



DRAFT SCOPING REPORT
May 2016

THE PROPOSED BOITSHOKO SOLAR POWER PLANT NEAR KATHU, NORTHERN CAPE PROVINCE

PROJECT DETAIL

DEA Reference No.	:	To be obtained
Project Title	:	Proposed Boitshoko Solar Power Plant near Kathu, Northern Cape Province
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Client	:	Boitshoko Solar Power Plant (RF) (Pty) Ltd.
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TABLE OF CONTENTS

PROJECT DETAIL	1
TABLE OF CONTENTS	2
LIST OF TABLES	5
LIST OF FIGURES	6
LIST OF TABLES	7
APPENDICES	7
GLOSSARY OF TERMS AND ACRONYMS	8
EXECUTIVE SUMMARY	9
EXECUTIVE SUMMARY	10
1 INTRODUCTION	14
1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT	14
1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	16
1.3 DETAILS OF SPECIALISTS	16
1.4 STATUS OF THE EIA PROCESS	19
1.5 STRUCTURE OF THE REPORT	20
2 ACTIVITY DESCRIPTION	23
2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION	23
2.2 ACTIVITY DESCRIPTION	24
2.3 PHOTOVOLTAIC TECHNOLOGY	26
2.4 LAYOUT DESCRIPTION	27
2.5 SERVICES PROVISION.....	28
3 LEGISLATIVE AND POLICY CONTEXT	30
3.1 INTRODUCTION	30

3.2	LEGISLATIVE CONTEXT.....	32
3.3	POLICY CONTEXT	35
4	THE NEED AND DESIRABILITY.....	46
4.1	THE NEED FOR THE PROPOSED ACTIVITY.....	46
4.2	THE DESIRABILITY OF THE PROPOSED ACTIVITY	46
5	DESCRIPTION OF ENVIRONMENTAL ISSUES.....	49
5.1	CONSIDERATION OF ALTERNATIVES.....	49
5.1.1	No-go alternative.....	50
5.1.2	Location alternatives	50
5.1.3	Activity alternatives.....	51
5.1.4	Technical alternatives.....	52
5.1.5	Design and layout alternatives	53
5.1.6	Technology alternatives	54
5.2	PUBLIC PARTICIPATION PROCESS.....	55
5.2.1	General	56
5.2.2	Consultation process	58
5.2.3	Registered I&APs	58
5.2.4	Issues raised by I&APs and consultation bodies	60
5.3	THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE	60
5.3.1	Biophysical environment.....	60
5.3.2	Description of the socio-economic environment.....	67
5.4	SITE SELECTION MATRIX.....	70
5.5	CONCLUDING STATEMENT ON ALTERNATIVES	75
6	DESCRIPTION OF THE IMPACTS AND RISKS.....	76
6.1	SCOPING METHODOLOGY	76
6.1.1	Checklist analysis.....	77

6.1.2	Matrix analysis.....	79
6.2	KEY ISSUES IDENTIFIED	94
6.2.1	Impacts during the construction phase.....	94
6.2.2	Impacts during the operational phase	94
6.2.3	Impacts during the decommissioning phase.....	94
7	CUMULATIVE EFFECTS ASSESSMENT	96
7.1	Introduction.....	96
7.2	Geographic Area of Evaluation.....	96
7.3	Temporal Boundary of Evaluation.....	97
7.4	OTHER PROJECTS IN THE AREA	98
7.4.1	Existing projects in the area	98
7.4.2	Projects in the foreseeable future.....	99
7.5	SPECIALIST INFORMATION ON CUMULATIVE EFFECTS	100
7.5.1	Geology.....	100
7.5.2	Soil, Land Capability and Agricultural Potential	101
7.5.3	Ecology	101
7.5.4	Birds.....	102
7.5.5	Social Impact Assessment	102
7.5.6	Visual	103
7.5.7	Heritage	103
7.5.8	Traffic.....	103
7.6	IMPACT ASSESSMENT	104
7.6.1	Potential Cumulative Effects	104
7.7	CONCLUSION	107
8	PLAN OF STUDY FOR EIA.....	109
8.1	INTRODUCTION	109

8.2	ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE	109
8.3	TASKS TO BE UNDERTAKEN	110
8.3.1	Project Description	110
8.3.2	Consideration of alternatives	110
8.3.3	Compilation of Environmental Impact Report	111
8.3.4	Public participation.....	111
8.4	ASPECTS ASSESSED	111
8.4.1	Specialist studies	112
8.4.2	Terms of reference for specialist studies	113
8.5	METHOD OF ENVIRONMENTAL ASSESSMENT	120
8.5.1	Impact Rating System	120
8.6	CONSULTATION WITH THE COMPETENT AUTHORITY.....	125
9	CONCLUSION	126
10	REFERENCES.....	128

LIST OF TABLES

Table 1.1: Listed activities

Table 1.2: Details of specialists

Table 1.3: Estimated timeframe for completion of the ‘scoping and EIA process’

Table 1.4: Structure of the report

Table 2.1: General site information

Table 2.2: Listed activities

Table 3.1: Legislative context for the establishment of Solar PV Plant

Table 3.2: Policy context for the establishment of a Solar PV Plant

Table 5.1: Issues raised by key consultation bodies

Table 5.2: Trip Summary for Long Distance Route

Table 5.3: Summary of identified heritage resources in the area

Table 5.4: Site selection matrix

Table 6.1: Environmental checklist

Table 6.2: Matrix analysis

Table 7.1: Potential Cumulative Effects for the proposed project

Table 8.1: Aspects to be assessed

Table 8.2: The rating system

LIST OF FIGURES

Figure 1: Locality Map

Figure 2: Regional Map

Figure 3: Footprint map

Figure 4: Land capability classification Map

Figure 5: Vegetation Map

Figure 6: Cumulative Impacts Map

Figure 7: Facility Layout

Figure 8: Proposed layout of the Remaining Extent of portion 1 of the farm Lime Bank No. 471

Figure 9: Location alternatives on the Remaining Extent of portion 1 of the farm Lime Bank No. 471

Figure 10: Horizontal irradiation for South Africa

Figure 11: Preferred site on the Remaining Extent of Portion 1 of the farm Limebank No 471

Figure 12: Surrounding land owners

Figure 13: The two vegetation units on the site, where the pans fall under Vegetation Unit 2

Figure 14: Geographic area of evaluation

Figure 15: Utility-scale Renewable Energy Generation Sites

Figure 16: National Wind and Solar PV SEA: Renewable Energy EIA Application Received before Dec. 2014

Figure 17: Preferred alternative on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471

PLATES

Plate 1: The site (taken towards the north)

Plate 2: The site (taken towards the north-east)

Plate 3: The site (taken towards the east)

Plate 4: The site (taken towards the south-east)

Plate 5: The site (taken towards the south)

Plate 6: The site (taken towards the south-west)

Plate 7: The site (taken towards the west)

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

Plate 9: Access road (taken towards the south-east)

Plate 10: Access road (taken towards the north-west)

Plate 11: Proposed access route to the site

Plate 12: Infrastructure on site

Plate 13: Non-perennial pan located in close proximity to the site (to be excluded from layout)

Plate 14: Grave located in close proximity to the site

Plate 15: Non-perennial pan located in close proximity to the site

Plate 16: The alternative site (taken towards the north-east)

Plate 17: The alternative site (taken towards the east)

Plate 18: The alternative site (taken towards the south-east)

Plate 19: The alternative site (taken towards the south)

Plate 20: The alternative site (taken towards the south-west)

Plate 21: The alternative site (taken towards the west)

Plate 22: The alternative site (taken towards the north-west)

Plate 23: Non-perennial pan on alternative site

Plate 24: Rail line adjacent to the alternative site

APPENDICES

Appendix A: EAP declaration

Appendix B: Press advertisement

Appendix C: On site notice

Appendix D: List of I&APs

Appendix E: Proof of correspondence

Appendix F: Written comments

Appendix G: Assessment

Appendix G1: Developer's Assessment

Appendix G2: Significance of potential impacts

Appendix H: Specialist Reports

Appendix H1: Geotechnical Report

Appendix H2: Ecological Fauna and Flora Habitat Survey

Appendix H3: Avifaunal Study

Appendix H4: Wetland Assessment

Appendix H5: Visual Impact Assessment

Appendix H6: Agriculture and Soils Impact Assessment

Appendix H7: Heritage Impact Assessment

Appendix H8: Paleontological Study

Appendix H9: Social Impact Assessment

Appendix I: Additional Information

GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
DEA	Department of Environmental Affairs
DM	District Municipality
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation

EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
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
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, Boitshoko Solar Power Plant (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 1 of the farm Lime Bank No. 471, registration division Kuruman, 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 2200 kWh/m²/annum.

EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Gamagara Local Municipality faces a number of challenges in addressing the needs and improving the lives of the community (IDP, 2015-2017). The Integrated Development Plan (2012-2017) of the John Taolo Gaetsewe District Municipality sets out the following objectives for the integrated development of the Gamagara Local Municipality's (JMLM): (1) to render quality, effective and sufficient services; (2) to promote the general wellbeing through a safe and healthy environment amongst

all residents; (3) to promote equality and fairness in the allocation of resources; and (4) to promote sound and sustainable economic growth in the municipal area.

In response to the above Boitshoko Solar Power Plant (RF) (Pty) Ltd. intends to develop a 115MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471, Registration Division Kuruman, Northern Cape Province situated within the Gamagara Local Municipality area of jurisdiction. The town of Kathu is located approximately 18km south east 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 280 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 Boitshoko Solar Power Plant’s behalf.

Regulation 21 of the EIA Regulations requires that a scoping report must contain all the information that is necessary for a proper understanding of the nature of issues identified

during scoping. The potential positive and negative impacts associated with the proposed activity have been identified. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18-24 months. The potentially most significant impacts relate to the impacts on the fauna and flora, soils, geology, existing services infrastructure, surface water, impacts on heritage resources, traffic impacts and socio-economic impacts such as the provision of temporary employment.

Impacts during the operational phase:

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

Impacts during the decommissioning phase:

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

Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Energy Blog's database seven other solar PV plants have been granted preferred bidder status within a **proximity radius of 80km** to the proposed Boitshoko PV plant. However, according to the Department's database eighteen (18) other solar plants have been proposed in relative close proximity to the proposed activity. Environamics and other environmental consultants are also in the process of applying for Environmental Authorisation for four (4) additional PV projects in the surrounding area.

The potential for cumulative impacts may therefore exist. The Draft Scoping Report includes a detailed assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats, generation of waste, temporary employment opportunities,

impact of construction workers on local communities, and an influx of job seekers and traffic impacts. Cumulative impacts (-Medium) during the operational phase relate to: visual intrusion, soil erosion, generation of additional electricity, the establishment of a community trust and the development of infrastructure for the generation of clean, renewable energy. The cumulative effect of the generation of waste was identified as 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 will contain information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation Appendix 3 of the EIA Regulations.

1 INTRODUCTION

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

Appendix 2. (2) A scoping report (...) must include- (a) details of:

- (i) the EAP who prepared the report; and
- (ii) the expertise of the EAP, including a curriculum vitae.

1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

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

The EIA Regulations No. 983 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

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
GNR. 983, 4 December 2014	Activity 11(i)	<ul style="list-style-type: none">• <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.”</i>• 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)	<ul style="list-style-type: none">• <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and</i>

		<p><i>where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i></p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • <i>“The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”</i> • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 115 MW electricity.
GNR. 984, 4 December 2014	Activity 15	<ul style="list-style-type: none"> • <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i> • In terms of vegetation type the site falls within the Kathu Bushveld vegetation types, which is described by Mucina and Rutherford (2006) as ‘least threatened’. Activity 15 is triggered since portions of the site have 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 2 of Regulation 982 the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;

- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

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

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Marélie Griesel
 Postal Address: PO Box 6484, Baillie Park, 2526
 Telephone: 018-290 8228 (w) 086 762 8336 (f) 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 curriculum vitae.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
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 and Wetland Assessment	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 & Social Impact Assessment Consultant	Mrs. L. Kruger	27 Tuscan Views 51Ditedu Ave Potchefstroom 2520	Cell: 082 447 1455	leandrihildebrandt@gmail.com

1.4 STATUS OF THE EIA PROCESS

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

- A site visit was conducted with the developer on 28 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.

It is envisaged that the Draft Scoping Report will be submitted to the Department in May 2016 and that the Final Scoping Report will be accepted by the Department in July 2016. The EIA process should be completed within approximately nine months of submission of the Draft Scoping Report, i.e. by January 2017 – see Table 1.3.

Table 1.3 : Estimated timeframe for completion of the ‘scoping and EIA process’

Activity	Prescribed timeframe	Timeframe
Site visit		29 Feb. – 2 March 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	August 2016
Public participation (DEIR)	30 Days	Sept. 2016
Submission of FEIR & EMPr	-	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 2 of Regulation No.982. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of a scoping report as specified in the Regulations		Section in report	Pages
Appendix 2. (2) - A scoping report must contain all the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-			
(a)	details of -	1	13-22
	(i) the EAP who prepared the report; and ii) the expertise of the EAP, including a curriculum vitae.		
(b)	the location of the activity, including-	2	23-29
	(i) the 21-digit Surveyor General code of each cadastral land parcel;		
	(ii) where available, the physical address and farm name;		
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	2	23-29
	(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-	2	23-29
	(i) all listed and specified activities triggered;		
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.		
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation,	3	30-45

	policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;		
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4	46-48
(g)	a full description of the process followed to reach the proposed preferred activity, site and location within the site, including – (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them. (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	5	49-74
(h)	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	6	75-94

	(viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;		
(i)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the EIA process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the EIA process; and (viii) a description of the tasks that will be undertaken as part of the EIA process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	8	107-123
(j)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	Appendix A to the report	
(k)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the EIA;		
(l)	where applicable, any specific information required by the CA; and	N/A	-
(m)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A	-

2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

- (i) the 21-digit Surveyor General code of each cadastral land parcel;
- (ii) where available, the physical address and farm name;
- (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

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

- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or
- (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

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

- (i) all listed and specified activities triggered;
- (ii) a description of the activities to be undertaken, including associated structures and infrastructure.

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471, Registration Division Kuruman, Northern Cape Province situated within the Gamagara Local Municipality area of jurisdiction. The proposed development is located in the Northern Cape Province in the north western interior of South-Africa (refer to Figure 2 for the regional map). The town of Kathu is located approximately 18km south east of the proposed development (refer to Figure 1 for the locality map).

The project entails the generation of up to 115MW electrical power through photovoltaic (PV) panels. The total footprint of the project will approximately be 280 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Boitshoko Solar Power Plant (RF) (Pty) Ltd. from the property owner, Mr. Hendrik van Der Merwe, for the life span of the project

(minimum of 20 years). It is expected that generation from the facility will tie in with the Ferrum–Umtu 132kV power line, which will also traverse the Remaining Extent of the farm Wincanton No. 472. The property owner of the Remaining Extent of the farm Wincanton No. 472 is San Solar Energy Facility (Pty) Ltd.

Table 2.1: General site information

Description of affected farm portion	The Remaining Extent of Portion 1 of the farm Lime Bank No. 471, Registration Division Kuruman, Northern Cape
21 Digit Surveyor General codes	C04100000000047100001
Title Deed	T2827/1999
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 280 ha
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	280 ha
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 – refer to plates 1-24 for photographs of the development area.

2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

Table 2.2: Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per project description:
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GNR. 983, 4 December 2014	Activity 11(i)	<ul style="list-style-type: none"> • <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.”</i> • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.
GNR. 984, 4 December 2014	Activity 28(ii)	<ul style="list-style-type: none"> • <i>“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.”</i> • Activity 28(ii) is triggered since the farm has been previously cultivated and the property will be re-zoned to “special”.
GNR. 984, 4 December 2014	Activity 1	<ul style="list-style-type: none"> • <i>“The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”</i> • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 115 megawatts electricity.
GNR. 984, 4 December 2014	Activity 15	<ul style="list-style-type: none"> • <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i> • In terms of vegetation type the preferred site falls within the Kathu Bushveld vegetation types, which is described by Mucina and Rutherford (2006) as ‘least threatened’. 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:

- 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 where reasonably possible. The site is readily accessible from the R380. An internal site road network is to be constructed. Additionally, the turning circle for trucks will also be taken into consideration.
- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

2.3 PHOTOVOLTAIC TECHNOLOGY

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

- PV Panel Array - To produce up to 115MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.
- Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. As Boitshoko Solar Power (RF) (Pty) Ltd. has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with the Ferrum–Umtu 132kV power line. The project will potentially 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 laid ~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 R380 Provincial Road. There is no need for a new access road, because the site will make use of the existing entrance to the site. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access road will have a width of ~6m and the internal road/track ~5m.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.

2.4 LAYOUT DESCRIPTION

The layout plan will follow the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site will be considered – refer to figure 8 below. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, transmission lines and perimeter fences). Limited features of environmental significance exist on site. A draft layout plan is included in the Final Scoping Report.

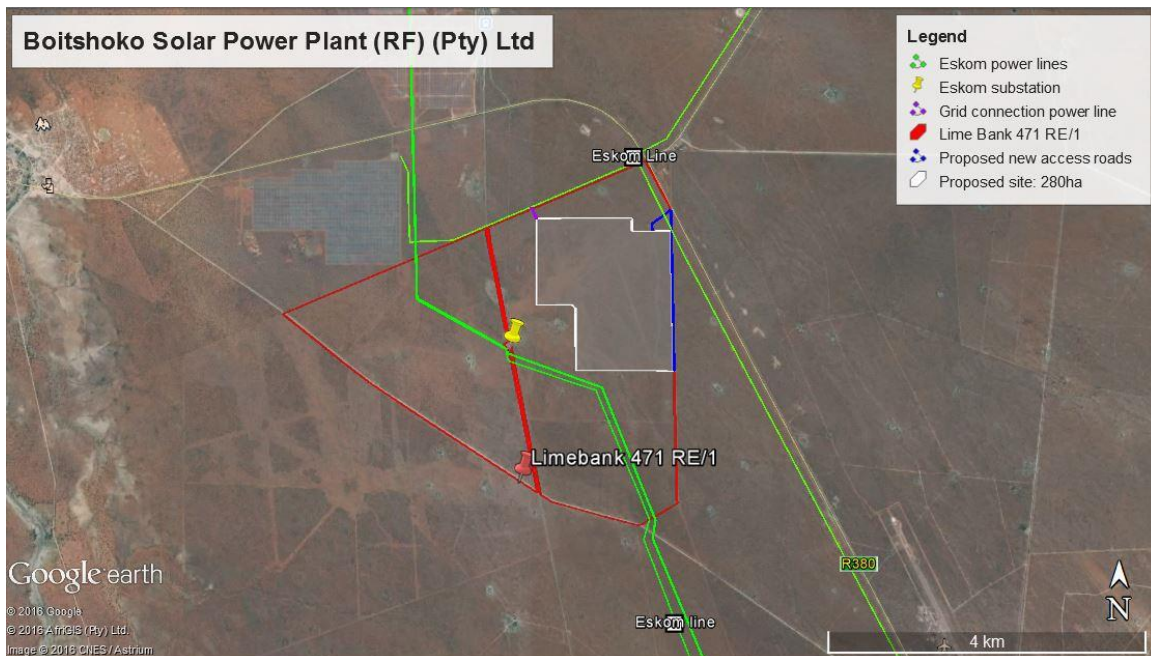


Figure 8: Proposed layout of the Remaining Extent of Portion 1 of the farm Lime Bank No. 471

2.5 SERVICES PROVISION

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

The site falls within the D41J 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 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 880m³ of water required per

annum. Drinking water supplied will comply with the SANS:241 quality requirements and it is noted that the Gamagara Local Municipality remains the Water Service Authority in that area of jurisdiction.

Generally, the water supply does not require the construction of a reverse osmosis plant. This is however dependant on the quality of the water, or what the mineral content is. Should a reverse osmosis plant be required, brine (the excess minerals) will be formed during the filtration process that will be stored and then removed. Determining baseline water quality conditions is important in order to appropriately manage incidents in the future. The quality of the water will however only undergo testing if the project is selected as preferred bidder by the Department of Energy. Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs should be considered by the developer. Furthermore, indigenous vegetation will be used during landscaping and the staff will be trained to implement good housekeeping techniques.

Portable chemical toilets will be utilized, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed waste site (such as Hotazel, Kuruman or Kathu). 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 2016 to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years) – refer to Appendix I. To date no feedback has been received.

3 LEGISLATIVE AND POLICY CONTEXT

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

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

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

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Environmental Affairs (DEA) as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in IDPs and SDFs. Therefore, to ensure streamlining of environmental authorisations it is imperative for the proposed activity to align with the principles and objectives of key national, provincial and local development policies and legislation. The following acts and policies 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)
- John Taolo Gaetsewe District Municipality Integrated Development Plan for 2012 – 2016
- Gamagara Local Municipality Draft Integrated Development Plan for 2015 – 2017

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 D41J 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. It should also be noted that if the development

			occurs within 500m from a wetland, a WULA may be required.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Department of Environmental Affairs (DEA)	2008	<p>NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.</p> <p>Regulations No. 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.</p>
National Environment Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs (DEA)	2004	<p>The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.</p> <p>Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.</p>
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

1999)			<p>establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.</p> <p>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS and all relevant documents will be submitted for their comments and approval.</p>
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	<p>The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.</p> <p>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.</p>

3.3 POLICY CONTEXT

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

POLICY	ADMINISTERING AUTHORITY	DATE	SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT
Strategic Plan,	Department of	2015	The strategic plan identifies six Departmental programmes. Programme 6 relates to clean energy. The

2015 – 2020

Energy

purpose of this programme is to manage and facilitate the development and implementation of clean and renewable energy initiatives as well as EEDSM. Strategic objective 6.3 relates to effective renewable energy: To ensure the integration of renewable energy into the mainstream energy supply of South Africa by planning & coordinating initiatives & interventions focused on the development & improvement of the renewable energy market through:

- facilitating the incorporation of renewable energy technologies into the IEP & other key energy policy documents;
- resource mapping;
- establishing a conducive environment for the growth of decentralised (renewable energy based) embedded electricity generation;
- providing up-to-date data on performance & costs of renewable energy technologies as inputs to the IEP;
- identify 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 Energy Policy of the Republic of South Africa

Department of Minerals and Energy

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:

- 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 Energy	Department of Minerals and Energy	2003	This White Paper on Renewable Energy supplements the <i>White Paper on Energy Policy</i> , which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.
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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 38 renewables; 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 38 renewables were brought forward in order to accelerate a local industry;
- To account for the uncertainties associated with the costs of 38 renewables and fuels, a nuclear fleet of 9,6GW was included in the IRP;
- The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of

the RBS.

The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for 39renewable. In addition to all existing and committed power plants (including 10GW committed coal), the plan includes 9,6GW of nuclear; 6,3GW of coal; 17,8GW of 39renewable; and 8,9GW of other generation sources. The Policy-Adjusted IRP has therefore resulted in an increase in the contribution from 39renewable from 11,4 GW to 17,8 GW.

Northern Cape Provincial Development and Resource Management Plan/Provincial Spatial Development Framework (PSDF)	Northern Cape Provincial Government	2012	<p>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 <i>“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:</i></p> <ul style="list-style-type: none">• <i>setting and monitoring, where appropriate, measurable standards with regard to, amongst other, public access to health, safety, amenities, education and economic opportunity;</i>• <i>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;</i>• <i>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;</i>• <i>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</i>• <i>informing and guiding the preparation and implementation of district and local municipal infrastructure management plans and land development plans” (PSDF 2012:4).</i>
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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	<p>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.</p> <p>This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms</p>
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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.

<p>John Taolo Gaetsewe District Municipality Integrated Development Plan (IDP)</p>	<p>John Taolo Gaetsewe District Municipality</p>	<p>2012 - 2019</p>	<p>The John Taolo Gaetsewe District Municipality’s Integrated Development Plan for 2012-2019 (further referred to as “the Plan”) highlights the achievements and challenges of the municipality. One of these challenges is that the growth in access to electricity as a primary source of energy in the district has been spectacular. Over the period of 2001-2007 electricity as a source of energy has increased to 90% in the district municipality. Thus there, has been a growth of 31.8 % over six (6) years.</p> <p>The Plan goes further by stating the development priorities of the municipality. They are:</p> <ul style="list-style-type: none"> - Priority 1: Water and Sanitation; - Priority 2: Roads and Transport; - Priority 3: Local Economic Development (LED); - Priority 4: Land Development and Reform; - Priority 5: Integrated Human Settlements; - Priority 6: Sustainable Development Orientated Municipalities; - Priority 7: Environmental Management, Climate Change and Municipal Health;
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- Priority 8: Disaster Management; and
- Priority 9: HIV/Aids and TB

One of the long-term strategic objectives of the district, according to the Plan, that particularly relate to the proposed project is “Environmental Management, Climate Change and Municipal Health”. Under this strategic objective one of the common issues that affect the district identified by the Plan is the use of solar energy for future purposes. The Plan goes further by stating that “serious investment in and exploitation of renewable sources of energy has not only resulted in the district becoming self-reliant in the generation of electricity, but seen it make a sizeable injection on the national electricity grid”.

Furthermore, the plan describes the local economic development strategy of the district. Key thrusts were identified. Thrust 5 (Industrial Development) relate to the proposed project. This thrust refers to the programmes that relate to the manufacturing projects identified and the associated enabling public sector interventions. This thrust also refers to the general improvement in living conditions, infrastructure and overall economic growth, which should serve as a boost of potential in this sector. An example of these projects includes solar energy plants.

Gamagara Local Municipality Draft Integrated Development Plan (IDP)	Gamagara Local Municipality	2015-2017	<p>The vision of the Gamagara Local Municipality according to the Draft Integrated Development Plan for 2015-2017 (further referred to as the Plan) is to provide a prosperous community with a futuristic economy. The mission of the municipality is to <i>“provide universal sustainable services to the community in order to attain a safe and healthy environment, as well as socio-economic development by exploiting economic benefits and strengthening stakeholder relations.”</i></p> <p>The Plan is the process through which the municipality prepares a strategic developmental plan, which is the principal strategic development plan. This Plan also crosses departmental divisions by linking the physical, social, institutional and economic components of planning and development structures. It also integrates and aligns planning in the different sectors of government, thereby enforcing and upholding the spirit of co-operative governance in the public sector. The Plan makes the following policy</p>
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pronouncements and performance targets that intersect with developmental mandates assigned to local government. This Plan further refers to the creation of employment initiatives in the area. The prospects for economic growth and development within the municipal area for the short – and long-term will focus on manufacturing, heritage and tourism, wholesale and retail trade and solar energy.

According to the Gamagara Local Municipality Draft Integrated Development Plan for 2015 – 2017 the following were identified as the key priority areas for the years 2015 -2016, they are: basic service delivery, water and sanitation, electricity, roads and sanitation, mixed developing houses and construction of RDP houses.

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)¹
- World Bank Group Environmental, Health and Safety General Guidelines (EHS Guidelines) (2007)
- Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution (2007)
- International Finance Corporation's Policy on Environmental and Social Sustainability (2012)
- DEA. (2013). Draft National Renewable Energy Guideline. Department of Environmental Affairs, Pretoria, South Africa
- DEA, (2012), Guideline 5 – Final companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010
- DEA, (2012), Guideline 7 – Public participation in the Environmental Impact Assessment process
- DEA, (2012), Guideline 9 – Need and desirability
- DEAT, (2006), Guideline 3 – General guide to the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 4 – Public participation in support of the Environmental Impact Assessment Regulations
- DEAT, (2006), Guideline 5 – Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations
- BirdLife, (2015). Guidelines to minimise the impact on birds of Solar Facilities and Associated Infrastructure in South Africa

3.6 CONCLUSION

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

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

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

4 THE NEED AND DESIRABILITY

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

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

4.1 THE NEED FOR THE PROPOSED ACTIVITY

The proposed activity is a direct result of the growing demand for electricity and the need for renewable energy in South Africa. According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of 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 World bank estimates that these results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO₂ 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 Gamagara Local Municipality's Integrated Development Plan such as ensuring economic growth in the region and creating long term employment (IDP, 2015-2017).

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 and soil 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 14-17 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.

Increased access to electricity as a source of energy: The John Taolo Gaetsewe District Municipality's IDP for 2012-2019 highlights that the growth in access to electricity as a primary source of energy in the district has been spectacular. Over the period of 2001-2007 electricity as a source of energy has increased to 90% in the district municipality. The increased use of electricity as a source of energy may be linked to the increase urbanisation in this region. According to the Gamagara IDP of 2015/2016 the population in the local municipality increased with 79% from 2001 to 2011 and is growing at a rate of 5.84% yearly.

5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

- (h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including –
 - (i) details of all the alternatives considered;
 - (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
 - (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.
 - (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
 - (ix) the outcome of the site selection matrix;
 - (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and
 - (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;

5.1 CONSIDERATION OF ALTERNATIVES

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

An initial site assessment (refer to Appendix G) was conducted by the developer on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471 and the farm was found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. Some parts of the farm have been deemed not suitable for the proposed development such as areas surrounding farm structures (windmills, cattle loading bays, etc.) or near the non-perennial pans that are located around the selected sites. These factors were then taken into consideration and appropriate buffers were implemented to exclude them from the layout plan. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site. From the information obtained, a single preferred alternative has emerged (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 (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 Boitshoko Solar Power Plant (RF) (Pty) Ltd. in the Kathu area to potentially establish solar facilities. From a local perspective, the Remaining Extent of Portion 1 of the farm No. 471 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 livestock ranching and 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 4 for an illustration of the land capability classification).

Two possible sites were identified on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471. These sites are referred to as "the alternative" and "the preferred site". Some limited environmental sensitive features occur on both sites. Provision was made to assess both the preferred alternative (280 hectares) and the alternative site (300 hectares) – refer to figure 9. The sizes of the sites make provision for the exclusion of any sensitive environmental features that may arise as a result of the EIA process.

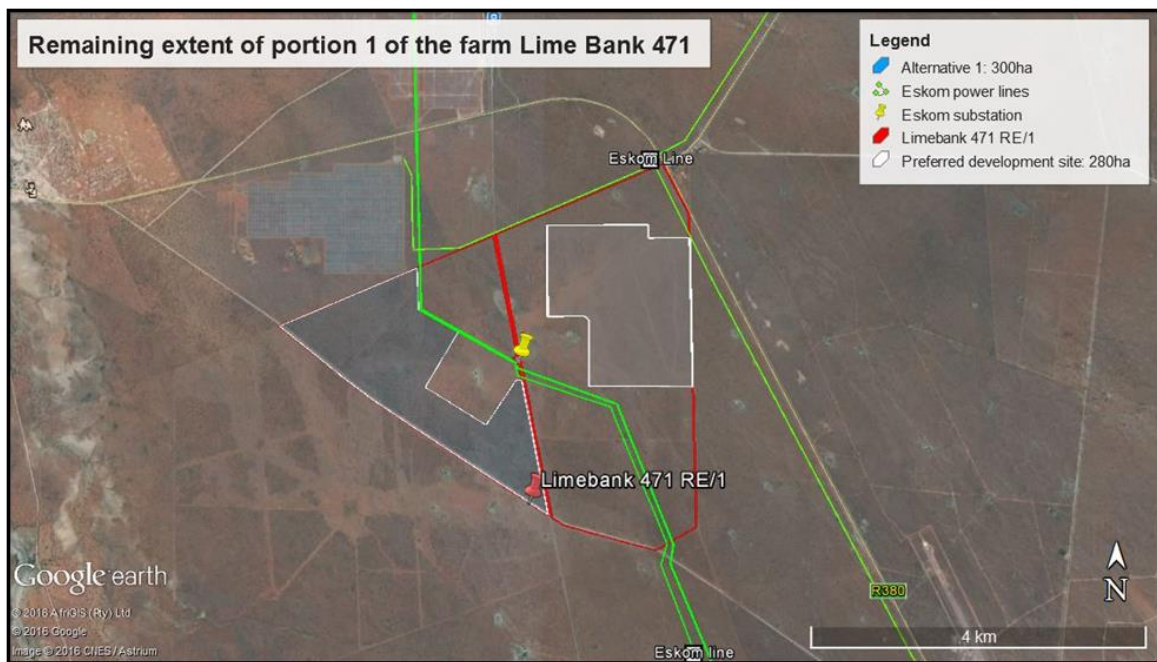


Figure 9: Location alternatives on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471

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 – Boitshoko Solar Power Plant (RF) (Pty) Ltd. is part of a portfolio of solar PV projects throughout South Africa. Boitshoko Solar Power Plant (RF) (Pty) Ltd. is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for the Kathu area – refer to figure 10.

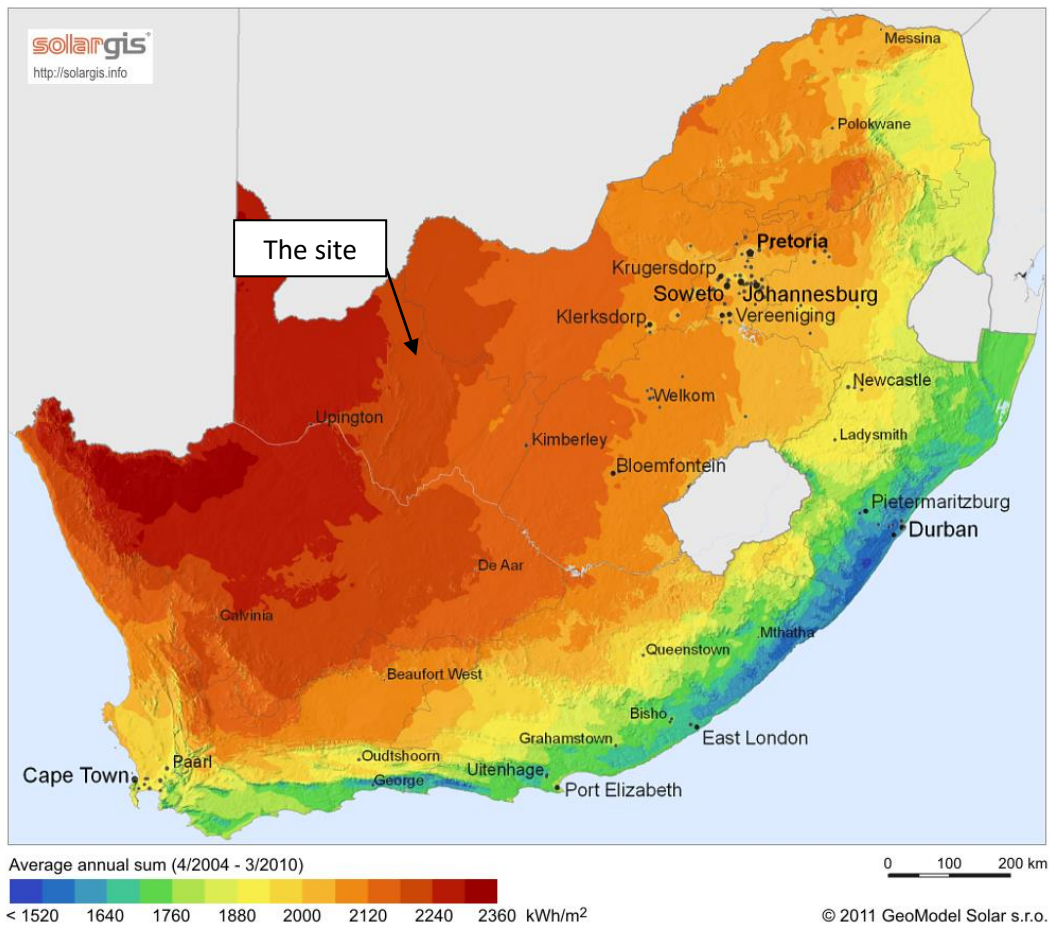


Figure 10: Horizontal irradiation for South Africa (SolarGIS, 2011)

The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all of the components can be recycled.

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

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

5.1.4 Technical alternatives

It is expected that generation from the facility will likely tie in with the Ferrum–Umtu 132kV power line. A transmission line will be constructed within 36m wide servitude towards the power line which is the preferred alternative 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).

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

5.1.5 Design and layout alternatives

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer. The layout plan will be submitted as part of the EIA Report, indicating the preferred location on site for the proposed development. Three alternative sites on the same farm were identified but after the initial site assessment the alternative sites were ruled out and the EIA will therefore only focus on the single preferred site – refer to figure 11.

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

- How to accommodate any protected tree or plant species.
- How to avoid any pans surrounding the site.

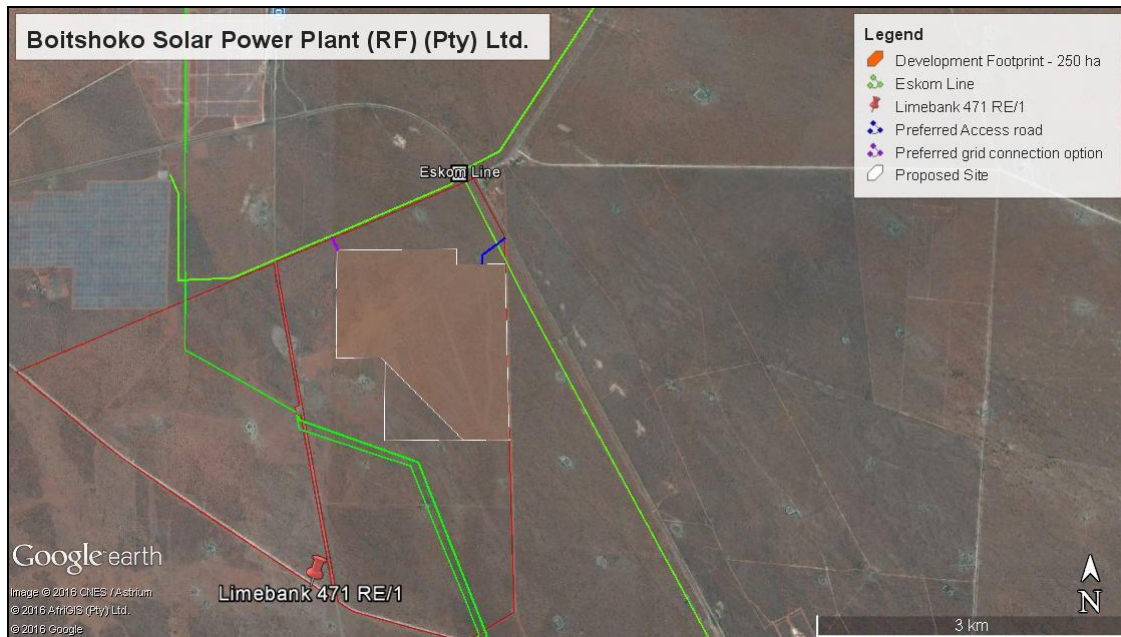


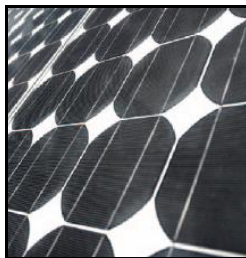
Figure 11: Preferred site on the Remaining Extent of Portion 1 of the farm Limebank No 471

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):

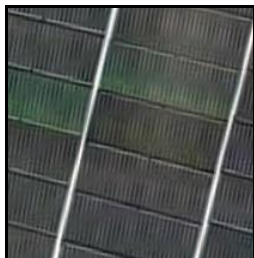
Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, 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 28 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:

- The Department of Water Affairs and Forestry
- Northern Cape Department of Environmental Affairs and Nature Conservation
- Northern Cape Department of Agriculture, Forestry and Fisheries
- The National Department of Agriculture

- The Provincial Heritage Resources Agency (PHRA), Northern Cape
- The Wildlife and Environment Society of South Africa (WESSA)
- The Department of Energy
- The Northern Cape Department of Energy
- The Northern Cape Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Department of Communications
- Northern Cape Department of Mineral Resources
- Transnet
- ESKOM
- The Civil Aviation Authority (CAA)
- The Northern Cape Department of Public Works, Roads and Transport
- National Energy Regulator of South Africa (NERSA)
- The Municipal Manager at the John Taolo Gaetsewe District Municipality
- The Municipal Manager at the Gamagara Local Municipality
- The Local Councilor at the Gamagara Local Municipality
- Leads 2 Business – Melanie Miles
- Land owner - Mr. Hendrik van Der Merwe
- Wincanton 472 RE - San Solar Energy Facility (Pty) Ltd (land owner of power line route)
- Halliford 466 portion 3 - Kasselmann trust
- Mash 467 RE - Sishen Iron Ore Company (Pty) Ltd.
- Limebank 471 portion 2 - Curtis Boerdery cc

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 and Mrs Stephanie Kasselmann.

➤ Direct notification of surrounding land owners and occupiers

Written notices were also provided to all surrounding land owners and occupiers on 17 March 2016. The Gamagara Local Municipality and other local property owners were contacted to obtain the contact details of the surrounding land owners; four farmer's contact details could be obtained – refer to figure 12. The surrounding land

owners were given the opportunity to raise comments by 20 April 2016. To date only Mrs Stephanie Kasselmann registered as an I&AP (see Appendix F for written comments). For a list of surrounding land owners see Appendix D.

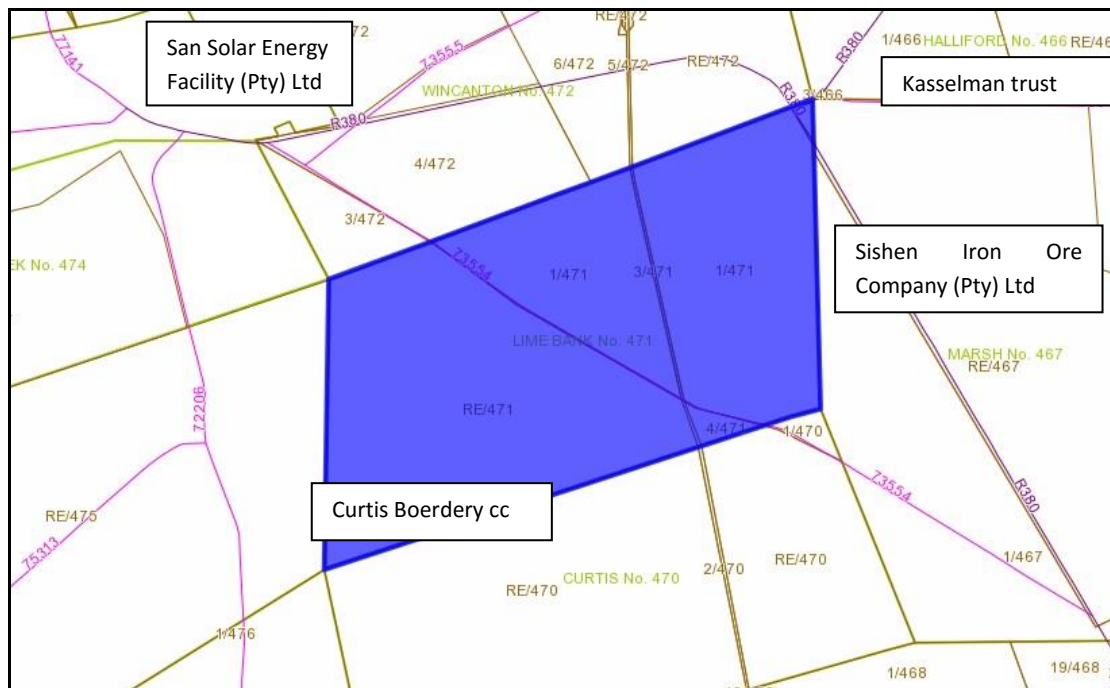


Figure 12: Surrounding Land Owners

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." This report is the Draft Scoping Report and will be made available to the following potential and/or registered I&APs and State Departments:

- The Department of Water Affairs and Forestry
- Northern Cape Department of Environmental Affairs and Nature Conservation
- Northern Cape Department of Agriculture, Forestry and Fisheries

- The National Department of Agriculture
- The Provincial Heritage Resources Agency (PHRA), Northern Cape
- The Wildlife and Environment Society of South Africa (WESSA)
- The Department of Energy
- The Northern Cape Department of Energy
- The Northern Cape Department of Agriculture
- The South African Heritage Resources Agency (SAHRA)
- Passenger Rail Agency of South Africa (PRASA)
- South African National Roads Agency (SANRAL)
- SENTECH
- Department of Communications
- Northern Cape Department of Mineral Resources
- Transnet
- ESKOM
- The Civil Aviation Authority (CAA)
- The Northern Cape Department of Public Works, Roads and Transport
- National Energy Regulator of South Africa (NERSA)
- The Municipal Manager at the John Taolo Gaetsewe District Municipality
- The Municipal Manager at the Gamagara Local Municipality
- The Local Councilor at the Gamagara Local Municipality
- Lead 2 Business – Melanie Miles
- Limebank 471 – Hendrik van der Merwe
- Wincanton 472-RE – San Solar Energy Facility (Pty) Ltd
- Halliford 466-3 – Kasselmann trust
- Mash 467-RE – Sishen Iron Ore Company (Pty) Ltd
- Limebank 471-5 Curtis Boerdery cc

They will be provided with a copy of the Draft Scoping Report and will be requested to provide written comments on the report within 30 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Final Scoping report.

5.2.4 Issues raised by I&APs and consultation bodies

The comments received to date from consultation bodies are summarized in table 1.5. The full wording and original correspondence is included in Appendix F.

Table 5.1: Issues raised by I&APs and 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 Boitshoko Solar Power Plant and asked whether we could forward her the BID for the application and register her as an I&AP.
I&AP	Mrs Stephanie Kasselman	On a comments and response form (no date) Mrs. Kasselman expressed concerns about the visual impacts on the indigenous veld. She also expressed her concerns about the clearing of large areas of vegetation, the removal of topsoil and the creation of dust. She stated that the area is reliant on farming activity and she is worried about the potential for soil erosion, especially by wind.

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.

5.3.1.1 Geology, soils and agricultural potential

The site features red sandy soils (Mispah, Hutton and Clovelly forms) which vary in depth from shallow to moderately deep. Rockiness of the soil surface varies. A number of non-perennial pans were observed in the vicinity of the site and were recorded for the sake of the potential ecological importance of these pans in the larger ecological system.

According to the Agriculture and Soils Impact Assessment (attached in Appendix H6) there is a single land type across the site, associated with predominantly shallow, sandy soils on underlying hardpan carbonate or rock. The geology is surface limestone, alluvium and red wind-blown sand of Tertiary to Recent age with a few occurrences of amygdaloidal andesitic

lava (Ongeluk Formation). Soils are predominantly of the Hutton soil form, with lesser coverage of shallow Mispah form.

The site is of the Kathu Bushveld vegetation unit. The land capability is classified as Class 7 - non-arable, low potential grazing land. The site has a grazing capacity of 14-17 hectares per large stock unit. The land capability is classified as Class 7 -non-arable, low potential grazing land. The site has a grazing capacity of 14-17 hectares per large stock unit. The significance of all agricultural impacts is influenced by the fact that the site has climate limitations regarding moisture availability, as well as soil imitations with shallow soils and hardpan rock, making it unsuitable for cultivation and the land use is therefore limited to grazing.

A comment from an I&AP raised the issue of potential increased wind erosion with the removal of vegetation for the proposed project. The soils are classified as having low to moderate susceptibility to water erosion and as highly susceptible to wind erosion. There is however no evidence of significant erosion or other land degradation on the site. The site is of the Kathu Bushveld vegetation unit. The impact has been identified during the Agriculture and Soils Impact Assessment (refer to Appendix H6) and management measures will be implemented to mitigate the impact.

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

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

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

- Generation of alternative land use income through rental for energy facility which will improve the financial sustainability of the farming enterprise.
- Increased security against stock theft and predation for small stock farming within fenced panel areas.

5.3.1.2 Vegetation and landscape features

The Kathu Bushveld vegetation type, under which the site is classified, is described by Mucina and Rutherford (2006) as 'least threatened'. The Kathu Bushveld is characterised by a mostly open landscape with a shrub layer, a medium-tall tree layer in places and some fewer mature *Acacia trees* – refer to Plates.

The areas studied are mostly flat sandy plains with shrubs and few tall trees and some small interspersed pans of which none are found on the preferred site and only one on the alternative site. No threatened ecosystems were recorded in or in the vicinity of the study area.

The vegetation is dominated by tall woody shrubs, where for the largest part of the study area the average height for these shrubs is 1.5-2.0m. A smaller area is covered by lower shrubs of 0.5-1.5m. The areas with lower shrubs generally also have a better grass cover and are mostly situated on shallower, rocky soils. Ten (10) plant species of specific conservation significance were recorded in the study area during the study period. Two are listed by Raimondo et al (2009) in the South African Red Data list as Declining species. Two tree species are included in the protected tree species list published by the National Forests Act (Act no.84 of 1998) (NFA, 1998), and nine of the 10 are listed as protected by the Northern Cape Nature Conservation Act (Act no. 9 of 2009) (NCNCA, 2009). Prominent, but not dominant trees are *Boscia albitrunca* and *Acacia erioloba*.

Red Data, Protected and Endemic Plant Species

According to the Ecological Fauna & Flora Habitat Survey (refer to Appendix H2) ten plant species of specific conservation significance were recorded in the study area during the study period. Two are listed by Raimondo et al (2009) in the South African Red Data list as Declining species. Two tree species are included in the protected tree species list published by the National Forests Act (Act no.84 of 1998) (NFA, 1998), and nine of the 10 are listed as protected by the Northern Cape Nature Conservation Act (Act no. 9 of 2009) (NCNCA, 2009). No species listed as 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), were recorded in the study area during this study.

Alien Invasive Species

According to the Ecological Fauna and Flora Habitat Survey (refer to Appendix H2) the one invasive alien species that was recorded is the woody species *Prosopis glandulosa* var. *torreyana*. Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development/ decommissioning footprint.

Pans

A number of non-perennial pans and drainage lines were recorded in the vicinity of the site. None of these pans actually occur on the preferred site and only one on the alternative site, but were studied none the less because of their proximity to the site and their potential ecological importance in the larger ecological system within which the study area falls.

A buffer zone of 32 m from the edge of all pans, as prescribed for wetlands in Government Notice R.544 in Government Gazette 33306 of 18 June 2010, was delineated and mapped for all pan areas as the pans have limited sensitivity. According to the Ecological Fauna and Flora Habitat Survey & Wetland Assessment (refer to Appendix H2) it is anticipated that the proposed development would not have a major influence on the hydrological regime of the depression at the site.

No threatened plant or animal species are suspected to be present at the site. Given the present restricted nature of the wetlands around the site, as well as the lack of threatened

species, it is recommended that proposed developments, if approved, focus on maintaining the integrity and functioning of a small depression in a low rainfall area (below 500 mm per annum). The type of development proposed, if approved, does not have the same impact as for example a plantation or buildings in terms of shade effects on the flora and fauna, and more importantly, on buffer zones or corridors.

Pans act as well-used bird areas where a variety of birds come to drink and could attract wetland bird species during times of high rainfall if the pans fill with water. Wetland bird species were not observed on site, but cannot be disregarded as the study was done during a drought period.

A buffer zone of 32 m would be deemed sufficient, given the type of development and the restricted nature of the pans, and is thought to be adequate to maintain the functioning thereof at the site. However, extra precaution was taken and a buffer of 500m will be implemented which will exclude the need for a WULA.

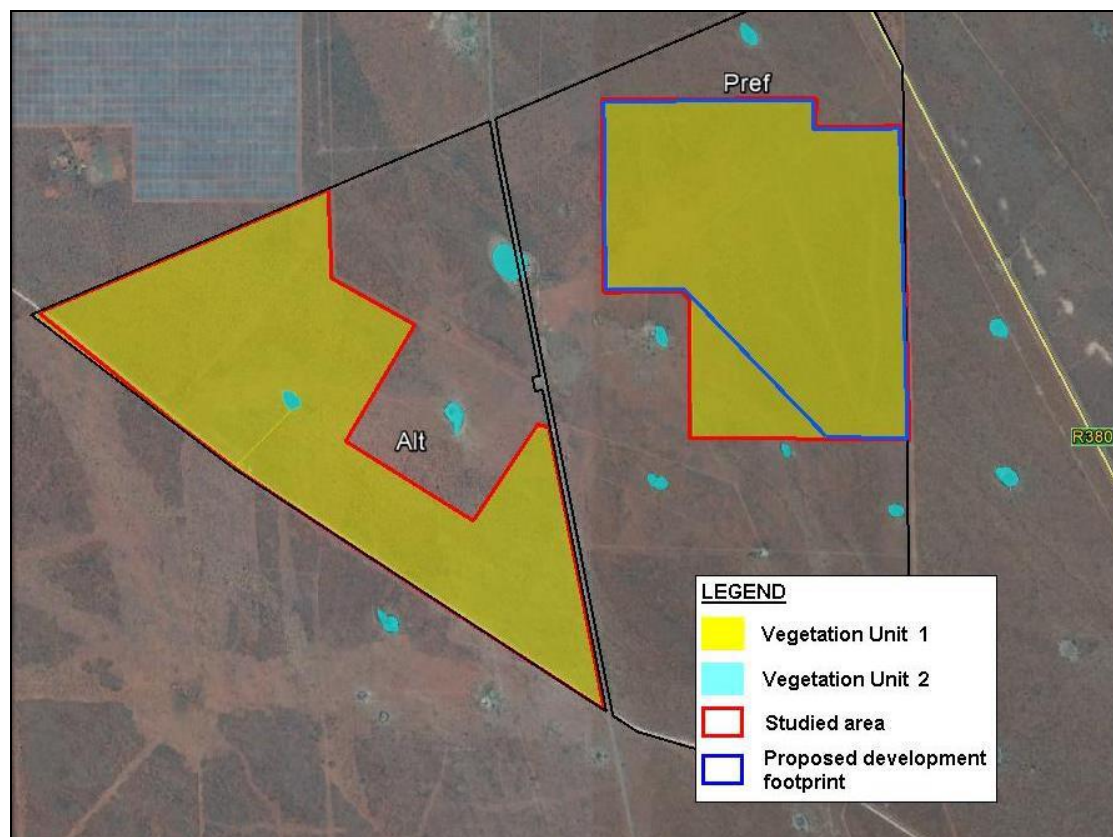


Figure 13: The two vegetation units on the site, where the pans fall under Vegetation Unit 2

5.3.1.3 Climate

According to Mucina and Rutherford (2006) rainfall peaks in summer and autumn with very dry winters. The mean annual precipitation (MAP) ranges from 220-280 mm with frequent frost in winter. Mean maximum and minimum temperatures for the area in question are 37°C in December and 2.2°C in July, respectively.

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

5.3.1.4 Biodiversity

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of sensitive species or animal life 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) the site proposed for the development has vegetation dominated by dense stands of *A. melifera* and a few tall Camelthorn trees (*Vachellia erioloba*). Grass cover is highly variable depending on rain and grazing pressure. During the assessment, rain had fallen, thunderstorms were active in the area and the veld was green, the trees were in leaf and some grass sward layer was apparent. Thus, this can be seen as a wet-season assessment with a flush of vegetation and grass. The Avifaunal Study recorded Seventy-six (76) avian species in or around Lime Bank farm of which 4 are collision-prone (Martial Eagle *Polemaetus bellicosus*, Black-chested Snake-Eagle *Circaetus pectoralis*, Pale Chanting Goshawk *Melierax canorus*, Greater Kestrel *Falco rupicoloides*). The Martial Eagle, an Endangered species, occurred on the pylons just outside the alternative PV site.

In the thicket, relatively low species richness of smaller birds (ave 16 species km⁻¹) but healthy numbers of birds (36 birds km⁻¹) were found. The Passage rate of the large collision-prone birds was 0.0 birds per of observation, as none were observed traversing either the preferred or alternative sites. Other species that may be attracted to the panels such as wetland birds (2 sp) or sandgrouse were present but in low numbers. Territorial 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.

If the proposed mitigation measures are followed to minimize any impacts to the threatened raptors highlighted, it is recommended that this solar site development go ahead, with a full post-construction monitoring protocol in place as it does so.

The avifauna of the area may be affected by the infrastructure of the PV plant but based on the avifaunal analysis of the number of birds on site suggests the impact will be minimal

based on one site visit in the wet season. A second dry-season visit will help clarify the use of the site by collision-prone species in the surrounding area, although it is foreseen that if the recommendations made by the Avifaunal Study (Appendix H3) are followed and prove effective, Boitshoko Solar PV could proceed with the least impact to the avifauna of the area.

5.3.1.4.2 Ecological

Through a literature research the Ecological Fauna and Flora Habitat Survey & Wetland Assessment (refer to Appendix H2) confirmed that no animals recorded in the study area were restricted or endemic to the area. The plausible reptile species richness of the area (28 species were identified) was negatively affected by the wealth of crown cover as well as a lack of rockiness or sandy substrates interspersed throughout the farm. For the most part of the year the likelihood of any amphibians occurring in the area is low but there is no doubt some species would gather at the pans after good rain. No physical record of the listed butterfly occurring in the area exists (Appendix A, Table 12-4), but has been included due to the close proximity of the nearest record (i.e. Hotazel) and its "Data deficient" status. Furthermore, the species is endemic to the region and has habitat preferences corresponding with the environmental characteristics of the farm.

The area is visibly transformed with signs of overgrazing (bush encroachment). Some areas are very densely populated by trees and large shrubs. The area is not particularly sandy with ground cover showing some regeneration after the farm-owner removed his cattle. 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.

5.3.1.5 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 the presence of mines in the area which have an extremely negative visual impact. However, due to the extent of the proposed development a visual impact study was conducted to determine to what extent the proposed development will be visible to observers and whether the landscape provides any significant visual absorption capacity.

Regarding service development, motorists on the R380 regional road are likely to be impacted, especially if the preferred site is chosen, since there are little to no screening of visual impacts from the road. This will be applicable mainly to tourists and people that are not residents in the area. The alternative site is located 2,7km west from the R380 with some existing screening. The majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period (~15 months) and the lifespan of the development (25 years). The residents of the towns of Kathu and Deben are unlikely to be sensitive to the proposed development due to the fact that Kathu and Deben are "mining towns". Residents of these towns have been living with a negative visual impact since 1953.

Landscape features

The farm Lime Bank 471 is currently vacant and surrounded by other vacant farmland and mine property. The farms in the area are mainly used for livestock grazing and other nearby property for mining. The proposed development is located approximately 13km north west from the town of Kathu, next to the R380 between the towns of Kathu and Deben. Although the site itself offers a pleasant rural view, the nearby area is mainly used for iron ore open cast mining with an existing highly negative visual impact.

The farm is located in an area with relatively low significance in elevation, meaning that the farm is not located on a mountain, at the foot of a mountain or in an area with a significant difference in elevation.

The preferred and alternative sites lie at the same height above sea level, where the Town of Kathu is slightly higher and the town of Deben slightly lower. Regarding visibility of the preferred and alternative sites, although the landforms and vegetative cover is not likely to limit visibility of the site, the visibility is of low significance

5.3.1.6 Traffic consideration

The main entrance to the site is on the farms' gravel road entrance from the R380. The R380 provides access to other farms in the area and is also the main road linking to major towns in the area, like Kathu and Dibeng. The movement of the heavy construction vehicles during the construction phase might potentially damage the current farm roads and in the process also create dust and safety impacts.

There is already heavy vehicle traffic on the R380 to and from Kathu, however the construction phase of this project is unlikely to significantly add to the existing traffic load. During interviews with farmers in the vicinity of the proposed project, the Social Impact Assessment (refer to Appendix H9) they asserted that the road needed to be maintained. They also asked that drivers of the heavy vehicles should have the correct licensing and vehicles need to be road worthy. They also commented that drivers need to comply with the law and the speed limits. The impact of the noise levels and the load of the traffic on the road are likely to be low.

The photovoltaic equipment and all its components will be transported to the site from Durban and/or Cape Town. The vehicles used to transport the photovoltaic equipment are standard container trucks and not oversize vehicles. As this route is travelled by the same type of vehicle throughout, no obstacles (e.g. low overhead services, cattle grids, narrow bridges etc.) are expected.

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

Table 5.2: Trip Summary for Long Distance Route

Route Description	Delivery trips (None peak)	Construction Vehicle Trips (None peak)	Cumulative trips for four SPPs
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Durban to Kathu via R34	9 vpd	5 vpd	56 vpd
Cape Town to Kathu via N18	9 vpd	5 vpd	56 vpd

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 Boitshoko Solar Power Plant (SPP) has a variety of associated socio-economic benefits. In terms of employment the construction phase will employ approximately 400 semi-skilled employment opportunities over a period of 18 – 24 months. The operational phase however, will employ approximately 53 employment opportunities over a period of 20 years.

It is reported by the John Taolo Gaetsewe District Municipality IDP of 2012 – 2016 that in 2007 the mining sector in the district was the most significant contributor to the district's GDP (49.6%). Other contributors included the government services sector (12.6%), the trade sector (9.1%) and the finance and business services (7.7%). Through these figures it is evident that this district heavily relies on the mining sector. The IDP of John Taolo Gaetsewe District Municipality sets out the following objectives for the integrated development of the Gamagara Local Municipality: (1) to render quality, effective and sufficient services; (2) to promote the general wellbeing through a safe and healthy environment amongst all residents; (3) to promote equality and fairness in the allocation of resources; and (4) to promote sound and sustainable economic growth in the municipal area.

According to the 2011 Census the population of this municipal area consist of 41 617 people. According to the Gamagara IDP of 2015/2016 the population increased with 79% from 2001 to 2011 and is growing at a rate of 5.84% yearly. The majority of the population is considered to be black (55%), while 28.7% are coloured and 14% of the population white. Afrikaans and Tswana are also the most spoken languages in this municipal area.

The IDP of 2015/2016 of the Gamagara Local Municipality indicates that the literacy level of this municipal area is low with only 24.9% of the population with matric and only 3.6% that went through higher education. With regards to employment, the majority of the employment sector is male, with most of the females unemployed or as discouraged work-seekers. According to the IDP most of the job creation initiatives should be targeted at females for the majority of the females are economically inactive. The IDP further states that according to the 2011 Census 17.7% of the Gamagara population were unemployed and 65% of those constitute to the youth. The majority of the population in this area also have no monthly income, therefore development initiatives should be directed towards them.

According to the Gamagara Draft IDP of 2015-2017, the mining sector is the key economic driver for this municipal area. The IDP states that 43% of the employed population in this

municipal area are employed in the formal sector, while 5% are employed in the informal sector.

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 Heritage Impact Assessment (attached as Appendix H7) the cultural landscape qualities of the region essentially consist of 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.

Early history

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. Kathu Pan is formed by a shallow depression with an internal drainage and a high water table. Archaeological and palaeo-environmental data from Kathu Pan and Kathu Townlands were used to reconstruct changes over time in the prehistoric environment (Beaumont 2004). The transitional Fauresmith at Kathu Pan has been dated to ca. 500 000 BP (Porat et al. 2010). A current research project at Kathu Pan 1 established a date of 500 000 years for a Fauresmith blade assemblage where blades were systematically removed from prepared cores (Porat et al. 2010; Wilkens & Chazan 2012).

The LCT's from this area often contain very fine handaxes. At Kathu Townlands an outcropping of banded ironstone that covers a large area of around 25 km contains enormous quantities of flaked items. A variety of handaxes, long blades, convergent flakes/points and scrapers have been found in Fauresmith collections. Middle Stone Age tools were also recovered from the Kathu localities (Beaumont 2004). A number of stone tools dating to the Fauresmith assemblage and Middle Stone Age were identified on the rim of a small pan-like depression occurring adjacent to the old farmstead. The density is approximately 1 stone tool/5m² (see Appendix 5).

Early Iron Age occupation did not take place in the region and seems as if the earliest people to have settled here were those of Tswana-speaking origin (Tlhaping and Tlharo) that settled mostly to the north and a bit to the west of Kuruman. 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.

Historic period

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. As already indicated, the larger region as well as the study area has been sparsely populated and has largely been used for cattle farming.

Table 5.3 is a summary of the heritage resources identified by the Heritage Impact Assessment (attached as Appendix H7) in the study

Table 5.3: Summary of identified heritage resources in the area

Identified heritage resources			
General protection (NHRA)	Coordinates		Description
Archaeological site or material (Section 35)	S 27.61432	E 22.95034	A number of stone tools dating to the Fauresmith assemblage and Middle Stone Age were identified in the vicinity of a small pan-like depression. The density is approximately 1 stone tool/5m ² .
Graves or burial grounds (Section 36)	S 27.61363	E 22.95297	A small informal burial place was found in an overgrown area and it is therefore difficult to establish the correct number of graves, although there might be as many as five. The graves are all only marked with packed stones, although one seems to have been fenced off in the past.

From a heritage point of view, it is recommended that the proposed development be allowed to continue on condition that the following is included in the environmental authorisation:

- It is recommended that the burial site is retained and it should be permanently fenced off, leaving a buffer zone of at least five metres from the outer edge of the graves. If the graves cannot be retained, it should be relocated, but only on condition of following the correct procedures.
- 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.

The Palaeontological Impact Assessment (refer to Appendix H8) indicates that the proposed development footprint, including both the preferred and one alternative site, is underlain by well-developed Kalahari Group surface limestones (T1), calcretes and wind-blown sands of low to moderate palaeontological sensitivity, but impact on palaeontological heritage

resources is on the whole considered to be low, as no potentially palaeontologically significant karst features were identified within the boundaries of the Boitshoko SPP footprint. As far as the palaeontological heritage is concerned, the proposed Boitshoko SPP development with associated transmission line may proceed with no additional mitigation or 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. The high solar irradiation experienced in the Northern Cape indicates to 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. The Remaining Extent of Portion 1 of the farm Lime Bank No. 471, 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 ~2200 kWh/m²/year is relevant in the area.
- Topographic conditions: The surface area 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 1 of the farm Lime Bank No. 471 is 1 295.5232 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 the R380 Regional Road.

- Grid connection: In order for the PV facility to connect to the national grid transmission line will be constructed within a 36m wide servitude towards the Ferrum–Umtu 132kV power line. 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 of this report. 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 the non-perennial pans, a limited amount of red listed or protected fauna and flora.

From an environmental perspective the proposed site is considered highly desirable due to its high irradiation value (i.e. energy generation), proximity to a grid connection, site access (i.e. to facilitate the movement of construction vehicles during the construction phase), environmental conditions (i.e. geology, soils, agricultural potential, and ecological and archaeology sensitivity) – refer to Table 5.4 for the site selection matrix. The site selection criteria were utilised by Subsolar and from a location, geological, heritage and ecological point of view the site, if managed and impacts mitigated, has some potential medium to low impacts in regards to the potential loss of habitat for fauna and flora, the potential loss of indigenous fauna and flora and the potential loss of faunal and floral species of conservation significance. It is evident from the discussion above that the Remaining Extent of portion 1 of the farm Lime Bank No. 471 may be therefore be considered suited for the development of a Solar Power Plant and both site was assessed.

It is evident from the discussion above that Remaining Extent of Portion 1 of the farm Lime Bank No. 471 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. The site selection matrix (refer to Table 5.6) compares the two alternative locations on the farm against the site selection criteria explained above.

Table 5.6: 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
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Site selection criteria	Preferred site	Alternative site	Comments / Discussion
Location	A	A	<ul style="list-style-type: none"> Both sites are located in an area with a Global Horizontal Radiation of ~2200 kWh/m²/year.
Grid connection	A	A	<ul style="list-style-type: none"> Both sites are able to connect to the Ferrum-Umtu 132kV power line. The preferred alternative and alternative will be able to connect to the Ferrum-Umtu 132kV power line next to the site and both will require a short power line to be constructed.
Site access	A	A	<ul style="list-style-type: none"> Access to the preferred alternative will be easily obtained from the R380 Provincial Road. Access to the alternative site will be obtained via the existing farm roads.
Geology & soils	A	A	<ul style="list-style-type: none"> 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	A	<ul style="list-style-type: none"> Topography remains homogeneous throughout both sites with no obvious change in slope.

Visual impacts	B	A	<ul style="list-style-type: none"> • According to the Visual Impact Assessment (attached as Appendix H5) the proposed development is located in an area with relatively low significance in elevation. • Motorists on the R380 regional road are likely to be sensitive, especially if the preferred site is chosen, since there are little to no screening of visual impacts from the road. The alternative site is located 2,7km west from the R380 with some existing screening.
Agricultural potential	A	A	<ul style="list-style-type: none"> • 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	B	Unknown	<ul style="list-style-type: none"> • A small informal burial place was found on the preferred site. It is recommended that the burial site is retained and it should be permanently fenced off. • The alternative site was not assessed by the specialist; therefore, no comparison may be drawn.
Vegetation	B	B	<ul style="list-style-type: none"> • Habitat characteristics are comparable between both the preferred and alternative site.
Water features	A	B	<ul style="list-style-type: none"> • A number of non-perennial pans were observed in the area and some drainage lines were also recorded on the alternative site. • No pans were recorded directly on the preferred site and only one on the alternative site.
Biodiversity	A	A	<ul style="list-style-type: none"> • The biodiversity characteristics are comparable between both the preferred and alternative site.

Avifaunal	B	B	<ul style="list-style-type: none"> • The avifaunal study concluded that few differences existed in small bird numbers with respect to the preferred vs the alternative proposed PV site. • No collision-prone birds were recorded on either site, but two species (Martial Eagle and Pale Chanting Goshawk) may hunt within them at times.
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 5.6, the preferred site is still emerged as preferred due to the fact that potentially less impacts on water features.

In conclusion the preferred alternative entails the development of the 115MW Photovoltaic Solar Energy facility on the following location on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471 – Refer to Figure 14:

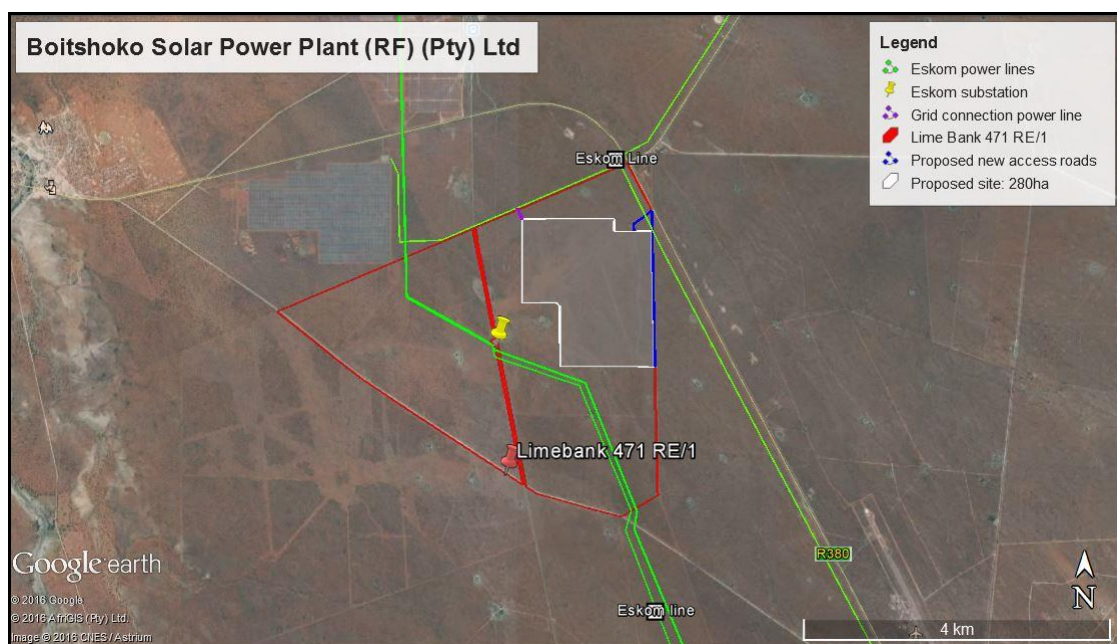


Figure 14: Preferred alternative on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471

The preferred layout on the Remaining Extent of Portion 1 of the farm Lime Bank No. 471 will be included as part of the Environmental Impact Report (EIR). It may be concluded that this is the only location that will be assessed in further detail.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

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

(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

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

6.1 SCOPING METHODOLOGY

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

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.
- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 28 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	×			A small informal burial place was found on the preferred site.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous forest		×		None.
IX. Grass land		×		None.
X. Bird nesting sites		×		None.
XI. Red data species	×			<i>Acacia erioloba</i> , and <i>Crinum</i> c.f. <i>macowanii</i> listed by Raimondo et al (2009) in the South African Red Data list as Declining species were recorded on the site.
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 is not expected to be significant.
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 R380.
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 880m ³ 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	×			Several non-perennial pans and some streams are located in the surrounding area.
II. A conservation or open space area		×		None.
III. An area that is of cultural importance	×			A number of stone tools and a small informal burial place were identified outside the preferred site.
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 during the EIA process. An indication is provided of the specialist studies being conducted and which 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.

<p><u>Activity 15 (Regulation 984):</u> <i>"The clearance of an area of 20 hectare or more of indigenous vegetation..."</i></p>	<p>circle for trucks will also be taken into consideration.</p> <ul style="list-style-type: none"> 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. <p><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.</p> <p><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.</p>		line network.														wetland species; - All power lines – <i>present and future</i> – must be marked with bird diverters to reduce the possible impact risk for the bustards and raptorial species.		
		Air	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Loss of topsoil in disturbed areas, causing a decline in soil fertility. Soil Erosion caused by alteration of the surface characteristics. 			S	S	Pr	PR	M	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.	M	Soil, Land Capability and Agricultural Potential Study			
		Geology	<ul style="list-style-type: none"> Collapsible soil. Seepage Active soil (high soil heave). Erodible soil. Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar 			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.	L	Geotechnical Study as part of the Soil, Land Capability and Agricultural Potential Study			

				<ul style="list-style-type: none"> panel columns. The presence of undermined ground. Instability due to soluble rock. Steep slopes or areas of unstable natural slopes. Areas subject to seismic activity. Areas subject to flooding. 										<ul style="list-style-type: none"> If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. Retention of vegetation where possible to avoid soil erosion. 		
			Existing services infrastructure	<ul style="list-style-type: none"> 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. 									Yes	-	L	Confirmation from the Local Municipality
			Ground water	<ul style="list-style-type: none"> Pollution due to construction vehicles. 									Yes	-	L	-

													recommended on the gravel road leading to the site. Remedial work on the road network should take place before the construction phase starts.			
			Health & Safety	<ul style="list-style-type: none"> 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. 									Yes	<ul style="list-style-type: none"> 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 H9). 	M	Social Impact Assessment
			Noise levels	<ul style="list-style-type: none"> The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site. 									Yes	<ul style="list-style-type: none"> During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers. 	L	-
			Tourism	<ul style="list-style-type: none"> Since there are no tourism 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

			industry	facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.														
			Heritage resources	<ul style="list-style-type: none"> No potential cultural or heritage resources were identified on or around the site. 		-	S	S	Po	I	ML	Yes	<ul style="list-style-type: none"> - 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																		
	<p>The key components of the proposed project are described below:</p> <ul style="list-style-type: none"> <u>PV Panel Array</u> - To produce 115MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun. <u>Wiring to Central Inverters</u> 	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> 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. Degradation and/or destruction of natural pans. 		-	P	L	Po	PR	ML	Yes	<ul style="list-style-type: none"> - Indigenous vegetation must be maintained and all as removed as they appear and disposed of appropriately. - Re-vegetation of the disturbed site is aimed at 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 	M			Ecological Fauna and Flora Habitat Survey & Avifaunal Study	

	<p>- 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.</p> <ul style="list-style-type: none"> • <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. Whilst Boitshoko 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 the Ferrum-Umtu 132kV power line. The Project will inject up to 100MW into the Substation. The installed 												Survey & Avifaunal Study.			
		Air quality	<ul style="list-style-type: none"> • 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	N/A	N/A
		Soil	<ul style="list-style-type: none"> • 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 										Yes	<p>- 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.</p> <p>- 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.</p> <p>- Also refer to the mitigation measures listed in the Agriculture and Soils Impact Assessment (attached as Appendix H6).</p>	M	Soil, Land Capability and Agricultural Potential Study
		Geology	<ul style="list-style-type: none"> • Collapsible soil. • Seepage (shallow water table). • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns. • The presence of undermined ground. • Instability due to soluble rock. 										Yes	<p>- Surface drainage should be provided to prevent water ponding.</p> <p>- Mitigation measures proposed by the detailed engineering geological investigation should be implemented.</p>	L	Geotechnical Study included as part of soil study

<p>capacity will be up to approximately 115MW.</p> <ul style="list-style-type: none"> <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 R380 Provincial 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 surrounding farm. 			<ul style="list-style-type: none"> Steep slopes or areas of unstable natural slopes. Areas subject to seismic activity. Areas subject to flooding. 												
	Existing services infrastructure		<ul style="list-style-type: none"> 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 3 000 000 liters of water per annum will be required for the operation of the solar plant. 										<ul style="list-style-type: none"> Waste has to be accommodated at a licensed landfill site. Water saving devices will be implemented 	M	Confirmation from the Local Municipality
	Ground water		<ul style="list-style-type: none"> 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. 										<ul style="list-style-type: none"> All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely banded (impermeable floor and sides) to prevent accidental discharge to groundwater. 	L	-
	Surface water		<ul style="list-style-type: none"> Increase in storm water runoff. The development will potentially result in an increase in storm water runoff that needs to be managed to prevent soil erosion. Leakage of hazardous materials. The development will comprise of a distribution substation and 										<ul style="list-style-type: none"> The storm water management plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. 	L	Wetland Assessment

			will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.													
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	<ul style="list-style-type: none"> • 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, Kagiso's service providers should implement a 'locals first' policy, especially for semi and low-skilled job categories	N/A	Social Impact Assessment	
			Visual landscape	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> • The proposed development will not result in any traffic impacts during the operational phase. 		-		L	L	Po	CR	NL	Yes	-	L	-
			Health & Safety	<ul style="list-style-type: none"> • The proposed development will not result in any health 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

				and safety impacts during the operational phase.												
			Noise levels	<ul style="list-style-type: none"> The proposed development will not result in any noise pollution during the operational phase. 	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tourism industry	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> The establishment of a Community Trust. 		+	L	L	Pr	I	N/A	Yes	- Boitshoko, in consultation with the JMLM, should investigate the options for the establishment of a Community Development Trust.	N/A	Social Impact Assessment	
			Electrical infrastructure	<ul style="list-style-type: none"> 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.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Air pollution due to the increase of traffic of 	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure	L	-	

<p><u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.</p>		construction vehicles.										reduced exhaust emissions.		
	Soil	<ul style="list-style-type: none"> • Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills). 		-	S	S	Pr	PR	M	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion.	M	-	
	Geology	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Pollution due to construction vehicles. 		-	S	S	Pr	CR	ML	Yes	-	L	-	
	Surface water	<ul style="list-style-type: none"> • Increase in storm water run-off. • Pollution of water sources due to soil erosion. • Destruction of watercourses 		-	L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> - 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 	M	Wetland Assessment	

													enforced. - Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.		
		Noise levels	<ul style="list-style-type: none"> The generation of noise as a result of construction vehicles, the use of machinery and people working on the site. 	-		L	S	D	CR	NL	Yes	- The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	-	
		Tourism industry	<ul style="list-style-type: none"> 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	N/A
		Heritage resources	<ul style="list-style-type: none"> It is not foreseen that the decommissioning phase will impact on any heritage resources. 		-	S	S	Pr	PR	ML	Yes	-	L	Heritage 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	-
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6.2 KEY ISSUES IDENTIFIED

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

6.2.1 Impacts during the construction phase

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

- Activity 11(i) (Regulation 983): *“The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”*
- Activity 28(ii) (Regulation 983): *“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”*
- Activity 1 (Regulation 984): *“The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”*
- Activity 15 (Regulation 984): *“The clearance of an area of 20 hectare or more of indigenous vegetation...”*

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, surface water (non-perennial pans), 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, surface water (non-perennial pans), 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. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.

7 CUMULATIVE EFFECTS ASSESSMENT

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

7.1 Introduction

The EIA Regulations (2014) determine that cumulative impacts, “in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.” Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

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

Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix G. This chapter analyses the proposed project’s potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

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

7.2 Geographic Area of Evaluation

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

generally includes an area of a 120km radius surrounding the proposed development – refer to figure 15 below.

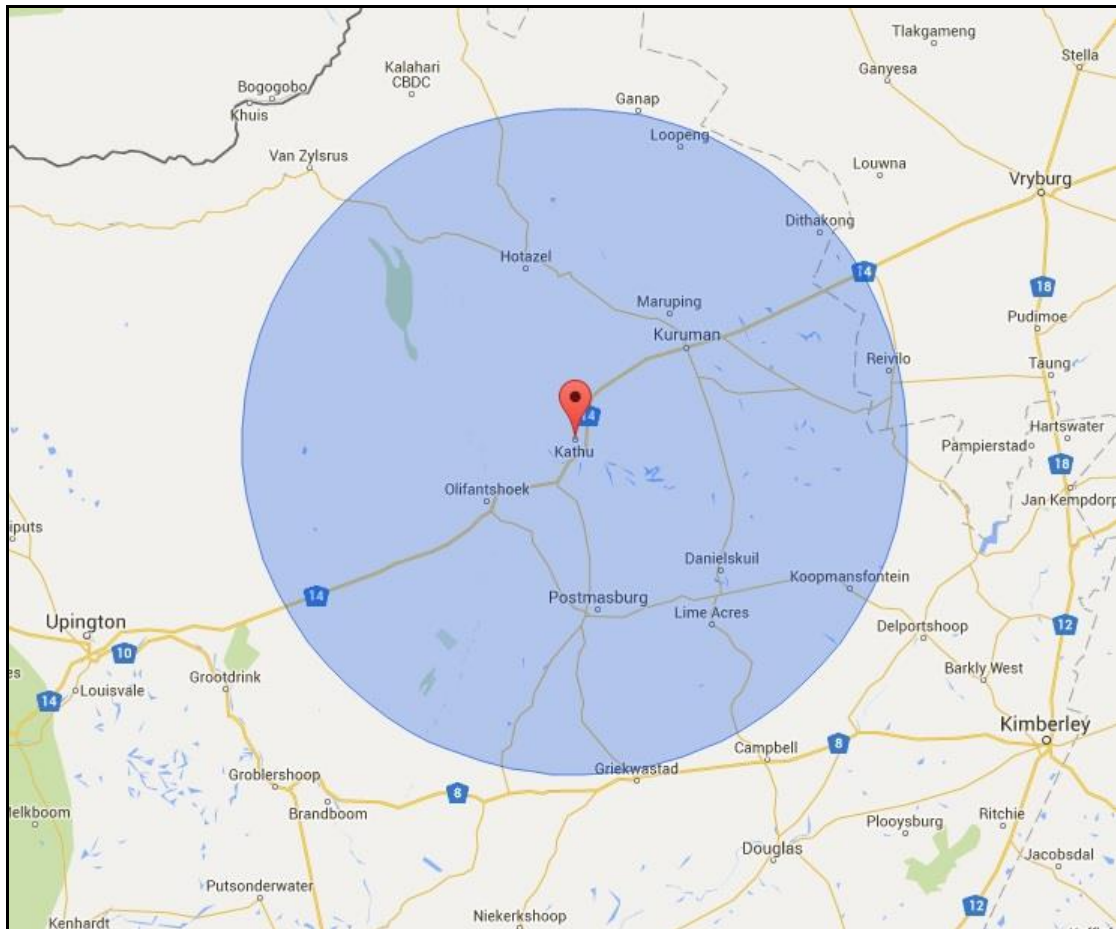


Figure 15: Geographic area of evaluation with a 120km radius around the proposed development site

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

7.3 Temporal Boundary of Evaluation

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the Proposed Project, beginning in 2019 and extending out at least 20 years, which is the minimum expected project life of the proposed project. Where

appropriate, particular focus is 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 seven solar PV plants have been granted preferred bidders status within the geographic area of investigation – refer to figure 16 below. Two of the plants are fully operational:

- Adams Solar PV2 with a capacity of 82.5MW near Hotazel, Northern Cape Province (Awaiting construction – approved and financed).
- Kathu Solar Energy Facility with a capacity of 75MW near Kathu, Northern Cape Province (Fully operational).
- Sishen Solar Facility with a capacity of 74MW near Kathu, Northern Cape Province (Fully operational).
- Kathu Solar Park (CSP) with a capacity of 100MW near Kathu, Northern Cape Province (Awaiting construction – approved and financed).
- Jasper Power Company Technology: Solar Photovoltaic (PV) with a capacity of 75MW near Postmasburg, Northern Cape Province (Fully operational).
- Redstone CSP with a capacity of 100MW near Postmasburg, Northern Cape Province (Awaiting construction – approved and financed).
- Lesedi Power Company Solar Photovoltaic (PV) with a capacity of 64MW near Postmasburg, Northern Cape Province (Fully operational).

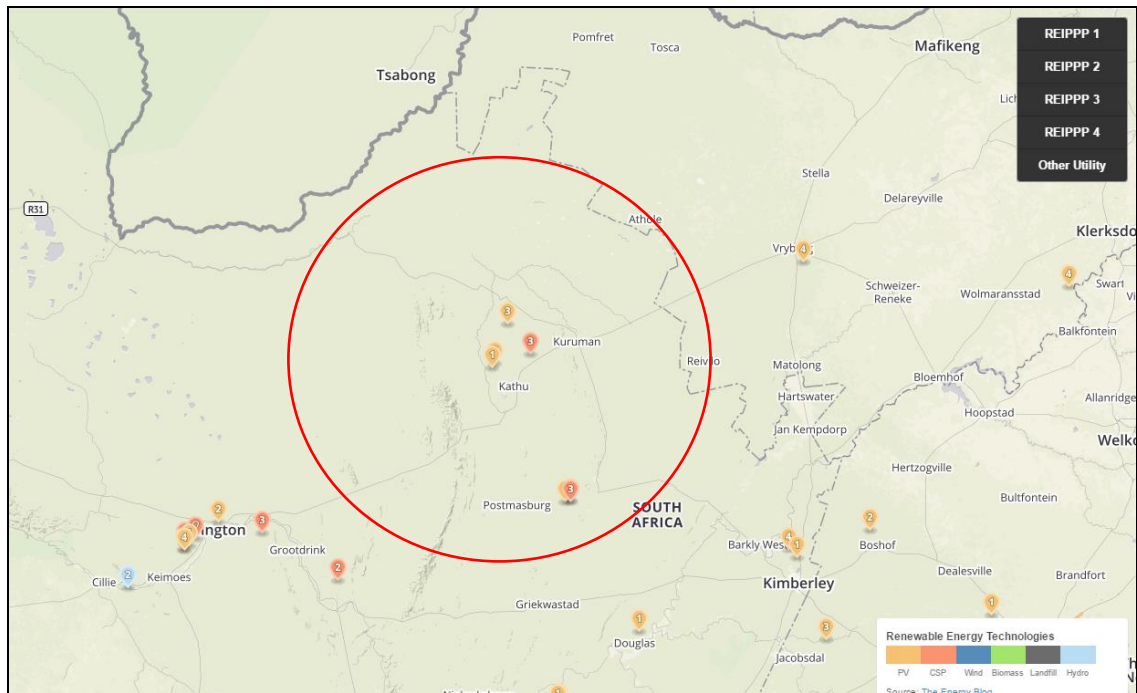


Figure 16: Utility-scale Renewable Energy Generation Sites

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 17 below. According to this database approximately 21 applications have been submitted for renewable energy projects within the geographical area of investigation. The majority of these projects are located in close proximity to Kathu and Postmasburg.

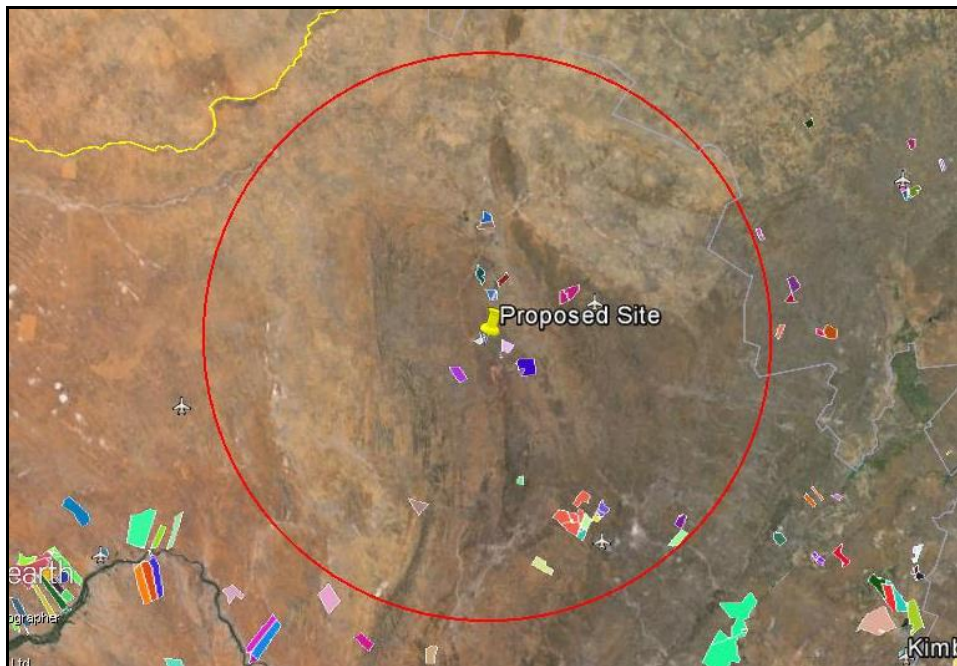


Figure 17: National Wind and Solar PV SEA: Renewable Energy EIA Application Received before Dec. 2015

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

- The proposed Kagiso Solar Power Plant near Hotazel, Northern Cape Province.
- The proposed Tshepo Solar Power Plant near Kathu, Northern Cape Province.
- The proposed Life Solar Plant near Postmasburg, Northern Cape Province.
- The proposed Lutzburg 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 local area. The following sections present their findings.

7.5.1 Geology

The desktop geotechnical study as part of the Agriculture and Soils Impact Assessment (refer to Appendix H6) confirmed that based on the available information a fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm. 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 major limitation to agriculture is the limited climatic moisture availability, but the shallow soils are also a serious limitation. The land capability is classified as Class 7 -non-arable, low potential grazing land. The site has a grazing capacity of 14-17 hectares per large stock unit. The vegetation is grazed and sparse due to low rainfall, but there is no evidence of significant erosion or other land degradation on the site.

There is potential for cumulative impacts to arise as a result of other projects that impact on agricultural land in the area. Although the loss of individual project portions of land has low significance, the cumulative impacts of land loss regionally can become more significant. 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 sites such as this one, with very low agricultural potential. 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.

7.5.3 Ecology

Cumulative impacts, from an ecological point of view, are those that will impact the natural faunal and floristic communities and habitats surrounding the proposed solar development, mainly by other similar developments and their associated infrastructure in its direct vicinity. As more and more similar developments occur in the direct vicinity of the currently proposed development, habitat losses and fragmentation will occur more frequently and populations of threatened, protected or other habitat specific species (both faunal and floral) will be put under increasing pressure through competition for suitable habitat. Fragmentation of habitats prevent the natural flow of ecosystem services and may have a detrimental effect on the gene pool of a species, which may lead to the loss of a population of such a species on fragmented portions. Through a development, such as the one proposed for the study area, natural habitat is totally transformed and although some vegetation cover generally returns to these areas, microhabitats are totally destroyed and the area will probably never again be able to function without some human maintenance and management.

The Ecological Fauna and Flora Habitat Survey (Appendix H2) states that no loss of a particularly sensitive or localised habitat type of particular conservation importance is anticipated if the site is developed. No loss of corridors or connectivity of ecosystems is anticipated if the proposed footprint is developed. No threatened or near-threatened plant species are likely to occur on the site. However, currently limited data exists to measure and monitor the cumulative impact that the proposed type of development will have on a local and/or regional scale. Research in this regard is therefore urgently proposed. As mitigation for any cumulative impact this development may have, it is also proposed that where practically possible, a buffer of at least 100m (preferably more) of natural vegetation be left undisturbed surrounding this type of development in order to promote and preserve the

flow of ecosystem services and gene pools along these corridors as well as the necessary habitat for threatened, protected or other habitat sensitive species.

7.5.4 Birds

The Avifaunal Study (refer to Appendix H3) states that cumulative impacts are those that will impact the general avian communities in and around the Boitshoko solar development, mainly by other solar farms and associated infrastructure. This will happen via the same factors identified here viz: collision, avoidance and displacement. Therefore, we need to know as a starting point the number of solar farms around the region within 50 km, and secondly, to know their impact on avifauna.

The construction and maintenance of PV technology causes mainly permanent habitat destruction and disturbance. Maintenance activities are likely to cause some disturbance to birds in the general surrounds, and especially the shy or ground-nesting species resident in the area. Mitigation of such effects requires that best-practice principles be rigorously applied – i.e. sites are selected to avoid the destruction of key habitats for red data species, and the disturbance and construction and the final footprint size, for key species, should all be kept to a minimum.

Though no red data listed bird species were observed at the site it is likely that individuals of red-listed species may sometimes occur on or over the site in its current condition. However, in the absence of any particular feature to attract them, these individuals will be at most only transient users of the area to be developed. Thus the development of the proposed SPP will have no marked effect on red-listed species. The avifauna of the area may be affected by the infrastructure of the Solar Power (PV) plant but the analysis of the number of birds on site suggests the impact will be minimal based on one site visit in the wet season.

By the end of 2015 there were 7 Solar PV farms with preferred bidder status in the geographic area of study which all add to the cumulative impacts. Because there are no post-construction mortality data or displacement data for any of these aspects in South Africa, it is a futile exercise to attempt to put any figures to the Cumulative Impacts for birds in and around the solar sites. Once the data is collected and published (or released to other specialists) for a minimum of a year's monitoring, we can then quantify this aspect. On present data we cannot even guesstimate the cumulative impact.

7.5.5 Social Impact Assessment

According to the Social Impact Assessment (refer to Appendix H9) the project represents an important development opportunity for the communities surrounding Boitshoko SPP. Should it be approved, it will not only supply the national grid with much needed clean power, but will also provide a number of opportunities for social upliftment. The cumulative impacts for each of the potential social impacts were assessed throughout the report. The most significant cumulative social impacts are regarding the generation of waste, employment opportunities, the visual intrusion, an increase in construction vehicles, the in-migration or potential influx of job seekers, risks to safety, livestock and farm infrastructure.

7.5.6 Visual

The Visual Impact Assessment (refer to Appendix H5) confirmed that the proposed development may increase the cumulative visual impact together with farming activities, dust on gravel roads, existing Eskom power infrastructure and new projects, mines in the area and the other proposed solar power facilities in the area.

Although the site itself offers a pleasant rural view, the nearby area is mainly used for livestock grazing and mining activities. Regarding possible landscape degradation, the landscape does not appear to have any specific protection or importance and the majority of the affected area falls within the agricultural development area. However, taking into account all positive factors of such a development including economic factors, social factors and sustainability factors, the visual impact of this proposed development will be insignificant and it is suggested that the development commence, from a visual impact point of view.

7.5.7 Heritage

The Heritage Impact Assessment (refer to Appendix H7) confirmed that a small informal burial place was identified on the site proposed for development. As the site is very much overgrown, it is difficult to establish the correct number of graves, although there might be as many as five. The graves are all only marked with packed stones, although one seems to have been fenced off in the past. The burial place is located inside the study area and it is therefore anticipated that it eventually would be impacted on by the solar plant development. Due to its low significance, the potential for cumulative impact is also considered to be minimal.

7.5.8 Traffic

There is already heavy vehicle traffic on the R380 to and from Kathu, however the construction phase of this project is unlikely to significantly add to the traffic load on the R380. The farmers that were interviewed commented that the road still needed to be maintained. Drivers of the heavy vehicles should also have the correct licensing and vehicles needed to be road worthy. They also commented that drivers need to comply with the law and the speed limits. The volume of the traffic is also low on this road. The impact of the noise levels and the load of the traffic on the road are likely to be low.

The impact of the construction traffic on the general traffic and the surrounding communities along the haulage route is considered to be low. All the components will be transported by truck from Durban or Cape Town to the site using the routes as defined. Both these routes are of acceptable standard and should not impede travel from a riding quality perspective. No abnormal loads will be transported to the site.

The access to the site is off road R380 and may require upgrading. The development of a solar farm on the Remaining Extent of portion 1 of the farm Lime Bank No. 471 in the Northern Cape Province is therefore supported from a traffic perspective, but may result in cumulative impacts if other projects in the area are approved.

7.6 IMPACT ASSESSMENT

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

7.6.1 Potential Cumulative Effects

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

Table 7.1: Potential Cumulative Effects for the proposed project

Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase		
Loss or fragmentation of indigenous natural fauna and flora	The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on avifauna. However, the condition of the natural vegetation appears to be moderate to good.	- Medium
Avifauna	Development of multiple solar energy facilities in this region may have cumulative impacts on birds, such as collision prone species.	- Low
Loss or fragmentation of habitats	The developments are not located in an ecological sensitive area.	- Medium
Soil erosion	The largest risk factor for soil erosion will be during the operational phase when storm water run-off from the surfaces of the photovoltaic panels could cause erosion. Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area. The	- Low

	specialist rated the cumulative impact of soil erosion as negligible.	
Disturbance of soils and existing land use	Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area. However, the effect of compaction mitigation will be localised within the area and will only have an effect during the construction and operational years.	- Low
Impacts of the geology on the proposed development	A fatal flaw cannot be identified that may prematurely terminate the development of 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 activities and people using the existing gravel roads adjacent to site. Dust will be the main factor to take into account.	- Low
Increase in construction vehicles	If damage to roads is not repaired, then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were not responsible for the damage. However, no local roads will be used.	- Negligible
In-migration or potential influx	Impacts on family and community relations that may, in some cases, persist for a long	- Low

of job seekers	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.	
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.	- Low
Increased risks of grass fires	The risk of grass fires can be mitigated and managed.	- Negligible
Heritage resources	Due to its low significance, the potential for cumulative impact is also considered to be minimal.	- Negligible
Operational Phase		
Change in land use	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.	- Negligible
Visual intrusion	The operation of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with the existing Eskom power infrastructure and agricultural infrastructure.	- Low
Consumption of water	An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water.	- Medium
Generation of additional electricity	The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area). In combination, the four projects being proposed by Subsolar energy around Kathu will potentially add 600MW to the	+ Low

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

7.7 CONCLUSION

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

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
 - Loss or fragmentation of indigenous natural fauna and flora (- Medium)
 - Loss or fragmentation of habitats (- Medium)

- Generation of waste (- Medium)
- Local employment, business opportunities and training (+ 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 PLAN OF STUDY FOR EIA

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

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

- (i) a plan of study for undertaking the EIA process to be undertaken, including-
 - (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;
 - (ii) a description of the aspects to be assessed as part of the EIA process;
 - (iii) aspects to be assessed by specialists;
 - (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;
 - (v) a description of the proposed method of assessing duration and significance;
 - (vi) an indication of the stages at which the competent authority will be consulted;
 - (vii) particulars of the public participation process that will be conducted during the EIA process; and
 - (viii) a description of the tasks that will be undertaken as part of the EIA process;
 - (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

8.1 INTRODUCTION

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

8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE

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

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

8.3 TASKS TO BE UNDERTAKEN

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

8.3.1 Project Description

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

8.3.2 Consideration of alternatives

The following project alternatives will be investigated in the EIR:

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

8.3.3 Compilation of Environmental Impact Report

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

8.3.4 Public participation

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

8.4 ASPECTS ASSESSED

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

Table 8.1: Aspects assessed

Aspects	Potential impacts	Description of the impact	Specialist studies / technical information
Construction of the PV Solar facility	<ul style="list-style-type: none"> Impacts on the fauna and flora 	Refer to table 6.2	Ecological Fauna and Flora Habitat Survey & Avifauna Study
	<ul style="list-style-type: none"> Non-perennial pans 	Refer to table 6.2	Wetland Assessment
	<ul style="list-style-type: none"> Impacts on agricultural potential (soils) 	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	<ul style="list-style-type: none"> Impacts associated with the geology of the site 	Refer to table 6.2	Geotechnical study
	<ul style="list-style-type: none"> Impacts on existing services infrastructure 	Refer to table 6.2	Confirmation from the Local Municipality
	<ul style="list-style-type: none"> Temporary employment, impacts on health and safety 	Refer to table 6.2	Social Impact Assessment
	<ul style="list-style-type: none"> Impacts on heritage resources 	Refer to table 6.2	Heritage Impact Assessment &

			Palaeontological Heritage Assessment
Operation of the PV Solar facility	<ul style="list-style-type: none"> Impacts on the fauna and flora 	Refer to table 6.2	Ecological Fauna and Flora Habitat Survey & Avifauna study
	<ul style="list-style-type: none"> Non-perennial pans 	Refer to table 6.2	Wetland Assessment
	<ul style="list-style-type: none"> Impacts on agricultural potential (soils) 	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	<ul style="list-style-type: none"> Impacts associated with the geology of the site 	Refer to table 6.2	Geotechnical study as part of soil study
	<ul style="list-style-type: none"> Increased consumption of water 	Refer to table 6.2	EAP assessment
	<ul style="list-style-type: none"> Pressure on existing services infrastructure 	Refer to table 6.2	Confirmation from the Local Municipality
	<ul style="list-style-type: none"> Visual Impact 	Refer to table 6.2	Visual Impact Assessment
	<ul style="list-style-type: none"> Provision of employment & generation of income for the local community 	Refer to table 6.2	Social Impact Assessment
Decommissioning of the PV Solar facility	<ul style="list-style-type: none"> Impacts on agricultural potential (soil) 	Refer to table 6.2	Soil, Land Capability and Agricultural Potential Study
	<ul style="list-style-type: none"> Socio-economic impacts (loss of employment) 	Refer to table 6.2	Social Impact Assessment
Cumulative Impacts	<ul style="list-style-type: none"> Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity. 	Refer to table 6.2	EAP assessment

8.4.1 Specialist studies

Based on the initial descriptions of potential environmental impacts or aspects (refer to Table 7.1), specialists have been subcontracted to assess the potential impacts that may be significant. The specialist studies assess impacts on both the social and the biophysical environment and also help in identifying ways that can help to mitigate the envisaged impacts. The following specialist studies have been included to address the potentially most significant impact as identified during the scoping phase – refer to Table 6.2:

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

8.4.2 Terms of reference for specialist studies

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

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

8.4.2.1 General Requirements

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

- The details of-
 - the specialist who prepared the report; and

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

In addition to the above, specialists are expected to:

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

8.4.2.2 Proposed ToR for the Social Impact Assessment

The key activities in the SIA process as embodied in the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007) will include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA;
- Collecting baseline data on the current social environment and historical social trends;
- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities;
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and
- Identifying alternatives and mitigation measures

In this regard the study should involve:

- Review of demographic data from the Census Survey;
- Review of relevant planning and policy frameworks for the area;
- Site specific information collected during the site visits to the area and interviews with key stakeholders;

- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

8.4.2.3 Proposed ToR for the geotechnical study

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

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

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

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

8.4.2.4 Proposed ToR for the heritage assessment

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

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

The objectives will be to:

- Identify possible archaeological, cultural and historic sites within the proposed development area;
- Document (GPS coordinates and map) all sites, objects and structures identified on the candidate sites;

- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources;
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance; and
- Consider relevant guidelines.

8.4.2.5 Proposed ToR for the ecological fauna and flora habitat survey

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

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

8.4.2.6 Proposed ToR for the wetland assessment

Undertake an assessment of the water features located on the proposed solar farms in accordance with the Classification System for Wetlands. The ToR for the assessment will include:

- Undertake a desktop study to provide the context and importance of wetlands in South Africa;
- Undertake site visits to ground truth all potential wetland areas within potentially affected areas and verify their existence;
- Investigate the key elements of habitats on the site, relevant to the conservation of wetlands;

- Evaluate the importance and significance of the site with special emphasis on the current status of biodiversity and ecological services of the wetlands;
- Integrate literature investigations with field observations to identify potential ecological impacts that could occur as a result of the development; and
- Make recommendations to reduce or minimise impacts, should the development be approved.

8.4.2.7 Proposed ToR for the visual impact assessment

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

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

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

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

The objectives of this study will be to:

- Describe the soils (distribution, types, depth, surface features, suitability for agriculture, physical and chemical characteristics, fertility, erodability, dry land production potential and irrigation potential);
- Determine the pre-development land capability;

- Determine the present land use;
- Conduct an Impact Assessment for the soils and land capability which will feed into the overall Environmental Impact Assessment;
- Propose mitigation measures for the impacts to form part of the Environmental Management Program; and
- Compile a soil, land capability and agricultural potential report to meet the Department of Agriculture's requirements and to encompass the findings of the desktop assessment, soil survey, agricultural evaluation and impact assessment.

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

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

8.4.2.9 Proposed ToR for avifaunal study

The Avifaunal Study should include the following:

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

8.4.2.10 Proposed ToR for the Paleontological Assessment

The scope of work for this study will consist of:

- A desktop investigation of the area, in which all geological maps, published scientific literature, previous paleontological impact studies in the same region and the author's field of experience (consultation with professional colleagues as well as examination of institutional fossil collections and data) should be studied and used.
- Based on the outcome of the desktop study and the comments obtained from SAHRA, the need for a field assessment must be determined. The desktop investigation must be supplemented with a field assessment if required.
- Assess the potential impacts, based on a supplied methodology.
- Describe mitigation measures to address impacts during the construction, operation and decommissioning stages.
- Describe cumulative impacts of the project on paleontological resources in both the local study area regional study area and the proponent's plans to manage those effects.
- Supply the client with geo-referenced GIS shape files of any sensitive areas.

8.4.2.11 Expected deliverables

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

8.5 METHOD OF ENVIRONMENTAL ASSESSMENT

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

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

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

8.5.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

Table 8.2: The rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).

DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of

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

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

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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

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

		flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

8.6 CONSULTATION WITH THE COMPETENT AUTHORITY

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

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

9 CONCLUSION

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

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

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

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

- Impacts on heritage resources
- Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity.

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

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

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

Ms. Marélie Giesel

Environamics Environmental Consultants

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