant visual absorption capacity*"

The Visual Impact Assessment (Refer to Appendix H4) concluded that the post mitigation impact is a "*Negative Low"* impact during the construction, decommissioning and operational phase of both the preferred and alternative sites. A small number of visual receptors are likely to be impacted by both the preferred and alternative sites due to close proximity. The preferred site will be most suitable as the alternative is located on a slope with a higher altitude and more protected vegetation to be cleared. Rural areas are clearly defined particularly from a distance and it is assumed that the majority of people would prefer rural views over views of heavy industrial development.

Where mitigation measures are concerned, a search and rescue programme for Camel thorn trees and other protected trees should be implemented. This will be effective mainly for smaller trees. The smaller trees can be relocated to areas around the proposed development where existing screening is minimal. The unnecessary destruction of existing trees should also be avoided where possible. Other indigenous flora can also be added for screening purposes. Contractors and operators should also avoid using public roads during daytime peak times where possible due to the population numbers in and around nearby towns, thus avoiding traffic and people.

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.

6.4.6 Issue 6: Agricultural / impacts on the soil

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

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

Based on the findings of the Agricultural and Soils Impact Assessment (refer to Appendix H5) the proposed development is on land zoned and used for agriculture. South Africa has very limited arable land and it is therefore critical to ensure that development does not lead to an inappropriate loss of land that may be valuable for cultivation. This assessment has found that the investigated site is on land which is of low agricultural potential and is not suitable for cultivation.

Because of the low agricultural potential of the site, the development should, from an agricultural impact perspective, be authorised. It is preferable to incur a loss of agricultural land on such a site, without cultivation potential, then to lose agricultural land that has a higher potential, to renewable energy development elsewhere in the country. No agriculturally sensitive areas occur within the proposed site and no part of it is therefore required to be set aside from the development.

Because the site is uniformly low potential, from an agricultural point of view, there is no preferred location or layout within the assessed site. There are no conditions resulting from this assessment that need to be included in the environmental authorisation.

6.4.7 Issue 7: Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix H8). The main question which needs to be addressed is:

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

The findings of the SIA (Refer to Appendix H8) indicate that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created.

In addition, this will also create local business opportunities benefitting the socio-economic development of the local community. The local community will however benefit from the establishment of a Community Trust if it is managed effectively.

The challenges posed by climate change and global warming will be addressed by the investment in renewable energy facilities like the proposed Solar Power Plant. The

establishment of the proposed Solar Power Plant is supported by the findings of this report and therefore, also creating a positive social benefit for society. It is however recommended that the environmental authorities consider the potential visual impacts addressed in the Visual Impact Assessment (VIA) of this proposed project and impacts to the sense of place, regarding this proposed project.

6.4.8 Issue 9: Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

> "How will the proposed development impact on the Palaeontological resources?"

According to the Palaeontological Impact Assessment (Appendix H7) the assessment indicates that the potential impact on palaeontological heritage resources within the preferred and alternative sites as well as along the associated transmission line is considered low to very low.

There are no areas within the preferred as well as the alternative site footprint that need to be avoided and no mitigation measures or further monitoring are required. Potential for cumulative impacts of this project on paleontological resources is considered to be low locally and regionally.

If, in the unlikely event that localized fossil material is discovered within the sandy overburden during the construction phase of the project, it is recommended that a professional palaeontologist be called to assess the importance and rescue the fossils

if necessary. As far as the palaeontological heritage is concerned, the proposed Life SPP may proceed with no further palaeontological assessments required.

6.4.9 Issue 10: Traffic Impacts

Large developments are normally associated with an increase in construction vehicle traffic. The main question which needs to be addressed is:

> "How will the proposed development impact on the traffic on main delivery routes to the site?"

According to the Traffic Impact Assessment (Appendix H9) 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 National Route 14 which will trigger the involvement of SANRAL and their approval. Adequate traffic accommodation signage must

be erected and maintained on either side of the access on N14 throughout the construction period.

The development of a solar farm on the remaining extent of Portion 2 of the Farm Ruby Vale No. 266 in the Northern Cape Province is therefore supported from a traffic engineering perspective.

6.5 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 6.4.

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.

6.5.1 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 6.4: 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.

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.

Information Requirements as set out by the DEA with the acceptance of the Final Scoping Report

(xix) Should there be any other similar projects within a 30km radius of the proposed development site, the cumulative impact assessment must be refined to indicate the following:

- Assessment of cumulative impacts of all identified impacts.
- Identified cumulative impacts must be clearly defined, and where possible the size of the identified impacts must be quantified and indicated, i.e. hectares of cumulatively transformed land.
- Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
- The cumulative impacts significance rating must also inform the need and desirability of the proposed development.

A cumulative impact environmental statement on whether the proposed development must proceed.

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 30km radius surrounding the proposed development – refer to figure 25 below.

Figure 25: 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 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Northern Cape Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. 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 on 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 no other projects have been granted preferred bidders status within the geographic area of investigation – refer to figure 26 below.

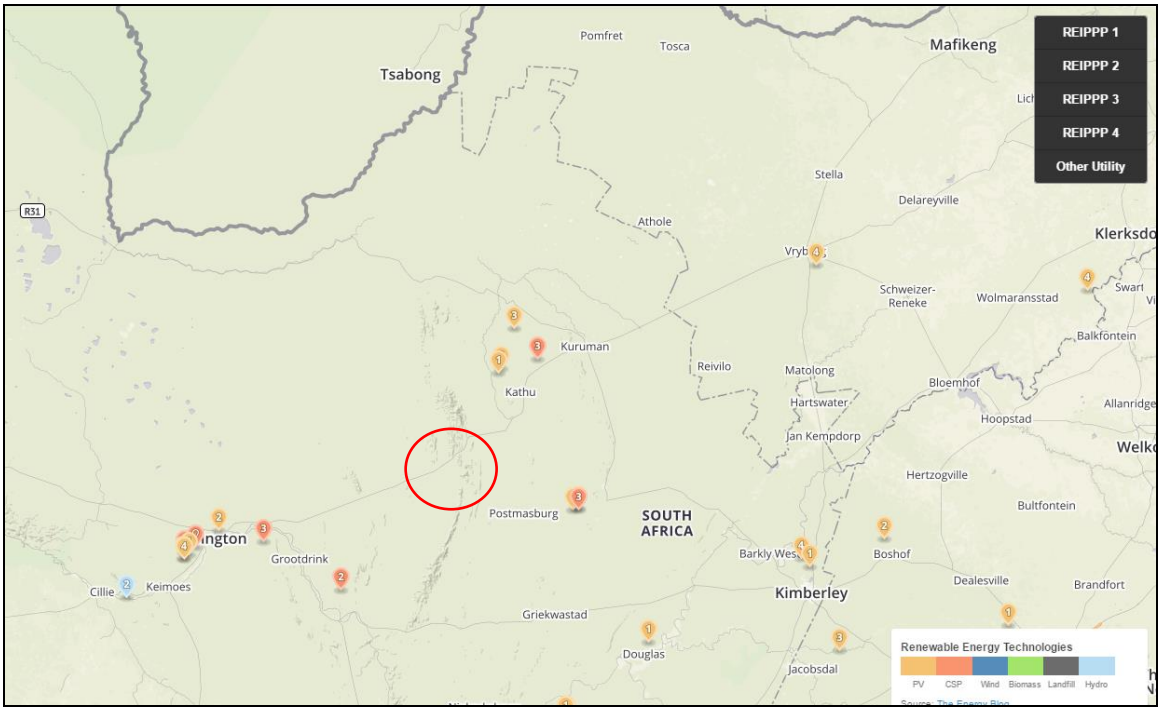


Figure 26: Utility-scale Renewable Energy Generation Sites

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 applications submitted within South Africa – refer to figure 27 below. According to the Department's database one (1) solar plant has been proposed in relative close proximity to the proposed activity, however, this site, namely Jasper Solar Company is incorrectly portrayed on the database and is in effect situated between Postmasburg and Danielskuil.

Figure 27: National Wind and Solar PV SEA: Renewable Energy EIA Application Received before Dec. 2016

Environamics is also in the process of applying for Environmental Authorisation for four (4) PV projects in the area, namely:

- The proposed Life Solar Plant near Postmasburg, Northern Cape Province.

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 geographical area of investigation. The following sections present their findings.

Projects within the geographical area of extent were identified and their specialist assessments were obtained by doing an internet search. Unfortunately not all the specialist information could be obtained. A PAIA request (Refer to Appendix K) was submitted to DEA to obtain the outstanding specialist studies. To date no additional studies have been obtained. For a list of the available specialist studies, please refer to Tabel 7.1 below:

Table 7.1: Specialist Assessments obtained

PROPOSED DEVELOPMENT	DEA REFERENCE NO.	CURRENT EIA STATUS	FARM DETAILS	Ecological	Avifaunal	Visual	Agri & Soil	Heritage	Palaeo	Social	Traffic
Life Solar Power Plant	14/12/16/3/3/2/933	EIA ongoing	Remaining Extent of Portion 2 of the farm Ruby Vale No. 266	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Lutzburg Solar Power Plant	14/12/16/3/3/2/938	EIA ongoing	Remaining Extent of Portion 2 of the farm Ruby Vale No. 266	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**
Jasper Power Company	12/12/20/2649	PB_R2	Near Kimberley	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

The project specialist was given access to the relevant specialist information and were required to assess the available reports by completing a table designed by Environamics. They were instructed to assess the cumulative effects of the projects in question by using the approved significance rating metodology and concluding with an impact statemnt on the significance of these potential cumulative impacts – refer figure 28 below for the process flow. The following sections present their findings. The detailed assessments conducted by the specialists are included as Addendums to their reports and the reviews of the specialist studies are included in Appendix L.

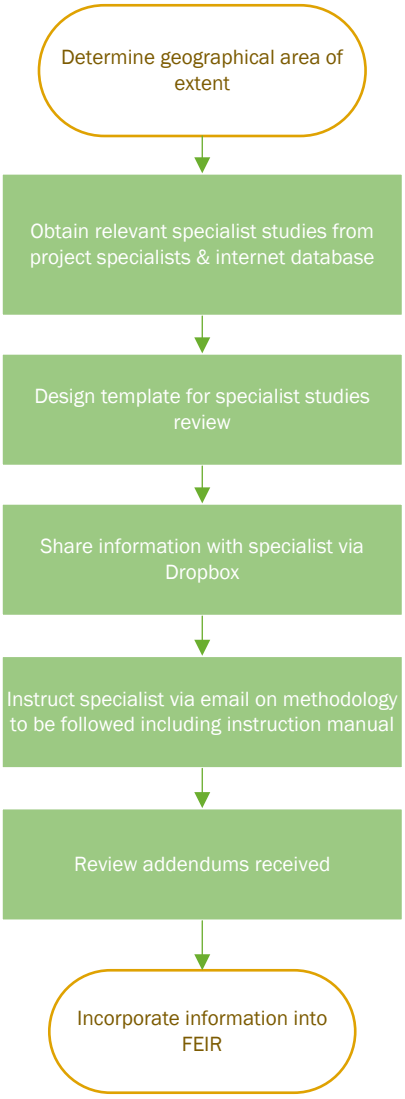


Figure 28: Process flow diagram for determining Cumulative Effects

7.5.1 Geology

The Geotechnical Study (refer to Appendix H1) confirmed that based on the available information a fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm. Soils on the site are predominantly deep, very sandy soils (Hutton soil form) but also include shallower soils on underlying rock, most prominent across the west to south of the alternative site. The soils have a generally low

water holding capacity. According to the specialist the site should be regarded as suitable for the proposed development and no cumulative impacts are foreseen.

7.5.2 Soil, Land Capability and Agricultural Potential

The Agricultural and Soils Impact Assessment (refer to Appendix H5) confirmed that Although the agricultural impact on individual project portions of land has low significance, as shown from all the specialist reports reviewed – refer to Appendix L, the cumulative impacts of loss of production potential becomes more significant regionally. The regional cumulative impact is assessed as having medium significance. However, despite this cumulative impact, it is still agriculturally strategic from a national perspective to steer as much of the country's renewable energy development as possible to regions such as this one, with low agricultural potential. It is preferable to incur a higher cumulative loss in such a region, than to lose agricultural land with a higher production potential elsewhere in the country.

7.5.3 Ecology

The Ecological Fauna and Flora Habitat Survey (refer to Appendix H2) confirmed that the regional cumulative impact is assessed as having medium significance. The cumulative impact on individual portions of land of proposed or current project areas has low to medium significance, as derived from the specialist reports reviewed, however, the cumulative impacts of loss of biodiversity and habitat integrity potentially becomes more significant regionally as more and more similar projects arise. However, despite this cumulative impact, it may still be argued from a national biodiversity perspective, that more of the country's renewable energy developments should be planned in regions such as this one, where the average biodiversity per area is generally lower than others. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher biodiversity potential and ecological value elsewhere in the country.

7.5.4 Birds

The Avifaunal Study (refer to Appendix H3) the two resident vulture species are both red data species (Taylor et al. 2015). Both will be disturbed from roosting by construction of the new solar developments and the power lines leading from them.

More importantly, new lines pose more risks for both threatened vulture species if they are erected without bird-friendly designs (to reduce the risk of electrocution) or bird diverters on the earth wires (to reduce the risk of collision). This is a High Priority as these are high risk and threatened species susceptible to both electrocution and collision (Phipps et al. 2013).

It was concluded that as long as ALL such solar projects in the area take cognisance of the risks to the large vultures and other collision-prone species, and all follow the recommended mitigation measures (bird-friendly conductors, bird-diverters on all earth wires) then the cumulative impacts can be reduced to acceptable levels for each project to proceed.

7.5.5 Social Impact Assessment

The Social Impact Assessment (refer to Appendix H8) indicates that previous similar projects described that the potential cumulative impacts associated with wind farms can also be regarded as pertinent to Solar Energy Facilities (SEFs). The relevant issues that need to be taken into consideration when it comes to the impacts on sense of place is, combined visibility (if two or more SEFs are visible from one location), sequential visibility (seeing two or more SEFs along a road or trail), the perceived or actual change in the land use across a region, loss of characteristic environment and element, and the visual compatibility of different SEFs in the same vicinity. It is further noted that cumulative impacts need to be considered in relation with dynamic and static viewpoints. It is also important that aesthetic perception regarding the sense of place, are a key determinant of people's attitudes and is subjective of matter.

The potential social impact associated with the establishment of an SPP will have a visual impact on the environment and its surroundings, however, the impact on the sense of place is likely to be low. The proposed Life and Lutzburg SPP might slightly be visible from the gravel road entrance to the proposed site, but the impact hereof on the sense of place is likely to be low. In addition, the transmission lines to the substation is also linked to visual impact and the areas sense of place. However, the potential social impacts associated with the transmission lines will be low. There is also already an established SPP in the area, also contributing to the economy of the local community. The potential negative impact of the proposed developments on the areas' sense of place still needs to be considered, because of South Africa's strong attachment to land and the number of SEFs increasing. The Visual Impact Assessments (VIAs) of all applications also needs to be evaluated and considered in this regard.

In addition, hereto, the proposed Life and Lutzburg SPP has the potential to result in significant positive cumulative impacts. The establishment of the proposed Life and Lutzburg SPP and other SEFs in the Northern Cape Province will create a positive socio-economic contribution to the province and the local municipality, and in turn will create a positive social benefit. The positive cumulative impacts in the case of the Life and Lutzburg SPP will include the creation of employment opportunities, training and skills development opportunities, downstream business opportunities and more movement will be made towards the use of renewable energies. For this reason, the proposed developments should be supported.

7.5.6 Visual

The Visual Impact Assessment (refer to Appendix H4) confirmed that the pre and post mitigation impact is a Negative Low impact during the construction, operational and decommissioning phases. Mitigation measures will ensure a Negative Low impact to prevent loss of visual resources. On some days dust can be seen from a far distance and dust suppression will play a cardinal role. Furthermore, the construction and decommissioning phases are short term and will only affect the area around the proposed developments. Implementing mitigation measures will further ensure that a negative visual impact be

minimised. Furthermore, solar PV panels are designed to absorb light, and accordingly only reflect a small amount of the sunlight that falls on them compared to most other everyday objects. Most notably, solar panels reflect significantly less light than flat water.

When referring to the combined cumulative assessment, the post mitigation impact is Low for the construction phase, Low for the operational phase and Low for the decommissioning phase. The pre mitigation impact for the construction phase is Low, Medium for the operational phase and Low for the decommissioning phase. According to the assessment mitigation measures will lower the impact further, still if all projects receives preferred bidder status, thus stating the importance of mitigation measures. At the time of this report it is still uncertain which of the projects near Postmasburg will receive preferred bidder status. The most significant visual impact will be that of dust generation, and as previously mentioned, dust suppression will play an important role. The construction plant will also add to a negative visual impact especially if both projects proceed at once. Traffic of such plant will increase in the area.

Taking into account all positive factors of such developments including economic factors, social factors and sustainability factors, the cumulative impact of all the projects near Postmasburg will be Low, taking into account post mitigation, and is suggested that all developments commence, from a visual impact point of view. Both projects are located in an area with an extremely low population density and viewers are limited to Transnet workers, Eskom workers and farmers.

7.5.7 Heritage

The Heritage Impact Assessment (refer to Appendix H6) concluded that due to a number of similar development applications in the region, a cumulative impact assessment was compiled. This was done by reviewing available reports, considering the quantity and significance of the various known and identified sites and reviewing the proposed mitigation measures for each of these.

A review of the available information indicates that overall the heritage potential, with the exception of some exclusion zones such as hills and river regions, is very low.
According to Section 7 of the National Heritage Resources Act, Act no. 25 of 1999, all the sites identified for the various projects are classified as having Grade III significance, i.e., being described as “Other heritage resources worthy of conservation on a local authority level.” No sites with a Grade I or Grade II significance have been identified.
An evaluation of the possible cumulative impacts from the combined solar power plant developments in the region on sites, features and objects of cultural heritage significance would be very low and is therefore seen as acceptable. Through the implementation of mitigation measures the impact, locally or cumulative, can be turned into a positive impact through the study of such sites, adding to local as well as regional knowledge. From a heritage point of view it is recommended that the proposed development be allowed to continue.

The Palaeontological Impact Assessment (Refer to Appendix H7) indicated that it is very difficult to realistically assess cumulative impacts on palaeontological heritage resources in the region, given the currently inadequate data on proposed infrastructure developments other than solar (i.e. mines, roads, township extensions). However, given the overall assessment, the cumulative impact on palaeontological heritage resulting from these developments, would probably be low. No specialist palaeontological mitigation is considered necessary, but in the event of chance fossil finds during construction, the responsible Environmental Control Officer should safeguard these, preferably in situ. The South African Heritage Resources Authority (SAHRA) should also be alerted as soon as possible.

7.5.8 Traffic

The table below is a summary of the expected trips generated by the development of the solar power plants along with the background traffic on each of the major routes into Olifantshoek. These volumes are for the immediate surrounding road network.

Table 7.2: Cumulative Trip Summary

Destinations	On N14	On R325
Current ADT on Route (vpd)	1 782	1 671
Delivery & Construction Trips (vpd)	192	192
Commuter Trips (vpd)	360	-
Total Expected Trips	**2 334**	**1 863**

The projected trips per day for the scenario that includes six solar developments, are deemed to be of no consequence to the LOS of the travelled route from Cape Town to Olifantshoek or Durban to Olifantshoek as it does not exceed or even approach the maximum ADT of 4 900 vpd. From table 7.2 above it is therefore apparent that the cumulative additional trips will not impact greatly on the immediate or wider road network. It must be noted that the traffic volumes were low to begin with and therefore the significance of the impact experienced by the normal road users is considered little in comparison to the current LOS.

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 7.3 Specific VECs were identified with reference to

the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.3 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.3: 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. Other projects will also constitute the removal of more protected tree species as the ones on site and may have a regional detrimental impact.	- Medium
Avifauna	Development of multiple solar energy facilities in this region may have cumulative impacts on birds, this will happen via the same factors identified here viz: collision, avoidance and displacement.	- Medium
Loss or fragmentation of habitats	The developments are located in an area with numerous protected plant and tree species as well as Red Data Bird species. Removal of large areas of these habitats may have a detrimental effect on loss of habitats.	- 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. The specialist rated the cumulative impact of soil erosion as negligible.	- Low
Impacts of the geology on the proposed development	A fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm.	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 and mining activities and people using the Regional Road 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 and mining activities in the area and result in higher maintenance costs for vehicles of locals and other road users. The costs will be borne by road users who were no responsible for the damage. However, the roads to be used from either Durban and Cape Town should be able to accommodate the construction vehicle traffic.	- 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 families and the community.	- Medium

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 considered to be negligible.	- Negligible
Impact on traffic	The cumulative additional trips will not impact greatly on the immediate or wider road network. It	-Low
Operational Phase		
Avifaunal	The impact on avian mortality is likely to be substantial unless mitigation measures are implemented.	-Low
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.	- Medium
Loss of agricultural land	It is preferable to incur a higher cumulative loss in a region with low agricultural potential, than to lose agricultural land with a higher production potential elsewhere in the country. Because of the very low agricultural potential of the site considered in this report, its contribution to any cumulative impact is low.	- low
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. The impacts can however be mitigated via relocation of farm workers and disturbed areas can be rehabilitated after the construction	- Low

	phase.	
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, mining in the area 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).	+ Low
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 and the existing mining infrastructure 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 and mining activities and people using the existing roads 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	- Medium

	cumulative impacts with regards to the availability of landfill space.	

7.7 CONCLUSION

This chapter of the Scoping Report 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:
  - 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 ENVIRONMENTAL IMPACT STATEMENT

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

Appendix 3. (3) An EIR (...) must include-

(l) an environmental impact statement which contains-

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

(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and

(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;

(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;

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

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

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

- Impacts during construction phase:
  - Impacts on the fauna and flora (- Low)
  - Impacts on soil (- Low)
  - Impacts associated with the geology of the site (- Low)
  - Impacts on existing services infrastructure (- Low)
  - Temporary employment and other economic benefits (+ Medium)
  - Impacts on heritage resources (- Low)
  - Traffic impacts (- Low)

- Impacts during the operational phase:
    - Impacts on the fauna and flora
        - Avifauna Fatalities (- Medium)
        - Nesting for Birds (+ Medium)
    - Impacts associated with the soil (- Low)
    - Impacts associated with the geology of the site (- Low)
    - Increase in employment and other economic benefits (+ Medium)
    - Visual impacts (- Low)
    - Generation of income to the Local Community (+ Medium)
    - Pressure on existing services infrastructure and water sources. (- Low)
    - Impacts on heritage resources (- Low)
    - Additional electricity generation (+ Medium)

- Impacts during the decommissioning phase:
    - Loss of permanent employment (- Low) &
      the creation of temporary employment (+ Low)
    - Impacts on heritage resources (- Low)
    - Generation of waste (- Low)

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

8.2 RECOMMENDATION OF EAP

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

- The scoping phase complied with the agreement and specification set out in Regulation 21 and Appendix 2 of the 2014 EIA Regulations – already approved by the environmental authority.
- All key consultees have been consulted as required by Chapter 6 of the 2014 EIA Regulations - already approved by the environmental authority.
- The EIA process has been conducted as required by the 2014 EIA Regulations, Regulations 23 and Appendix 3.
- The EMPr has been compiled in accordance with Appendix 4 of the 2014 EIA Regulations.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.

- No additional specialist studies are proposed on any environmental issue raised and thus, no terms of reference are provided for such studies.

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

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

The final recommendation of the EAP is that:

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Lutzburg Solar Plant and associated infrastructure, Registration Division Gordonia, Northern Cape Province be approved subject to the following conditions:

- Implementation of the proposed mitigation measures set out in the EMPr.
- Implementation of the proposed mitigation measures set out in the specialist studies.
- The proposed solar facility must comply with all relevant national environmental laws and regulations.
- All actions and task allocated in the EMPr should not be neglected and a copy of the EMPr should be made available onsite at all times.
- Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

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

Marelie Griesel

Environamics - Environmental Consultants

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