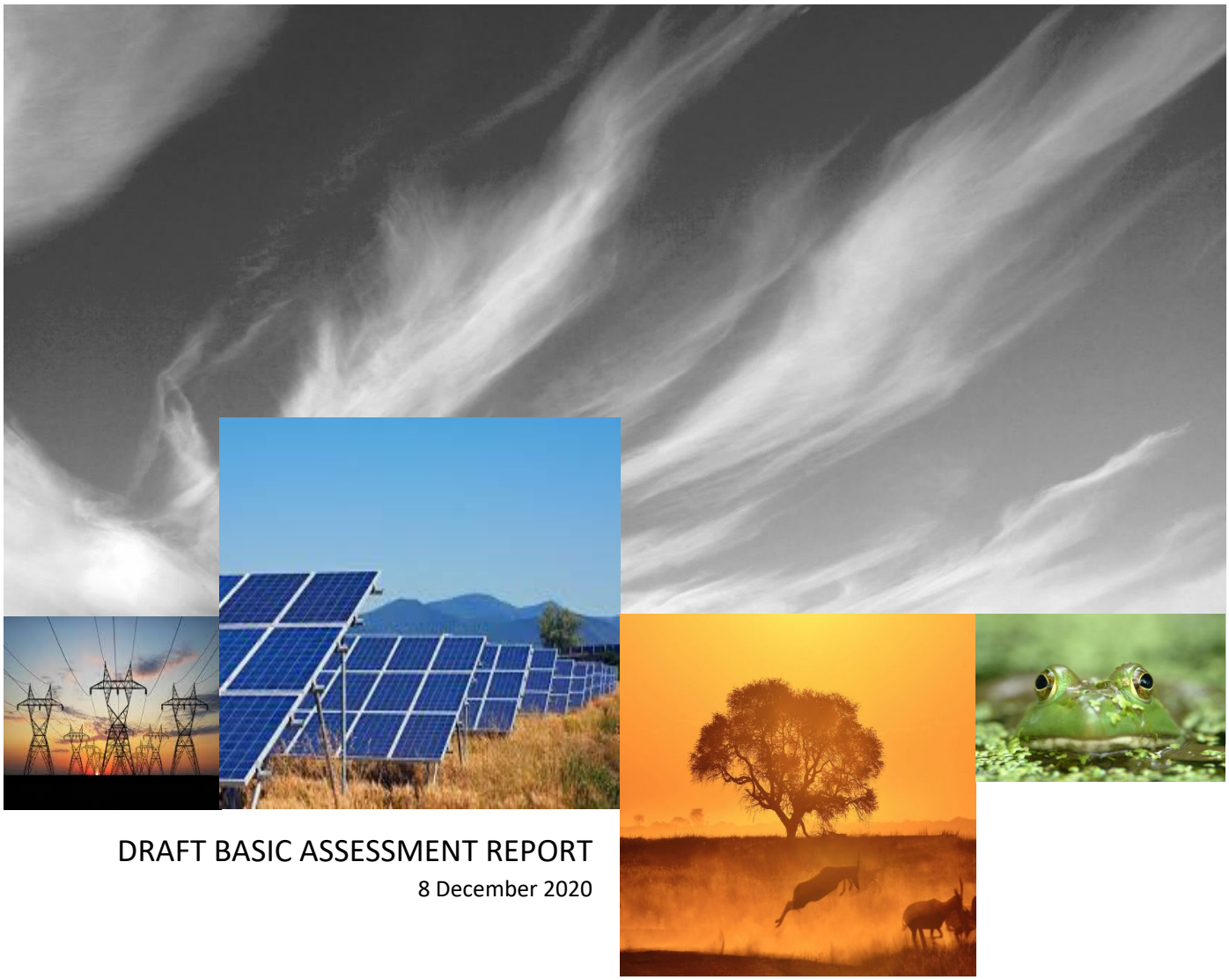

DRAFT BASIC ASSESSMENT REPORT

8 December 2020

DEVELOPMENT OF A POWER LINE AS PART OF THE BOITSHOKO PHOTOVOLTAIC SOLAR POWER PLANT NEAR KATHU, NORTHERN CAPE PROVINCE

ENVIRONAMICS

PROJECT DETAIL

DEA Reference No.	**:**	14/12/16/3/3/2/935
Project Title	**:**	Development of a power line as part of the Boitshoko Photovoltaic Solar Power Plant near Kathu, Northern Cape province.
Authors	**:**	Ms. Carli Steenkamp Ms. Christia van Dyk
Client	**:**	Boitshoko Solar Power Plant (RF) (Pty) Ltd.
Report Status	**:**	Draft Basic Assessment Report
Submission date	**:**	8 December 2020

When used as a reference this report should be cited as: Environamics (2020) Draft BAR: Development of a power line as part of the Boitshoko Photovoltaic Solar Power Plant near Kathu, Northern Cape province

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GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DEFF	Department of Environment, Forestry and Fisheries
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
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, 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. 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.

The IRP 2019 indicates that there is a short-term electricity supply gap of approximately 2 000 MW between 2019 and 2022. The objective of the RMIPPPP is to fill the current short-term supply gap, alleviate the current electricity supply constraints and reduce the extensive utilisation of diesel-based peaking electrical generators. 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 Limebank No. 471, registration division Kuruman, Northern Cape Province (refer to figure 1 for the locality map). An EIA for Boitshoko was conducted in 2016 and the project obtained an environmental authorisation (EA) on 8 February 2017. If Boitshoko is selected as a preferred bidder by the Department of Energy, construction of the Solar plant is said to start near the end of 2021. However, in order to reach Financial Close in June 2021, a number of tasks are required to be completed, including outstanding environmental permitting and authorisation requirements. This application therefore relates to the development of a 132kV Loop-in Loop-out overhead power line connecting the Boitshoko PV Solar Facility to the Ferrum-Fox 132Kv line.

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, 2019-2022). The Integrated Development Plan (2019-2022) of the John Taolo Gaetsewe District Municipality states that water and sanitation; roads and transport; local economic development, land development and reform; integrated human settlements, sustainable development orientated municipalities; environmental management, climate change and municipal health; and disaster management are development priorities in the municipality. The Gamagara Local Municipality's (JMLM) integrated development plan (2019-2022) sets out the following strategic objectives for the municipality: (1) to improve the lives of all through sustainable investment and development of infrastructure; (2) to ensure financial sustainability of the municipality; (3) to promote good governance by enhancing stakeholder participation; (4) to provide efficient and effective resources; (5) to facilitate community development; and (5) to create a conducive environment for economic development in the community and municipality.

The Boitshoko Solar Power Plant (RF) (Pty) Ltd. (hereafter referred to as Boitshoko SPP) was issued with an EA for the development of a 115MW photovoltaic solar facility and associated infrastructure on the Remaining Extent of Portion 1 of the farm Limebank 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. The total footprint of the project is approximately 280 hectares (including supporting infrastructure on site). This application relates to the connection of the approved project to the national grid via a 132kV Loop-in Loop-out overhead power line. The original location of the power line was approved under the original EA granted in 2017, but after receiving the Cost Estimate Letter for Grid connection and Supply from Eskom, it is proposed that the Boitshoko SPP will connect to the Ferrum-Fox 132Kv line instead of the Ferrum-Umtu 132Kv distribution line. A new power line route is therefore proposed.

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 activity has been identified with special reference to the proposed development and is 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."*

Being listed under Listing Notice 1 (Regulation 983) implies that the development is considered as potentially having a potential impact on the environment. Subsequently a 'basic assessment process' is required as described in Regulations 19 - 20. Environamics has been appointed as the independent consultant to undertake the Basic Assessment (BA) on Boitshoko Solar Power Plant's behalf.

Regulation 19 of the 2014 EIA Regulations (as amended) requires that a basic assessment report must contain the information set out in Appendix 1 to the Regulations or comply with a protocol or minimum information requirements relevant to the application as identified and gazetted by the Minister in a government notice. Appendix 1 to GNR982 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the Basic Assessment Report (BAR). It has been determined that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. All negative environmental impacts can

be effectively mitigated through the proposed mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarized below:

Impacts during the construction phase:

Construction of the power line will potentially result in the following impacts: loss of indigenous faunal and floral species diversity, impact on heritage objects, potential loss of productive farmland, in-migration or influx of job seekers, presence of construction workers on the local communities, increased risk of veld fires and generation of waste - general waste, construction waste, sewage and grey water. Socio-economic impacts such as the creation of local employment and business opportunities, skills development and training and technical support to local farmers and municipalities will be positive impacts emanating from the construction of the proposed power line.

Impacts during the operational phase:

The proposed power line and associated servitude will require routine maintenance work throughout the operational phase. The negative impacts are generally associated with visual impacts. The operational phase will have a direct positive impact through local employment and business opportunities, skills development and training, establishment of a Community Trust and the development of infrastructure for the generation of clean, renewable energy.

Impacts during the decommissioning phase:

The photovoltaic solar energy facility has a lifespan of between 20 and 25 years from where the project and its associated infrastructure will be decommissioned or upgraded. If the solar plant is not decommissioned the power line and the mast is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure will only be decommissioned once it has reached the end of life, or if no longer required. Upon decommissioning, the power line and mast would be disassembled and the components removed from site. The physical environment will benefit from the decommissioning of the infrastructure since the site will be restored to its natural state. During the decommissioning phase the following impacts are foreseen: loss of indigenous faunal and floral species diversity and the generation of waste.

Cumulative impacts:

It has been established that six (6) power lines surround the proposed site and according to the DEFF's database twelve (12) solar PV plant applications have been submitted to the Department within the geographic area of investigation. Given the location of the above power lines and proposed solar power facilities within 30km of the Bokamoso site, the potential for cumulative impacts are deemed to be medium. The potentially most significant cumulative impact during the construction phase relate to the loss or fragmentation of habitats, temporary employment and the impact of construction workers on local communities and influx of job seekers. The potential cumulative effects during the operational phase relate to visual impacts, the establishment of a community trust and the development of infrastructure for the generation of clean, renewable energy. During the decommissioning phase, the generation of waste may result in cumulative impacts.

In accordance with the EIA Regulations, this BA evaluates and rates each identified impact, and identifies mitigation measures which will be required in order to ensure the avoidance of negative residual risks. This BA also contains information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 20.

1 INTRODUCTION

This section aims to introduce the Basic Assessment Report (BAR) and specifically to address the following requirements of the regulations:

Appendix 1. (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-(a) details of: (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 BA 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 outline the activities for which BA should apply. The following activity with special reference to the proposed activity is 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)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.

Being listed under Listing Notices 1 (Regulation 983) implies that the proposed activity is considered as potentially having a potential impact on the environment. Subsequently a 'basic assessment process' is required as described in Regulations 19 - 20. According to Appendix 1 of Regulation 982, the objective of the basic assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;

- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine —
    - The nature, significance, consequence, extent, duration and probability of the impacts occurring; and
    - degree to which these impacts-
        - can be reversed;
        - may cause irreplaceable loss of resources, and
        - can be avoided, managed or mitigated; and
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to –
    - Identify and motivate a preferred site, activity and technology alternative;
    - Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

This report is the Draft Basic Assessment Report (DBAR) 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 report. The draft BAR will be made available to registered I&APs and all relevant State Departments. They will be requested to provide written comments on the draft BAR within 30 days of receiving it. All issues identified during this review period are documented and compiled into a Comments and Response Report as part of the Final BAR.

1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Carli Steenkamp

Postal Address: PO Box 6484, Baillie Park, 2526

Telephone: 082 220 8651 (Cell); 086 762 8336 (f)

Electronic Mail: carli@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the BA. 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 either the BA process or the original EIA process conducted in 2016. 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 D to this report. The expertise of the specialists is also summarized in their respective curriculum vitae's.

Table 1.2: Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Geotechnical Study	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch, 7612	Tel. 021 866 1518 Cell 082 927 9018	johann@johannlanz.co.za
Avifaunal Study	Birds & Bats Unlimited	Dr. Rob Simmons	Constantia Cape Town 8010	Tel: 021 794 8671 Cell: 082 780 0133	rob.simmons@uct.ac.za
Ecological Fauna and Flora Habitat Survey	Environmental Research Consulting	A. Götze	P. O. Box 20640 Noordbrug 2522	Cell: 082 789 4669	albie.erc@gmail.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	Paleo Field Services	Dr. Lloyd Rossouw	P. O. Box 38806 Langenhovenpark 9330	Cell: 084 250 5992	lloyd.rossouw@gmail.com
Agricultural & Soils Impact Assessment	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Tel: 082 316 7749	johan@phala-environmental.co.za
Social Impact Assessment	Phala Environmental Consultants	Mrs. Marelie Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	mareliebotha90@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Dirk van der Merwe	Edison Square, Century City, 7441	-	dirkvdm@bviwc.co.za

1.4 STATUS OF THE BA PROCESS

The BA process is conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of Regulation No. 982. Table 1.3 provides a summary of the EIA process and future steps to be taken. It can be confirmed that to date:

- A pre-application meeting request and public participation plan was submitted on 10 November 2020.
- The DEFF accepted the public participation plan in an email dated 18 November 2020.
- A site visit was conducted on 19 November 2020.
- An application for a Basic Assessment Process and the draft BAR was submitted on November 2020.
- The draft Basic Assessment report will be made available for comments from December to January 2021.

It is envisaged that the BA process should be completed within approximately seven months of submitting the Draft BAR, i.e. by May 2021 – see Table 1.3.

Table 1.3: Project schedule

Activity	Prescribed timeframe	Timeframe
Submit public participation plan	-	10 Nov. 2020
Site visit	-	19 Nov. 2020
Specialist reports	-	Receive by 25 Nov. 2020
Submit application form & Draft BAR	-	8 Dec. 2020
Public participation	30 Days	~Dec. – Jan. 2021
Submit Final BAR	90 Days	Jan./Feb. 2021
Decision	107 Days	May 2021
Appeal period	20 Days	May 2021

1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 1 of Regulation No.982. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: Structure of the report

Requirements for the contents of an BAR as specified in the Regulations		Section in report	Pages
Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-			
(a)	details of -	1	12-22
	(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	23-28
	(i) the 21-digit Surveyor General code of each cadastral land parcel;		
	(ii) where available, the physical address and farm name;		
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;		
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-		
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or		
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;		
(d)	a description of the scope of the proposed activity, including-		
	(i) all listed and specified activities triggered and being applied for; and		
	(ii) a description of the 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:	3	29-47
	(i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and		
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;		
(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	48-51
(g)	A motivation for the preferred site, activity and technology alternative.	5	52-70
(h)	a full description of the process followed to reach the preferred alternative 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;		
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	6 & 7	71-127
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;		
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;		
	(viii) the possible mitigation measures that could be applied and level of residual risk;		
	(ix) the outcomes 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 full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -		
	(i) a description of all environmental issues and risks that were identified during the EIA process; and		
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.		
(j)	an assessment of each identified potentially significant impact and risk, including-		
	(i) cumulative impacts;		
	(ii) the nature, significance and consequences of the impact and risk;		
	(iii) the extent and duration of the impact and risk;		
	(iv) the probability of the impact and risk occurring;		
	(v) the degree to which the impact and risk can be reversed;		
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and		
	(vii) the degree to which the impact and risk can be mitigated;		

(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;		
(l)	an environmental impact statement which contains-	8	128-130
	(i) a summary of the key findings of the environmental impact assessment:		
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and		
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;		
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;		
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Not applicable	
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8	128-130
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;		
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Not applicable	
(r)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix A to the report	
	(i) the correctness of the information provided in the report;		
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs);		
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and		
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and		
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable	
(t)	any specific information that may be required by the CA; and	Not applicable	
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable	

2 ACTIVITY DESCRIPTION

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

Appendix 1. (3) An BAR (...) must include-

(b) the location of the activity, including-

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

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

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

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is-

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

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

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

(i) all listed and specified activities triggered and being applied for;

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

2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a 132kV Loop-in Loop-out overhead power line connecting Boitshoko PV Solar Power Plant to the Ferrum-fox 132kV line on the Remaining Extent of Portion 1 of the farm Limebank 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 development of an approximately 150m long power line for each of the Loop-in Loop-out lines constructed within a 110m corridor – 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).

Table 2.1: General site information

Description of affected farm portion	The Remaining Extent of Portion 1 of the farm Limebank 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	132 kV Overhead power line
Structure Height	Power lines ~32m
Length of the power line	Approximately 150m each
Power line corridor width	Approximately 110m
Surface area to be covered	Approximately 1.2 hectares

The site is located between the approved Boitshoko PV energy facility and the R380 regional road, which is in a rural area and is bordered by farms and a diesel depot. The site survey revealed that the site currently consists of grazing for cattle – refer to plates 1-10 for photographs of the development area. The property on which the development is to be established is owned by Mr. Hendrik van Der Merwe.

2.2 ACTIVITY DESRIPTION

The proposed development will trigger the following activity:

Table 2.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 983, 4 December 2014	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered since the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.

2.3 ACTIVITIES ASSOCIATED WITH THE 132KV POWER LINE

Connecting the Boitshoko PV solar energy facility 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 has been authorised to step the voltage up to 132kV, after which the power will be evacuated into the national grid. As Boitshoko Solar Power Plant (RF) (Pty) Ltd. has received a cost estimate letter from Eskom stating that the

facility will be required to tie in with the Ferrum-Fox 132Kv line instead of the Ferrum-Umtu 132Kv distribution line.

- Construction Phase:

  The Boitshoko 132 kV Loop-in Loop-out overhead power lines will each be approximately 150m long and constructed within an identified corridor. The minimum vertical clearance to buildings, poles and structures not forming part of the power line must be 3.8m, while the minimum vertical clearance between the conductors and the ground is 6.7m. The minimum distance between trees and shrubs and any bare phase conductor of a 132kV power line must be 4m, allowing for the possible sideways movement and swing of both the power line conductor and the tree or shrub. The structure to be utilised for the power line towers will be informed by the local geotechnical and topographical conditions as well as by specific requirements from Eskom.

  Construction of the proposed power line will take approximately 12 months to complete and, on completion, will be handed over to Eskom Holdings Soc Ltd. to operate and maintain.

- Operation Phase:

  The proposed power line and associated servitude will require routine maintenance work throughout the operation period.

- Decommissioning Phase:

  The photovoltaic solar energy facility has a lifespan of between 20 and 25 years from where the facility and its associated infrastructure will be decommissioned or upgraded. If the solar plant is not decommissioned the power line is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure will only be decommissioned once it has reached the end of life, or if no longer required. Upon decommissioning, the power line would be disassembled, and the components removed from site.

2.4 LAYOUT DESCRIPTION

The power line route follows the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site are considered – refer to figure 9 below. The total surface area proposed for the power line route is approximately 1.2 hectares in extent. Limited features of environmental significance exist on site. The proposed route of the power line is the shortest route from the on-site substation to the Ferrum-Fox 132Kv power line and is the preferred alternative for the developers and Eskom. A final layout plan is included as Figure 8 in the report.

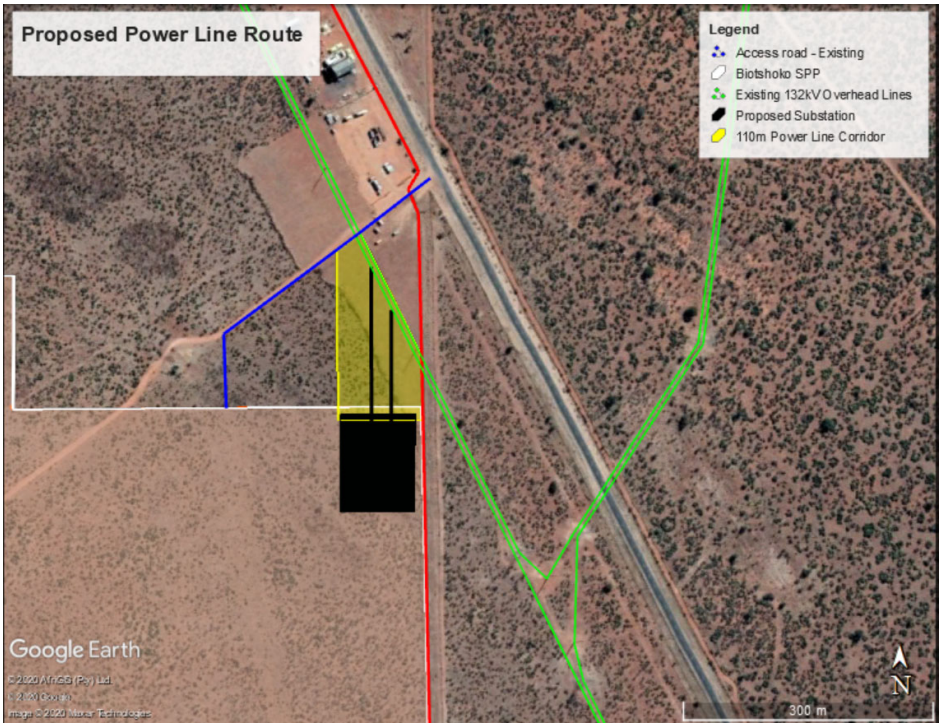

Figure 9: Proposed 110m power line corridor

Table 2.3 provide the coordinate points for the proposed power line corridor.

Table 2.3: Coordinates

Coordinates			
Power Line	A	27°36'14.49"S	22°57'49.47"E
	B	27°36'12.10"S	22°57'49.42"E
	C	27°36'9.40"S	22°57'49.50"E

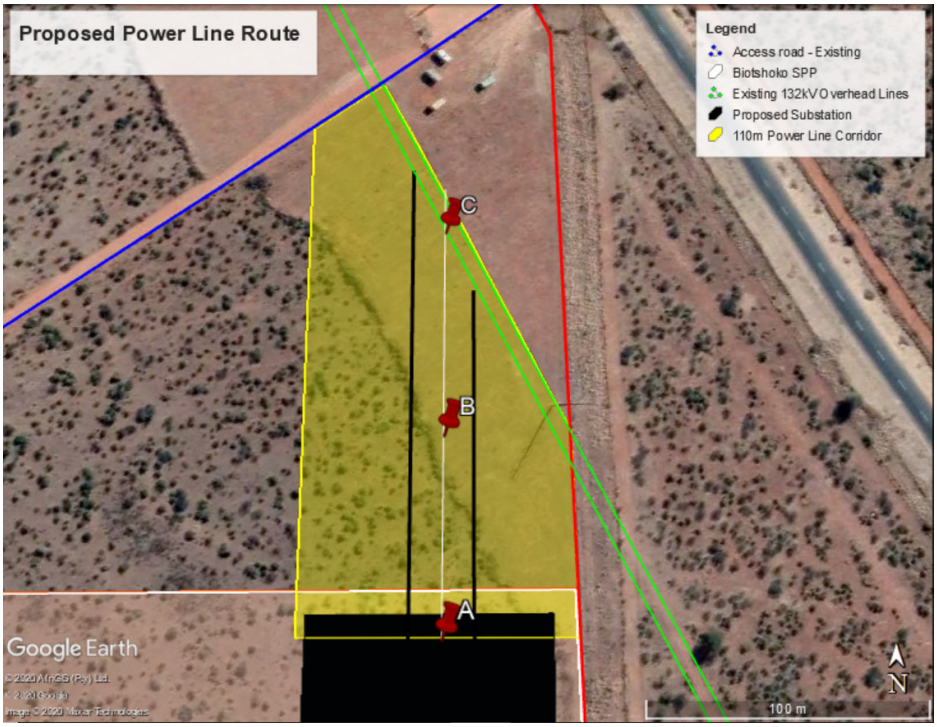

Figure 10: Map indicating coordinate points

2.5 SERVICES PROVISION

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

2.5.1 Water

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

The site falls within the 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.

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. Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of storm water, the capture and use of rainwater from gutters and roofs would be

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

2.5.2 Storm water

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Storm water management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F.

2.5.3 Sanitation and waste removal

Portable chemical toilets will be utilized, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed Deben landfill site. 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). In a letter dated 25 May 2016 the Gamagara Local Municipality indicated that they do not foresee any problems with the disposal of solid waste from the Boitshoko SPP, provided that it excluded building rubble, scrap metal and other refuse which does not fall into the category of domestic waste (refer to Appendix C5).

2.6 Decommissioning of the facility

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

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

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

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- The surface will be restored to the original contours and hydro seeding will take place.

3 LEGISLATIVE AND POLICY CONTEXT

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

Appendix 1. (3) An BAR (...) must include-

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

3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants and associated infrastructure 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 (DEFF) 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)
- The National Forests Act, 1998 (Act 84 of 1998)
- The Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009)
- 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)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa
- New Growth Path Framework

- 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 2019 – 2020
- Gamagara Local Municipality Draft Integrated Development Plan for 2019 – 2022

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) listed in Regulation R983 which requires a 'basic 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.

National Environmental Management: Waste Act (Act No. 59 of 2008)	Department of Environmental Affairs (DEA)	2008	NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determine that no person may commence, undertake or conduct a waste management activity listed in this schedule unless a license is issued in respect of that activity. It is not envisaged that a waste permit will be required for the proposed development.
National Environment Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs (DEA)	2004	The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development. Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
The National Heritage Resources Act	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

(Act No. 25 of 1999)			Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith. The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a "heritage resource" includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected. A case file has been opened on SAHRIS and all relevant documents were submitted for their comments and approval.
Conservation of Agricultural Resources Act (Act No. 85 of 1983)	National and Provincial Government	1983	The objective of the Act is to provide for control over the utilization of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith. Consent will be required from the Department of Agriculture in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement.
The National Forests Act, 1998 (Act 84 of 1998)	Department of Agriculture, Forestry and Fisheries	1998	The purposes of this Act are to: (a) promote the sustainable management and development of forests for the benefit of all; (b) create the conditions necessary to restructure forestry in State forests; (c) provide special measures for the protection of certain forests and trees: (d) promote the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. (e) promote community forestry;

			(f) promote greater participation in all aspects of forestry and the forest products industry by persons disadvantaged by unfair discrimination. Section 12(1) read with s15(1) of the NFA stated that the Minister may declare a particular tree, group of trees, woodland; or trees belonging to a particular species, to be a protected tree, group of trees, woodland or species. A list of protected tree species was gazetted in GN 635 of 6 December 2019. The effect of the declaration is that no person may (a) cut, disturb, damage or destroy; or (b) possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except under a license granted by the Minister; or in terms of an exemption published by the Minister in the Gazette.
The Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009)	Northern Cape Department of Environmental Affairs and Nature Conservation	2009	The Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith. Chapter 6 of the Act relates to the sustainable utilisation of plants, amongst other protected plants while chapter 7 relates to invasive species.

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

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	Department of Minerals and Energy	2003	This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out

Renewable Energy			Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels. The medium-term (10-year) target set in the White Paper is: *10 000 GWh (0.8 Mtoe) renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro. The renewable energy is to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. This is approximately 4% (1667 MW) of the projected electricity demand for 2013 (41539 MW)* (Executive Summary, ix).
Integrated Resource Plan (IRP) for South Africa	Department of Minerals and Energy	2010-2030	The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a "living plan" which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010, led to the Revised Balanced Scenarios (RBS) for the period 2010–2030. "*This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), 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 11,4 GW of renewables, which relates to the proposed Tirisano SEF. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options"* (RSA, 2011a). The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that: "*The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry*;

To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP;
The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and
Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS" (RSA, 2011a:6).

"The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources" (RSA, 2011a:6).

The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is:
"*Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment."*
"*Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed*" (IRP, 2011a:17).
In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP has been updated and were open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. The draft IRP of 2018 was open for comments until the end of October 2018. For the revision scenario analysis were conducted and the results thereof are included in the draft IRP of 2018. The results revealed that for the

			period ending 2030 that: *"The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025"; "Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030*"; and *"the scenario without renewable energy annual build limits provides the least-cost option by 2030*" (RSA, 2018:34). Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: "*Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050*" (RSA, 2018:34–35). In the final IRP of 2019 key considerations were taken into consideration together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *"The application of renewable build limits 'smoothes out' the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence*". The decision stated against this key consideration is to *"retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan"* (RSA, 2019:46). Hereby the IRP also recognizes renewable technologies' potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13).
Northern Cape Provincial Development and Resource Management Plan/Provincial	Northern Cape Provincial Government	2012	The Northern Cape Provincial Spatial Development Framework (further referred to as the PSDF) of 2012 in compliance with the Northern Cape Planning and Development Act 7 of 1998 (Chapter IV, Section 14), aims to "*ensure that the use and allocation of the province's resources, both renewable and non-renewable, are informed by a set of integrated and coordinated policies, objectives, implementation strategies, programmes and, where appropriate, projects aimed at:*

Spatial Development Framework (PSDF)	• *setting and monitoring, where appropriate, measurable standards with regard to, amongst other, public access to health, safety, amenities, education and economic opportunity;* • *ensuring that the supply of public infrastructure is directed towards meeting the required standards in a prioritised, coordinated, sustainable and cost-effective way, in terms of capital and maintenance expenditure;* • *ensuring the protection and sustainable utilisation of land, water and air where these are important for the maintenance of ecologically-sensitive systems or processes, areas of biological diversity, public health or public amenities;* • *providing an investment and expenditure programme coordinated with budgetary cycles and capable of securing financial and other resources from National Government and any other funding agencies as well as public/private sector partnerships; and* • *informing and guiding the preparation and implementation of district and local municipal infrastructure management plans and land development plans" (PSDF 2012:4).* The PSDF mainly aims to build a prosperous, sustainable growing provincial economy to firstly improve social development and to eradicate poverty. The PSDF adopted the International Union for Conservation of Nature's (IUCN) mission as their main goal. This goal states that essential ecological processes are being maintained, that natural resources are being preserved and utilised in a sustainable manner, that the use of the biosphere are managed while also maintaining its potential for future generations. The PSDF of 2012 highlights that renewable energy sources such as solar thermal and wind, comprise 25% of the Northern Cape's energy generation capacity by the year 2020, and should be progressively phased in as appropriate into the province. The PSDF further sets out energy objectives, which include the following: ▪ To promote the development of renewable energy supply schemes; ▪ To enhance the efficiency of Eskom's power station at the Vanderkloof power station; ▪ Reinforce additional electricity supply especially renewable energy projects; and

			▪ Develop and implement innovative energy technologies to improve access to reliable, sustainable and affordable energy services. Also recognize that the objective should be to obtain sustainable economic growth. Lastly, the PSDF notes that the Northern Cape need to develop large-scale renewable energy supply schemes in order to address the growing demand in energy and to promote a green economy in the province.
National Development Plan of 2030	The Presidency: National Planning Commission	-	The National Development Plan aims to "eliminate poverty and reduce inequality by 2030" (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa need to grow faster in order to benefit all South Africans. In May 2010 a draft national development plan was drafted, which highlighted the nine (9) key challenges for South Africa. The highest priority areas according to the plan are considered to be the creation of employment opportunities and to improve the quality of national education. In this regard, the plan sets out three (3) priority areas, namely to raise employment by a faster growing economy, improve the quality of education, and to build the capability of the state in order to play a more developmental and transformative role. One of the key challenges identified was that the economy is unsustainably resource intensive and the acceleration and expansion of renewable energy was identified as a key intervention strategy to address this challenge.
National Infrastructure Plan of South Africa	Presidential Infrastructure Coordinating Commission	2012	In the year 2012 the South African Government adopted a National Infrastructure Plan (hereafter referred to as the Plan). The aim of this Plan is to transform the economic landscape, while strengthening the delivery of basic services and creating new employment opportunities. This Plan also supports the integration of African communities, and also sets out the challenges and enablers that our country needs in order to respond to the planning and development of infrastructure with regards to fostering economic growth (RSA, 2012). The Plan has developed eighteen (18) strategic integrated projects (further referred to as SIPs). These SIPs stretches over all nine (9) provinces, covering social and economic infrastructure, and projects that enhances development and growth. Of the eighteen (18), five (5) are geographically focused, three (3) spatial, three (3) energy, three (3) social infrastructure, two (2) knowledge, one (1) regional integration, and one (1) water and sanitation focussed. The three (3) SIPs according to the Plan, which are energy focused and correlate to the proposed project are as follow:

			- SIP 8: Green energy in support of the South African economy; - SIP 9: Electricity generation to support socio-economic development; and - SIP 10: Electricity transmission and distribution for all. SIP 8 according to the Plan "*support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the IRP 2010 and support bio-fuel production facilities*". The purpose of SIP 9 according to the Plan is to "*accelerate the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances*". SIP 9 should also monitor the implementation of major projects such as new power stations like Medupi, Kusile and Ingula. Lastly, SIP 10's aim is to "*expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support economic development*" (RSA, 2012:20).
New Growth Path Framework	Department of Economic Development	-	The New Growth Path was developed after 16 years of South Africa's democracy, to respond to emerging opportunities and risks while building on policies. This framework provides a dynamic vision on how to collectively achieve a more developed, equitable and democratic society and economy. This framework mainly reflects the commitment of the South African Government to create employment opportunities for its people in all economic policies (RSA, 2011b). This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to: - Identify the possible areas of employment creation; and - Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b).

			This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction and investment of renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.
Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa	Department of Environmental Affairs	2014	The Department of Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives. This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). The REDZs also provide priority areas for investment into the electricity grid. Currently one of the greatest challenges to renewable energy development in South Africa is the saturation of existing grid infrastructure and the difficulties in expanding the grid. Proactive investment in grid infrastructure is thus likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still promoted across the country and any proposed development must be evaluated on its own merit. The proposed site does not fall within a REDZs.

John Taolo Gaetsewe District Municipality Integrated Development Plan (IDP)	John Taolo Gaetsewe District Municipality	2019 - 2020	The John Taolo Gaetsewe District Municipality's Integrated Development Plan for 2019-2020 (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. The Plan goes further by stating the development priorities of the municipality. They are: - 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; - 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	2019-2022	The vision of the Gamagara Local Municipality according to the Draft Integrated Development Plan for 2019-2022 (further referred to as the Plan) is to provide a prosperous community with a futuristic economy. The mission of the municipality is to "*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."* 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 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 Integrated Development Plan for 2019 – 2022 the following were identified as the key priority areas for the years 2019 -2022, 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, (2017). Best Practise Guidelines Birds & Solar Energy: Guidelines for assessing and monitoring the impact of solar power generating facilities on bird in southern Africa.

3.6 CONCLUSION

The basic assessment was undertaken in accordance with the EIA Regulations (as amended in 2017) published in GNR 982, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

The legislative and policy context plays an important role in identifying and assessing the potential social impacts associated with the proposed development. For this reason, the

[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.

proposed development project will be assessed in terms of its fit with the key legislative, policy and planning documents discussed above.

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy. The White Paper on the Energy Policy of the Republic of South Africa of 1998 stated that due to the fact that renewable energy resources operate from an unlimited resource base, i.e. the sun, renewable energy can increasingly contribute towards a long-term sustainable energy for future generations. This policy further highlights that due to the unlimited resources base of renewable energy in South Africa, renewable energy applications like PV solar energy and associated infrastructure are more sustainable in terms of social and environmental costs. The Integrated Resource Planning for Electricity for South Africa of 2010–2030, the National Infrastructure Plan of South Africa and the New Growth Path Framework all support the development of the renewable energy sector. In particular, the IRP also indicated that 43% of the energy generations in South Africa is allocated to renewable energy applications. On District and Local level not much attention is given explicitly to renewable sources like PV solar energy, however the documents reviewed do make provision for increase energy supply and efficiency in improving the quality of lives in terms of efficient physical infrastructure. At Provincial, District and Local level the policy documents support the applications of renewables. The Northern Cape Provincial Development and Resource Management Plan/ Provincial Spatial Development Framework (PSDF) of 2012 indicated that the development of renewable energy applications such as solar energy facilities, could be some of the means in which the Northern Cape can benefit from economically.

The review of the relevant policies and documents related to the energy sector thus indicate that renewables like solar energy and the establishment of solar energy facilities and associated infrastructure are supported on all spheres of Government. The proposed power line as part of the Boitshoko SPP is therefore supported by the related policy and planning documents reviewed in this section of the report.

4 THE NEED AND DESIRABILITY

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

Appendix 1. (3) An BAR (...) must include-
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

4.1 THE NEED FOR THE PROPOSED ACTIVITY

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

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

The primary rationale for the Boitshoko SPP 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). 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, 2019-2022).

The benefit of constructing the power line and thereby connecting the Boitshoko PV Solar Energy Facility to the electricity grid outweighs any negative aspects relating to the construction and associated loss of land. The proposed project will facilitate the connection of the Bokamoso PV Solar Energy Facility to the national grid thereby facilitating the transmission of renewable energy and upliftment of the local community through social economic development initiatives. This will have a positive impact at a local, regional and national level.

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 of the site falls within the second driest category and is classified as class 5, 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.

- Preferred location - The proposed power line route is considered to be the most feasible option for the location of this infrastructure, taking technical and environmental issues into consideration. The proposed Loop-in Loop-out power lines are eac approximately 150m long, and the proposed route of the power line is the shortest route from the on-site substation to the Ferrum-Fox power line and is the preferred alternative for the developers and Eskom.

- Cumulative impacts of low to medium significance – Six overhead power lines and twelve solar facilities have been granted preferred bidder status within proximity radius of 30km to the proposed Boitshoko PV plant. No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher

cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

- Increased access to electricity as a source of energy: The John Taolo Gaetsewe District Municipality's IDP for 2019-2020 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 1. (3) An BAR (...) must include-

(g) A motivation for the preferred site, activity and technology alternative;

(h) a full description of the process followed to reach the proposed preferred alternative, 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;

(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;

(viii) 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.

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

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

(xi) a concluding statement indicating the preferred alternative development location within the approved site.

5.1 CONSIDERATION OF ALTERNATIVES

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

At the time when the EIA was conducted in 2016, a single preferred power line route was identified, namely connection from the Boitshoko SPP to the Ferrum–Umtu 132kV power line. As part of the initial site assessment (refer to Appendix E1) conducted by the developer on the Remaining Extent of Portion 1 of the farm Limebank No. 471, the farm was found favourable 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 emerged for the power line route (Subsolar, 2016). Since then, a Cost Estimate Letter for Grid connection and Supply has been obtained from Eskom, where it is proposed that the Boitshoko SPP connect to the Ferrum-Fox 132Kv line instead of the Ferrum-Umtu 132Kv distribution line, which is now the shortest route.

The following sections explore different types of alternatives in relation to the proposed power line 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). The purpose of the proposed 132kV power line is to connect the authorised Boitshoko Solar Energy facility with the National Grid. If the status quo is maintained, the potential opportunity costs in terms of the successful operation of the Boitshoko PV Solar facility would be lost, since it will not be able to operate without the power line, which in turn will result in job losses and loss of economic growth in the area. Alternatively, the previously authorised power line corridor will need to be utilised which is less desirable than the proposed new route.

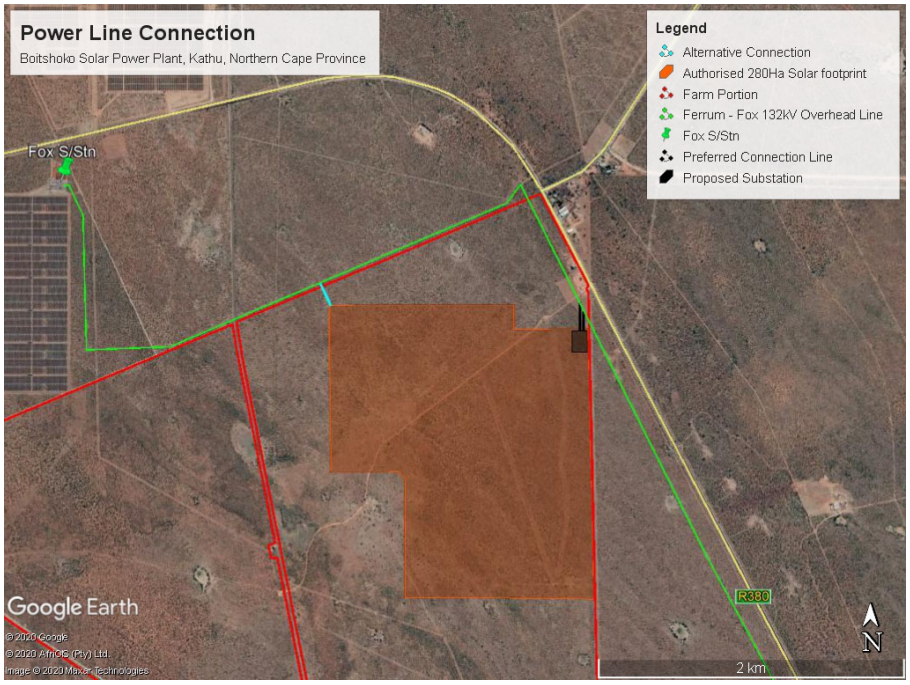

Figure 11: Location alternatives for the power line on the Remaining Extent of Portion 1 of the farm Limebank No. 471

5.1.2 Location alternatives

This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the power line. Only one route alternative is being considered, since Eskom has indicated in their Cost Estimate Letter for Grid connection and Supply that they prefer the Boitshoko SPP connect to the Ferrum-Fox 132Kv line. The proposed Loop-in-Loop-out power lines are each approximately 150m long, and the proposed route of the power line is the shortest route from the on-site substation to the National Grid. This option also ensures that the power line corridor does not cross any additional farm portions but rather connect to the grid in an area that has already been characterised by electricity infrastructure.

5.1.3 Design and layout alternatives

The choice of pylon structure to be used for the power line will be determined in consultation with Eskom and does not significantly affect the environmental impacts of the proposed development as provision has already been made for the visual, ecological and heritage impacts of erecting a power line. No defined structure has been confirmed at this stage and will depend on Eskom's technical requirements. The 132kV line must be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd. The structure to be utilised for the power line towers will also be informed by the local geotechnical and topographical conditions. The following alternatives are considered with regards to the proposed structures:

<u>Steel lattice towers:</u>

The steel lattice towers provide the following advantages over the other tower types available:

- Enables multipath earthing which enhances the overall electrical performance of the power line.

- Is visually less obtrusive than the mono-pole options.
- Is more practicable that other options i.e. more cost effective and more practical to construct and maintain.
- Is safer to work on than the monopole and wood pole structures.
- Is more durable than the wood pole structures.

Steel monopoles:

The steel monopole is considered less suitable than the steel lattice towers for the following reasons:

- Is visually more intrusive than the lattice towers.
- Is more expensive than the lattice towers.
- Requires more steel than the lattice towers.
- Is more difficult to erect.
- Is not as safe to work on as the lattice towers.

Wood poles:

Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them less efficient and practicable. The wood pole structure is also more susceptible to having the cross arms burnt off by electrical faults as well as being susceptible to deformation with height.

5.1.4 Technology alternatives

The power line will be constructed within the identified corridor towards the Ferrum-Fox 132Kv line. The 132kV Loop-in-Loop-out overhead transmission line is the only preferred alternative for the applicant due to the following reasons:

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

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

The choice of structure to be used for the power line will be determined in consultation with Eskom once the Engineers have assessed the geotechnical and topographical conditions and decided on a suitable structure which meets the prescribed technical requirements. The

choice of structures to be used will not have any adverse impacts on the environment. The line will be constructed according to the authorised standards for a power line approved by Eskom Holdings SoC Ltd.

Underground Transmission Lines - Underground cables have generally been used where it is impossible to use overhead lines for example because of space constraints. Underground cabling of high voltage power lines over long distances is not considered a feasible or environmentally practicable alternative for the following reasons:

- Underground cabling will incur significantly higher installation and maintenance costs.
- It is more difficult and takes longer to isolate and repair faults on underground cables.
- There is increased potential for faulting at the transition point from underground cable to overhead power line.
- Underground cables require a larger area to be disturbed during construction and maintenance operations and hence have a bigger environmental disturbance footprint.
- Underground cabling requires the disturbance of a greater area when it comes to agriculture and other compatible land uses as the entire servitude becomes available for use as opposed to just the area around the towers.

The following alternatives may be considered for the overhead power line:

Single Circuit Overhead Power Line

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

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

Double Circuit Overhead Power Line

Where sensitive environmental features are identified, and there is sufficient justification, Eskom will consider the use of double circuit (placing 2 power lines on either side of the same tower structure) to minimize impacts. However, the use of double-circuiting has a number of technical disadvantages:

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

The double-circuit overhead power line proves more feasible since the single circuit may not have the capacity to transmit the large amount of electricity generated from the plant and during maintenance the entire plant would not have to be off line as one of the double circuit

lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction. For the layout of the Boitshoko Solar Power Plant – refer to Figure 8.

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 19 November 2020 (see Appendix C1) 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. The public was informed that copies of the report will be made available upon request and that these will be sent via Dropbox, email, registered post or courier services.

- Site notices

  Site notices were placed on site and at the municipal offices in English on 20 November 2020 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 11 January 2021. The public was informed that copies of the report will be made available upon request and that these will be sent via Dropbox, email, registered post or courier services. Photographic evidence of the site notices is included in Appendix C2.

- Hard and/or soft copies of report

  Hard or soft copies of the report will be made available upon request. Hard copies will be made available for review to any interested and affected party who may not have access to the Internet or email communication. The availability of the report was

made known as part of the press advertisement and the site notices. All hard copies of the report will be sanitized prior to it being posted or couriered.

- Direct notification of identified I&APs

  Identified and registered I&APs, including key stakeholders representing various sectors, will be directly informed of the proposed amendment via registered post, telephone calls, WhatsApps and emails. A copy of the draft motivational report will be made available as part of the notification. I&APs will be requested to submit comments on the draft report within 30 days. For a complete list of I&APs with their contact details see Appendix C3 to this report. All letters will be sanitized prior to it being posted.

- Direct notification of surrounding land owners and occupiers:

  Written notices were provided via registered post, WhatsApp or email to all surrounding land owners and occupiers – refer to Figure 12. The surrounding land owners were given the opportunity to raise comments within 30 days. All letters will be sanitized prior to it being posted. For a list of surrounding land owners see Appendix C3.

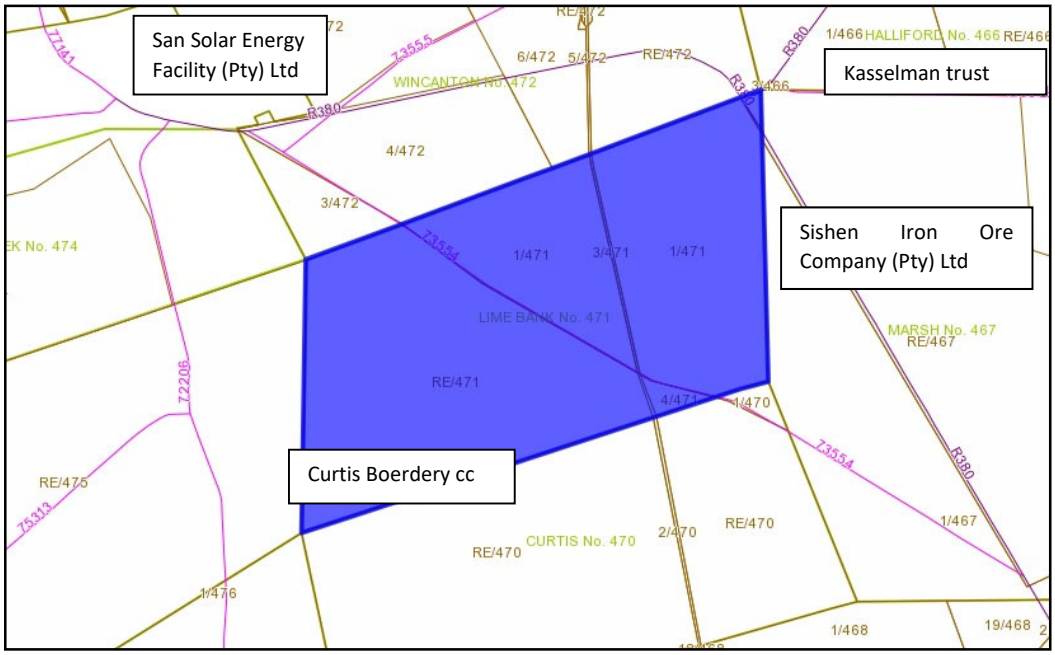

Figure 12: Surrounding Land Owners

- Circulation of Draft Basic Assessment Report

  As mentioned above, copies of the draft Basic Assessment report will be provided to all I&APs via registered post, couriers, Dropbox and/or email. They will be requested to provide their comments on the report within 30 days. All issues identified will be documented and compiled into a Comments and Response Report to be included as part of the Final Basic Assessment Report. Hard copies of the report will be sanitized prior to it being posted or couriered.

- Circulation of decision and submission of appeals:

  Notice will be given to all identified and registered I&APs of the decision taken by the DEFF. The attention of all registered I&APs will also be drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations. In accordance with the provisions of Regulation 4(1) of Government Notice No. 993, an appellant must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered I&APs and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

5.2.2 Consultation process

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

5.2.3 Registered I&APs

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

5.2.4 Issues raised by I&APs and consultation bodies

To date no comments have been received from consultation bodies. Any comments received during the circulation of the draft BAR will be summarized in the final BAR. The full wording and original correspondence will be included in Appendix C5.

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 apart from a number of indigenous and red data tree species that are located on the site as well as non-perennial wetlands located within the wider area.

5.3.1.1 Geology, soils and agricultural potential

According to the Agriculture and Soils Impact Assessment (attached in Appendix D5) the land type data shows the dominant soils to be shallow, sandy soils on underlying hardpan carbonate. 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 proposed site is identified by the screening tool as being entirely of low sensitivity for agricultural resources. The low agricultural capability of the site is predominantly due to the arid climate, which imposes a serious limitation on all agricultural production.

The issue of potential increased wind erosion with the removal of vegetation for the proposed project was highlighted as part of the original EIA in 2016. The brief geotechnical study (refer to appendix D5) confirms that 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.

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 A*cacia 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 in close proximity to the power line corridor. No threatened ecosystems were recorded in or in the vicinity of the study area.

The vegetation is dominated by tall woody shrubs, which also vary in height from one area to the next. On the largest part of the study area the woody vegetation reaches an average height of approximately 1.5 to 2.0 m and a smaller area is covered by lower shrubs of between 0.5 and 1.5 m. The areas with lower shrubs generally also have a better grass cover and are mostly situated on shallower, rocky soils. From an ecological point of view VU1 is in a moderate to poor veld condition due to overgrazing in the past and high levels of bush encroachment by *Senegalia mellifera subsp. detinens* and *Tarchonanthus camphoratus*.

Red Data, Protected and Endemic Plant Species

According to the Ecological Fauna & Flora Habitat Survey (refer to Appendix D2) 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. Prominent, but not dominant trees are *Boscia albitrunca* and *Vachellia erioloba* (refer to Figure 13).

Figure 13: Examples of Boscia albitrunca and Vachellia erioloba

Alien Invasive Species

According to the Ecological Fauna and Flora Habitat Survey (refer to Appendix D2) nine naturalized (alien) plant species were recorded in the study area. One of these species is the alien invasive woody species *Prosopisglandulosa var. torreyana*, which according to Hoffman *et al* (1999) (in Mucina & Rutherford, 2006), is one of the 12 agriculturally most important invasive alien plants in South Africa. This species together with three others are classified as alien weed or invader species, according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983) (CARA, 1983) in Henderson (2001) and also according to the National Environmental Management: Biodiversity Act's 2014 list of proposed weeds and invaders (NEMBA, 2014). Five uncategorized and non-invasive herbaceous weeds were also recorded. 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. Alien plant seed dispersal within the top layers of the soil within

footprint areas, that will have an impact on future rehabilitation, has to be controlled. A management plan and proper follow-up strategy for the prevention of the establishment and/or further spread of new populations of such species should be developed and enforced.

Pans

There are a number of natural non-perennial pans in close proximity to the preferred site. There are a number of non-perennial pans in the area though no surface water was visible during the 2016 site visit and none of these pans occur within 500m of the proposed power line corridor.

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.

Avifaunal

According to the Avifaunal Studies conducted in March and August 2016 (refer to Appendix D3) 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, we captured the all-important wet-season assessment with its flush of primary productivity. The Avifaunal Study recorded Seventy-six (76) avian species in or around Limebank 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.

The Passage rate of the large collision-prone birds was low at 0.13 birds h-1 in March and lower (0.0 birds h-1) in August. However, large numbers of other species that may be attracted to the panels such as sandgrouse, were present with 14.9 birds h-1 traversing the site to the water holes.

Ecological

Through a literature research the Ecological Fauna and Flora Habitat Survey (refer to Appendix D2) confirmed that no animals were restricted or endemic to the area. Some species listed have a low likelihood of occurring within the site, but are nonetheless listed if their habits, habitat requirements and estimated distribution ranges agree with the study findings. The plausible reptile species richness of the area was negatively affected by the wealth of crown cover as well as a lack of rockiness or sandy substrates (within our site). For the most part of the year the likelihood of any amphibians occurring on the site 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 site exists 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 site.

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 the power line on the site is not expected to have a significant visual effect, given the presence of numerous Eskom distribution and transmission lines as well as other industrial developments (diesel depot) and mines in the area which already transformed the visual landscape. However, due to the height of the power line (~32 meters) a visual impact study was conducted to determine to what extent the proposed power line 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, 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 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 Limebank 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 site 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 (refer to figure 14).

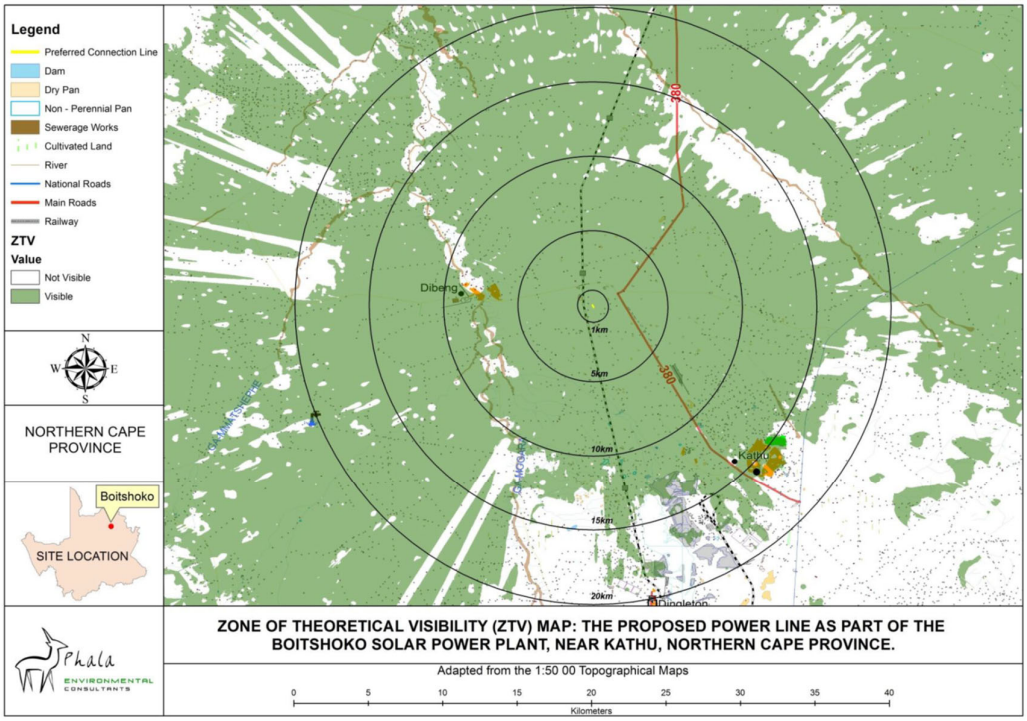

Figure 14: Zone of Theoretical Visibility

5.3.1.6 Traffic consideration

The site is located in the Northern Cape Province approximately 65km southwest of the town of Kuruman and approximately 21km northwest of the town of Kathu on Provincial Route 380 (R380). The PV plant equipment will be delivered to site from two possible locations being Cape Town Harbour, 1157km from site, or Durban Harbour, 1055km from site – Refer to figure 15. The site identified for this development is located off Provincial Route 380 on the farm, Limebank No.471.

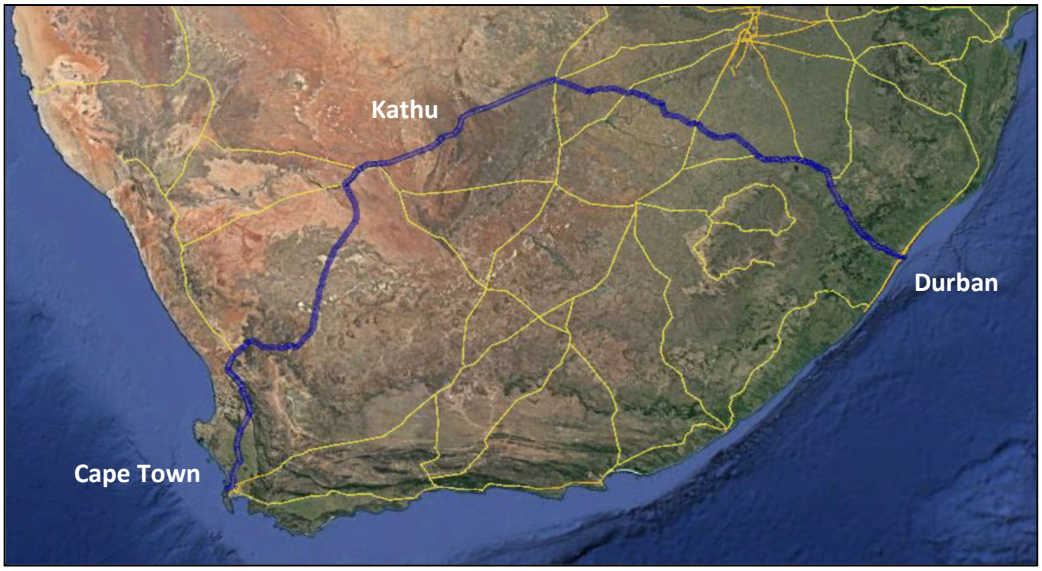

Figure 15: Transportation Routes

None of the new services that will be installed will be crossing any National Road Reserves. However, as the main access to the proposed facility is on a Provincial Route, a formal access application was applied for with the Northern Cape Department of Roads and Public Works, which has been approved in principle.

The vehicles used to transport the equipment are standard container trucks and not Abnormal Load Vehicles. As this route is travelled by the same type of vehicle throughout, no obstacles (e.g. low overhead services, cattle grids, narrow bridges etc.) are expected. Additionally, the local traffic during construction generated by commuting staff for the entire Boitshoko SPP is estimated as follow (expected to be peak hour trips):

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

The ultimate accepted capacity of a two lane highway is 3 200 vehicles per hour (vph). From historic traffic count data, it was observed that the roadways around Kuruman have an abundance of spare capacity, (specifically along the N14 and R31) as the current average daily traffic (ADT) along these roadways are between 2 000 vpd and 6 000 vpd. This therefore indicates that the estimated additional traffic generated by the construction staff travelling to and from site, can be accommodated on the existing roadways.

Table 5.1: Trip Summary for Long Distance Route

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

It is expected that the community of Kuruman, Kathu and Deben will participate in the construction phase of this development. The development of the solar farms in the surrounding area, creates an opportunity for temporary employment and economic upliftment of the surrounding communities. From a traffic point of view, the total daily construction traffic is deemed to be very low and will not significantly impact these communities. No traffic figures are expected during the operational period of the power line.

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) as a whole has a variety of associated socio-economic benefits. In terms of employment the construction phase will employ approximately 60 new skilled, 220 low-skilled and 120 semi-skilled employment

opportunities over a period of 18 – 24 months. The operational phase however, will employ approximately 3 new skilled, 40 low-skilled and 10 semi-skilled employment opportunities over a period of 20 years.

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.

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 2019-2022 for the John Taolo Gaetsewe District Municipality reports that nearly one in every three persons between 15 and 65 years of age in the JTGDM (30.3%) are not economically active. This is the highest figure in the Northern Cape Province, 4.2% higher than the Northern Cape Provincial figure of 26.28% and 6.56% higher than the national figure of 23.74%.

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.

The main sector that contributes to the economic development of this area and the province is the mining sector. The mining sector of this municipal area is an important contributor to the South African mining sector and adds to the international mining value chain. 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.

The Gamagara Local Municipality according to the IDP of 2019-2022 aimed in achieving to provide the following basic services to the communities within these municipal boundaries:

- that 99% of households have access to water;
- that 87.9% of the households have access to electricity;
- that 91.5% of the households have access to sanitation; and
- that 100% of the households receive refuse removal.

It is therefore the intension of the municipality to provide high levels of services in all areas of basic services to the population of the Gamagara Local Municipality (IDP, 2019-2022).

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 D6) 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.

Stone Age

Occupation of the region took place during the Stone Age. Most of this, however, seems to date to the Early Stone Age and centres in the areas where there are hills, e.g. to the east and south. For example, in the vicinity of Kathu, Beaumont & Morris (1990) and Dreyer (2007) identified to occurrence of extensive Early Stone Age occupation.

The Kathu sites contain significant ESA Acheulean and Fauresmith assemblages, and also a well-represented MSA (Beaumont 1990b, 2004; Chazan et al. 2012; Wilkins & Chazan 2012). Kathu Pan is formed by a shallow depression with an internal drainage and a high-water table. Archaeological and paleoenvironmental 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 with some superb symmetrical examples produced on banded ironstone in c. 0.8–1.3-Ma-old stratum 4b at Kathu Pan 1 (Beaumont & Bednarik 2013). Lithics in some of the Acheulean deposits, but also in MSA levels, display a shiny silica skin. At Kathu Townlands an outcropping of banded ironstone that covers a large area of around 25 km contains enormous quantities of flaked items. This phenomenon is ascribed to the use of the high-grade bedrock jasper and ironstone as a source for raw materials and is supported by the high incidence of handaxe roughouts (Beaumont 2004). The prepared core technique was used to produce the spectacular small handaxes, long blades, convergent flakes/points and scrapers found in Fauresmith collections. MSA tools were also recovered from the Kathu localities (Beaumont 2004). Surface sites around Kathu exhibit a palimpsest of prehistoric utilization and may contain lithics from all periods in the Stone Age succession.

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

Iron Age

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

Historic period

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

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

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

The site was visited on 23 March 2016. The area was investigated by travelling transects across it, giving special attention to features such as hills, outcrops and clumps of trees – refer to figure 16 below.

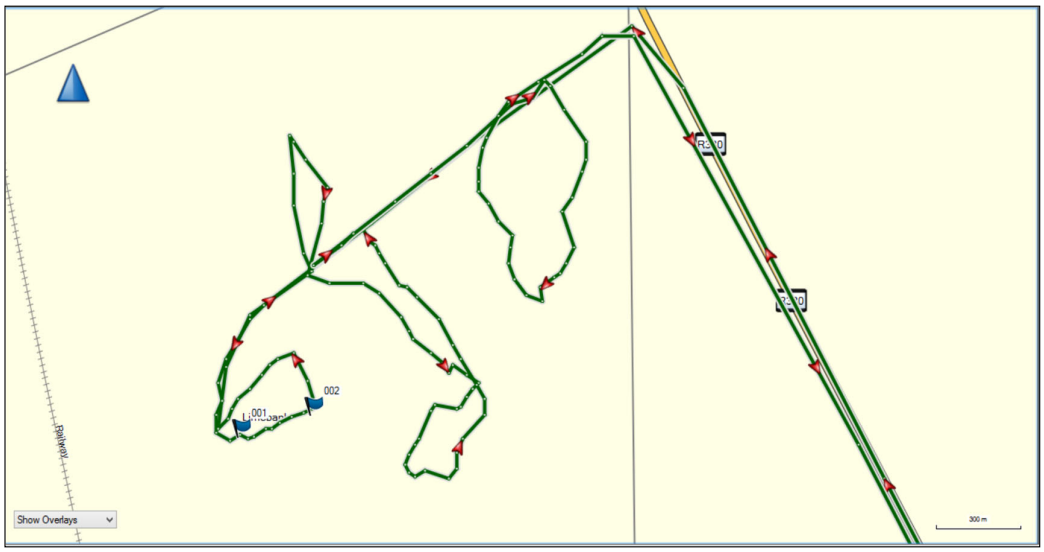

Figure 16: Map indicating the track log of the field survey

Two heritage resources were identified by the Heritage Impact Assessment (attached as Appendix D6) in the project area (refer to Figure 17 for the location of the heritage objects),

however these sites are only relevant to the PV facility since it is located outside the footprint of the proposed power line corridor. 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.

Palaeontology

The Palaeontological Impact Assessment conducted in 2016 (refer to Appendix D8) indicates that the proposed development footprint, including the location of the proposed power line corridor, is underlain by well-developed Kalahari Group surface limestones (Tl), 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 paleontologically 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 power line is largely dependent on technical and environmental factors such as topography of the site, access to the grid and capacity of the grid.

The Remaining Extent of Portion 1 of the farm Limebank No. 471, where the project is proposed to be located is considered favourable and suitable from a technical perspective due to the following characteristics:

- 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 an identified corridor towards the Ferrum–Fox 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. 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.

It is evident from the discussion above that Remaining Extent of Portion 1 of the farm Limebank No. 471 may be considered favourable and suitable in terms of these site characteristics. The challenge was therefore to compare the preferred location for the power line (Ferrum–Fox 132kV power line) with the original approved location (Ferrum-Umtu 132Kv power line). Since the environmental features of the two sites are similar, the Ferrum–Fox 132kV power line is preferred simply due to the fact that the route is shorter and since it is preferred by Eskom and the developer. No site selection matrix was therefore required to compare the site.

5.5 CONCLUDING STATEMENT ON ALTERNATIVES

When considering the information provided by the specialists with regards to the site selection criteria and the comparison, the preferred site emerged as preferred due to the fact that the proposed new power line route is shorter and preferred by Eskom and the developer.

In conclusion the preferred alternative entails the development of the 150m Loop-in-Loop-out power line on an identified corridor on the Remaining Extent of Portion 1 of the farm Limebank No. 471.The preferred layout of the power line route on the Remaining Extent of Portion 1 of the farm Limebank No. 471 is indicated in the attached layout plan. It may be concluded that this is the only location that was assessed in further detail.

6 DESCRIPTION OF THE IMPACTS AND RISKS

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

Appendix 1. (3)(i) An BAR (...) must include-

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

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

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

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

(i) cumulative impacts;

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

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

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

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

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

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

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

6.1 SCOPING METHODOLOGY

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

- Checklist (see section 6.1.1): The checklist consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts.

- Matrix (see section 6.1.2): The matrix analysis provides a holistic indication of the relationship and interaction between the various activities, development phases and the impact thereof on the environment. The method aims at providing a first order cause and effect relationship between the environment and the proposed activity. The matrix is designed to indicate the relationship between the different stressors and receptors which leads to specific impacts. The matrix also indicates the specialist studies that have been conducted to address the potentially most significant impacts.

6.1.1 Checklist analysis

The independent consultant conducted a site visit on 20 November 2020. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the study area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

Table 6.1: Environmental checklist

QUESTION	YES	NO	Un-sure	Description
1. Are any of the following located on the site earmarked for the development?				
I. A river, stream, dam or wetland		×		None.
II. A conservation or open space area		×		None.
III. An area that is of cultural importance		×		None.
IV. Site of geological significance		×		None.
V. Areas of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. Floodplain		×		None.
VIII. Indigenous forest		×		None.
IX. Grass land		×		None.
X. Bird nesting sites		×		None.
XI. Red data species	×			*Boscia albitrunca and Vachellia erioloba.*listed by Raimondo et al (2009) in the South African Red Data list as Declining species were recorded in the area.
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 relocation of the 132kV power line and will still have a medium negative impact during construction, operations and decommissioning.
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 SPP project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.		×		None.
VIII. Job creation		×		Approximately 453 employment opportunities will be created during the construction and operational phases for the SPP.
IX. Traffic generation		×		It is estimated that 64 trips per day will be generated over the 12 Month construction period for the SPP.
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. An indication is provided of the specialist studies which were conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

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

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

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

Table 6.2: Matrix analysis

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

Low significance	Medium significance	High significance	Positive impact

LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS			SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
			Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk	
CONSTRUCTION PHASE															
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."*	Site clearing and preparation The proposed 132kV power line will connect to the Ferrum-Fox power line. Power line tower footprints will need to be cleared of vegetation and some areas may need to be levelled. Civil works The main civil works are: • Tower pegging • Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat. • Construction of foundations for pylons. • Assembly and erection of towers. • Stringing of conductors.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of faunal and floral species of conservation significance. • Loss of indigenous faunal and floral species diversity. • Loss or fragmentation of habitats for faunal and floral species.		-	P	L	D	I	M	Yes	- Site clearing must take place in a phased manner, as and when required. - The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be confined to the fenced off area and minimised where possible. - No trapping or snaring to fauna on the construction site should be allowed.	L	Ecological Fauna and Flora Habitat Survey
			Air	• Air pollution due to construction activities and the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.	L	-
			Soil	• Loss of topsoil in disturbed areas, causing a decline in soil fertility.		-	S	S	Pr	PR	M	Yes	- Areas which are not to be constructed on within two months must not be	M	Agricultural and Soils Impact Assessment

				• Soil erosion caused by alteration of the surface characteristics.								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.		
			Geology	• Collapsible soil. • Seepage • Active soil (high soil heave). • Erodible soil. • Hard/compact geology. If the bedrock occurs close to surface it may present problems. • The presence of undermined ground. • Instability due to soluble rock. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.		-	S	S	Pr	CR	NL	Yes	- The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. - If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. - Retention of vegetation where possible to avoid soil erosion.	L	Geotechnical Study
			Existing services infrastructure	• Generation of waste that needs to be accommodated at a licensed landfill site. • Generation of sewage that needs to be accommodated by the local sewage plant.	-		L	S	D	CR	NL	Yes	-	L	Confirmation from the Local Municipality

				• Increase in construction vehicles on existing roads.											
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion.	-		L	S	Po	PR	ML	Yes	- Any hazardous substances must be stored at least 200m from any of the water bodies on site.	M	-
		SOCIAL/ECONOMIC ENVIRONMENT	Local unemployment rate	• Job creation. • Business opportunities. • Skills development.		+	P	S	D	I	N/A	Yes	- Where reasonable and practical, Boitshoko's service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.	L	Social Impact Assessment
			Visual landscape	• Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility.	-		L	S	D	CR	NL	Yes	An Environmental Control Officer should be appointed during the construction and decommissioning phase to oversee environmental compliance. • Dust suppression should be implemented during construction especially near roads where dust may cause reduced visibility. Due to a scarcity of water in the region, contractors should source alternative ways to implement dust suppression. One such way could be the use of fine gravel stone on roads with heavy traffic. • Implement good housekeeping.	L	Visual Impact Assessment
			Traffic volumes	• Increase in construction vehicles.	-		P	S	Pr	CR	NL	Yes	The development may commence without influencing the levels-of-service for the local road	L	Traffic Impact Assessment

													network. However, some remedial work is recommended on the gravel road leading to the site. Remedial work on the road network should take place before the construction phase starts.		
			Health & Safety	• Air/dust pollution. • Road safety. • Impacts associated with the presence of construction workers on site and in the area. • Influx of job seekers to the area. • Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site. • Increased risk of veld fires.		-	L	S	Pr	PR	ML	Yes	- Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. - It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site. - Also refer to the mitigation measures listed in the Social Impact Assessment (attached as Appendix D7).	M	Social Impact Assessment
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	-

			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	• No potential cultural or heritage resources were identified on or around the site.	-		S	S	Po	BR	NL	Yes	- Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.	L	Heritage Impact Assessment & Palaeontological Heritage Assessment
OPERATIONAL PHASE															
	<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 has been approved to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Boitshoko Solar Power Plant has received a cost estimate letter from Eskom, it stated that generation from the facility will tie in with the Ferrum -Fox 132kv power line. The Project will inject up to 100MW into the Substation. The installed capacity will be up to approximately 150MW.	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of faunal and floral species of conservation significance. • Loss of indigenous faunal and floral species diversity. • Loss or fragmentation of habitats for faunal and floral species. • Collision with the power line infrastructure by collision-prone birds. •		-	P	L	Po	PR	ML	Yes	- 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. - All new transmission lines should be be marked with bird diverters, as they go up. The priority areas - those with the highest mortality rate - should be considered first. - Also refer to the mitigation measures	M	Ecological Fauna and Flora Habitat Survey & Avifaunal Study

													listed in the Ecological Fauna and Flora Habitat Survey & Avifaunal Study.		
			Air quality	• The proposed development will not result in any air pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Soil	• Loss of agricultural land use caused by direct occupation of land. • Soil Erosion caused by alteration of the surface characteristics •		-	L	L	D	PR	SL	Yes	- An effective system of run-off control should be implemented, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion. - Another important measure is to avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads. - Also refer to the mitigation measures listed in the Agricultural and Soils Impact Assessment (attached as Appendix D5).	M	Agricultural and Soils Impact Assessment
			Geology	• 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. • Steep slopes or areas of unstable natural slopes. • Areas subject to seismic activity. • Areas subject to flooding.	-		S	S	Po	PR	ML	Yes	- Surface drainage should be provided to prevent water ponding. - Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	L	Geotechnical Study

			Surface water	• Increase in storm water runoff. The development will potentially result in an increase in storm water run-off that needs to be managed to prevent soil erosion.	-		L	S	U	PR	NL	Yes	- 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	-
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	• Potential visual impact on residents of farmsteads and travellers in close proximity to proposed facility.		-	L	L	D	PR	ML	Yes	- Due to the height of the power line and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the power line, but the subjectivity towards the the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy.	M	Visual Impact Assessment
			Traffic volumes	• The proposed development will not result in any traffic impacts during the operational phase.	-		L	L	Po	CR	NL	Yes	-	L	-
			Health & Safety	• The proposed development will not result in any health and safety impacts during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Noise levels	• The proposed development will not result in any noise pollution during the operational phase.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Tourism industry	• Enhance tourism in the area. The facility may become an attraction or a landmark within	+		P	L	Po	I	N/A	Yes	-	N/A	-

				the region that people would want to come and see.											
			Heritage resources	• It is not foreseen that the proposed activity will impact on heritage resources or vice versa.	-		S	L	Po	PR	ML	Yes	-	L	-
			Electricity supply	• Generation of additional electricity. The facility will generate electricity that will be fed into the grid.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
			Electrical infrastructure	• Additional electrical infrastructure. The proposed solar facility will add to the existing electrical infrastructure and aid to lessen the reliance of electricity generation from coal-fired power stations.	+		I	L	D	I	N/A	Yes	-	N/A	-
DECOMMISSIONING PHASE															
-	<u>Dismantlement of infrastructure:</u> During the decommissioning phase the Power line dismantled. <u>Rehabilitation of biophysical environment:</u> The biophysical environment will be rehabilitated	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	• Loss of faunal and floral species of conservation significance. • Loss of indigenous faunal and floral species diversity. • Loss or fragmentation of habitats for faunal and floral species.	-		P	L	D	I	M	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion.	N/A	-
			Air quality	• Air pollution due to the increase of traffic of construction vehicles.	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-
			Soil	• Soil degradation, including erosion. • Disturbance of soils and existing land use (soil compaction). • Physical and chemical degradation of the soils by		-	S	S	Pr	PR	M	Yes	- Re-vegetation of affected areas must be made a priority to avoid erosion. - Mitigation measures for the construction phase will apply	M	Agricultural and Soils Impact Assessment

				construction vehicles (hydrocarbon spills).											
			Geology	• It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Existing services infrastructure	• Generation of waste that need to be accommodated at a licensed landfill site. • Generation of sewage that need to be accommodated by the municipal sewerage system and the local sewage plant. • Increase in construction vehicles.		-	L	S	D	I	NL	Yes	-	L	-
			Ground water	• Pollution due to construction vehicles.	-		S	S	Pr	CR	ML	Yes	-	L	-
			Surface water	• Increase in storm water run-off. • Pollution of water sources due to soil erosion.	-		L	S	Po	PR	ML	Yes	- Removal of any historically contaminated soil as hazardous waste. - Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. - Removal of all substances which can result in groundwater (or surface water) contamination.	M	-
		SOCIAL/ECONOMIC ENVIRONMENT	Visual landscape	• Potential visual impact on visual receptors in close proximity to proposed facility.	-		L	S	D	CR	NL	Yes	- Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas.	L	Visual Impact Assessment
			Traffic volumes	• Increase in construction vehicles.	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of	L	Traffic Impact Assessment

													heavy construction vehicles through residential areas should not take place over weekends.		
			Health & Safety	• Air/dust pollution. • Road safety. • Increased crime levels. The presence of construction workers on the site may increase security risks associated with an increase in crime levels as a result of influx of people in the rural area.	-		L	S	Pr	PR	ML	Yes	- Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. - Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. - Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.	L	-
			Noise levels	• The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.	-		L	S	D	CR	NL	Yes	- The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	-
			Tourism industry	• Since there are no tourism facilities in close proximity to the site, the decommissioning activities will not have an impact on tourism in the area.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

			Heritage resources	• It is not foreseen that the decommissioning phase will impact on any heritage resources.		-	S	S	Pr	PR	ML	Yes	-	L	Heritage & Palaeontological Impact Assessment

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

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

6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which were addressed in more detail in the BA report – refer to the significance assessment attached as appendix E2 to the 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."*

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. Table 6.3 summarises the potentially most significant impacts and the mitigation measures that are proposed during the construction phase.

Table 6.3: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Geotechnical Study	Impacts of the geology on the proposed development.	Negative Low	Negative Low	• Foundations for mounting structures will need to be erected through the hardpan carbonate layer. No other mitigation measures are suggested. The mitigation measures in the generic EMPr for overhead electricity transmission and distribution infrastructure as per GNR 435 will suffice.
Ecological Fauna and Flora Habitat Survey	Loss of habitat for faunal and floral species	Negative Low	Negative Low	• Injudicious and unnecessary destruction of natural vegetation, other than the footprint area of the proposed development, must be avoided at all cost. • Water control structures should be constructed and well maintained to create a favourable habitat for the establishment of vegetation. • Soil that can serve as a growth medium for plants must be stripped and stockpiled for future landscaping and/or rehabilitation. • Special attention should be paid to alien and invasive control within these areas. Alien and invasive vegetation control should take place throughout all development and decommissioning phases to prevent loss of floral habitat. • Vehicles should be well maintained to prevent oil and other chemically based materials to enter the area. Refuelling points should be well managed and if any soils are contaminated, it should be stripped and disposed of at a registered hazardous waste dumping site.
	Loss of indigenous faunal and floral species diversity.	Negative Medium	Negative Low	• An alien vegetation control plan has to be implemented in order to manage alien plant species occurring within the developed and surrounding area.

				• Removal of the alien and weed species encountered on the property must take place in order to comply with existing legislation Removal of species should take place throughout the construction, operational, closure/ decommissioning and rehabilitation/maintenance phases. • Care should be taken with the choice of herbicides to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicides used. • Landscaping with local indigenous species is preferable and could include forage and host plants required by pollinators. • After the construction phase, reseeding of local indigenous plant species should be done.
	Loss of faunal and floral species of conservation significance	Negative Low	Negative Low	• Populations of species of conservation significance (ToPS, Red Data Listed species, protected species (nationally and/or provincially), plant species with medicinal or other cultural value) occurring outside the areas that will be directly impacted by the proposed development needs to be actively conserved in order to conserve a viable, non-fragmented gene pool of these species in the local area. • Any specimens of protected plant species known to occur in the vicinity of the development footprint and may potentially be impacted by the development activities are to be fenced off for the duration of the activity.
Avifaunal Study	Direct collision with the power line network.	Negative Low	Negative Low	• Bird diverters should be added to all new lines and motivate Eskom to mark all existing lines that are killing substantial numbers of birds, such that collision-prone species more readily detect and avoid contact. • Pylons should be staggered where lines can be positioned adjacent to existing lines – this will make both more visible.

Visual Impact Assessment	Visual intrusion.	Negative Low	Negative Low	• Contractors must avoid using roads not relevant to the project and new road construction must be avoided if possible. • Good housekeeping should be implemented & proper rehabilitation of disturbed areas after construction.
Agricultural and Soils Impact Assessment	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
Heritage Impact Assessment	Impacts on heritage objects	Negative Low	Negative Low	• 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.
Social Impact Assessment	Creation of local employment and business opportunities, skills development and training	Positive Low	Positive Medium	• Strategies need to be identified by the local municipality and the business sectors in order to maximise the potential benefits associated with the establishment of the Boitshoko SPP. • Efforts should be made to employ local contractors first and contractors that are compliant with the Broad Based Black Economic Empowerment (BBBEE) criteria. • Gender equality should also be promoted. If possible, a training and skills development programme for the local workers should be initiated prior to the construction phase.
	Technical support to local farmers and municipalities	Negative Low	Positive Medium	• Private consultation sessions with local farmers can be held to inform them about the installation of solar energy facilities, the benefits thereof, the process and costs.

				• Workshops can also be held for the local farmers as well as the local municipality to also advise them regarding the installation of SPPs and the process and costs thereof.
	Potential loss of productive farmland	Negative High	Negative Low	• The Boitshoko SPP need to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. Livestock grazing on the proposed site need to be relocated.
	In-migration or influx of job seekers.	Negative Medium	Negative Low	• A policy that no employment will be available at the gate should be implemented. Job seekers from the local community should be employed first.
	Presence of construction workers on the local communities	Negative Medium	Negative Low	• The proposed site of the Boitshoko SPP should be fenced off and the movement of construction workers should be limited to the vicinity of the site. • Transportation for the construction workers need to be arranged by the contractor to ensure that there will be no trespassing of properties by any staff. Necessary arrangements to enable workers to return to their hometowns over weekends should also be arranged in order to reduce the risks posed to local family structures and social networks. No staff should be accommodated overnight on site, except for security staff. Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses. This code of conduct should also outline the acceptable behaviour an activities of construction workers.
	Heavy vehicles and construction activities	Negative Low	Negative Low	• With regards to all safety measures, the drivers of the vehicles must be qualified and all vehicles must be road worthy.

				• Drivers should also be made aware of the strict speed limits on and off site and the potential road safety issues on site. • The contractor must repair any damages to the gravel roads on the site, during the construction phase, and any cost with regards to the repair of the roads must be borne by the contractor.
	Risk to safety, livestock and farm infrastructure.	Negative Low	Negative Low	• The proposed site of the Boitshoko SPP should be fenced off and the movement of construction workers should be limited to the vicinity of the site. • Contractors need to ensure that all workers sign a code of conduct before the construction phase starts, which are drawn up in accordance with the South African labour legislation. By doing this, workers will be legally informed of the associated risks on the property and that they would be held liable for any damages or losses. • Any form of theft, damaged infrastructure and trespassing will lead to immediate dismissal and the workers would be held liable for the costs thereof.
	Increased risk of veld fires.	Negative Medium	Negative Low	• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. • Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in fire-fighting and how to use the fire-fighting equipment. • The contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas.

				• Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly.
Other	Temporary noise disturbance.	Negative Low	Negative Low	• Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.
	Generation of waste - general waste, construction waste, sewage and grey water.	Negative Medium	Negative Low	• The Contractor shall install mobile chemical toilets on the site. • Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. • Ablution facilities shall be within 30m from workplaces. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). • Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. • Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. • Construction methods and materials should be carefully considered in view of waste reduction, re-use and recycling opportunities. • Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control.

				• Adequate weather and vermin proof waste bins and skips should be placed on site. Separate bins should be provided for general and hazardous waste. • Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. • Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. • The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. • A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. • If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. • Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. • Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. • All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours.

				• Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. • A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. • Under no circumstances may solid waste be burnt on site. • All waste must be removed promptly to ensure that it does not attract vermin or produce odours.

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. Table 6.4 summarised the negative impacts are generally associated with the power line, which include 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.

Table 6.4: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Avifaunal	Impact mortality on transmission line for the Red-listed bird groups identified as at risk	Negative Low	Negative Low	• All new transmission lines should be marked with bird diverters, as they go up. The priority areas - those with the highest mortality rate - should be considered first.
Visual Impact Assessment	Visual intrusion	Negative Medium	Negative Medium	• Good housekeeping should be implemented. • Risk assessments relating to fire hazards, "No Smoking" signs and the implementation of smoking areas. • Proper fire-fighting equipment should be available on site. Not only fire extinguishers but also equipment like a water truck which can store large amounts of water.
Agricultural and Soils Impact Assessment	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
Social Impact Assessment	Local employment and business opportunities, skills development and training	Positive Low	Positive Medium	• If possible, a training and skills development programme for the local workers should be initiated prior to the operational phase.

	Potential loss of productive farmland	Negative Low	Negative Low	• Establish a rehabilitation fund. This fund can be utilised for the rehabilitation of the proposed Boitshoko SPP in the decommissioning phase.
	Establishment of a Community Trust	Positive Low	Positive Medium	• Potential trustees to sit on the Community Trust need to be identified with the assistance of the local municipality. • Strict financial management controls need to be in place in order to manage the funds generated for the Community Trust from the proposed Boitshoko SPP. Financial managements controls also include an annual audit. • The criteria for identifying and the funding of community projects should be clear in order to optimally benefit the local community.
	Change in the sense of place	Negative Low / Positive Low	Negative Low / Positive Low	• Due to the height of the power line and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the power line, but the subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy.
	Development of infrastructure for the generation of clean, renewable energy	Positive Medium	Positive Medium	• Training and skills development programmes need to be implemented for the locals for the at least the first 5 years of the operational phase in order to maximise the number of locals employed during this phase.

				• Utilise the proposed Boitshoko SPP to promote and increase South Africa's contributions of renewable energy to the national energy supply grid.

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. Table 6.5 provides a summary of the impacts during the decommissioning phase. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, 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.

Table 6.5: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecological Fauna and Flora Habitat Survey	Loss of habitat for faunal and floral species	Negative Low	Negative Low	• To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and storm water diversion away from areas susceptible to erosion. • Water control structures should be constructed and well maintained to minimize erosion and to create a favorable habitat for the establishment of vegetation. • Alien and invasive vegetation control should take place to prevent loss of floral habitat. • 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 decommissioning footprint. • Vehicles should be well maintained to prevent oil and other chemically based materials to enter the area. Refueling points should be well managed and if any soils are contaminated, it should be stripped and disposed of at a registered hazardous waste dumping site. • Reseeding of indigenous grasses should be done to re-establish microclimates and niche habitats. • Upon decommissioning, all fencing should be removed to re-establish landscape connectivity.
	Loss of indigenous faunal and floral species diversity.	Negative Medium	Negative Low	• Removal of the alien and weed species encountered on the property must take place. • Care should be taken with the choice of herbicides to ensure that no additional impact and loss of indigenous plant species occurs due to

				the herbicides used. Proper training should be given to contractors/applicators to avoid spraying indigenous vegetation. • Landscaping with local indigenous species is preferable and could include forage and host plants required by pollinators. • Reseeding of local indigenous plant species should be done in between the developed infrastructure and all affected areas to re-establish plant species diversity, which in turn will create habitat for the return of faunal species, especially small mammals and invertebrates. • To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and storm water diversion away from areas susceptible to erosion. Water control structures should be constructed and well maintained to minimize erosion and to create a favorable habitat for the establishment of vegetation.
	Loss of faunal and floral species of conservation significance	Negative Low	Negative Low	• Any specimens of protected plant species known to occur in the vicinity of the development footprint and may potentially be impacted by the development activities, are to be fenced off for the duration of the activity. • If these species fall within the development footprint special • authorization is to be obtained from relevant conservation authorities for such species to be cut, disturbed, damaged or destroyed.
Agricultural and Soils Impact Assessment	Soil erosion	Negative Low	Negative Low	• There are no additional mitigation measures required, over and above what has already been included in the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
Other	Generation of waste	Negative Medium	Negative Low	• All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept.

6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- A Geotechnical Assessment – conducted by Johann Lanz (see Appendix D1).
- Ecological Habitat Fauna and Flora Study – Environmental Research Consulting (see Appendix D2).
- Avifaunal Study – Birds & Bats Unlimited (see Appendix D3).
- A Visual impact assessment - conducted by Phala Environmental Consultants (Pty) Ltd. (see Appendix D4).
- Agricultural and Soils Assessment – conducted by Johann Lanz (see Appendix D5).
- A Heritage Impact Assessment - conducted by Mr. J.A. van Schalkwyk (see Appendix D6).
- Social Impact Assessment - conducted by Phala Environmental Consultants (Pty) Ltd. (see Appendix D7).
- Traffic Study – conducted by BVi Consulting Engineers (see Appendix D9).
- A detailed assessment of the cumulative impacts associated with the proposed development – conducted by the lead consultant, Environamics in conjunction with the project specialists (refer to Section 7 of this report).

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

6.3.1 Issue 1: Geotechnical suitability

The geotechnical suitability for the SPP site was determined in 2016. The main question had to be addressed was:

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

According to the Geotechnical Study (Appendix D1) the entire site is probably underlain by shallow, hardpan carbonate that varies between 0 and 40cm below surface. It is likely to vary in thickness between about 20 and 80cm. There is a thin covering (0-40cm) of unconsolidated, sandy soil above the hardpan. The foundations for mounting structures will need to be erected through the hardpan carbonate layer.

None of the following occur on the site:

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

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

6.3.2 Issue 2: Heritage and archaeological impacts

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

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

The Heritage Impact Assessment (Refer to Appendix D6) confirmed the following:

The aim of this survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the areas of the proposed development, to assess the significance thereof and to consider alternatives and plans for the mitigation of any adverse impacts.

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/5m^2. This feature is viewed to have low significance on a local level and based on current understanding of the proposed development, this site is located outside the development area and would not be impacted by the solar plant development. Therefore, no further action is required.

A single informal burial site with at least five graves was identified. As it is located inside the SPP area it is anticipated that it eventually would be impacted on by the solar plant development.

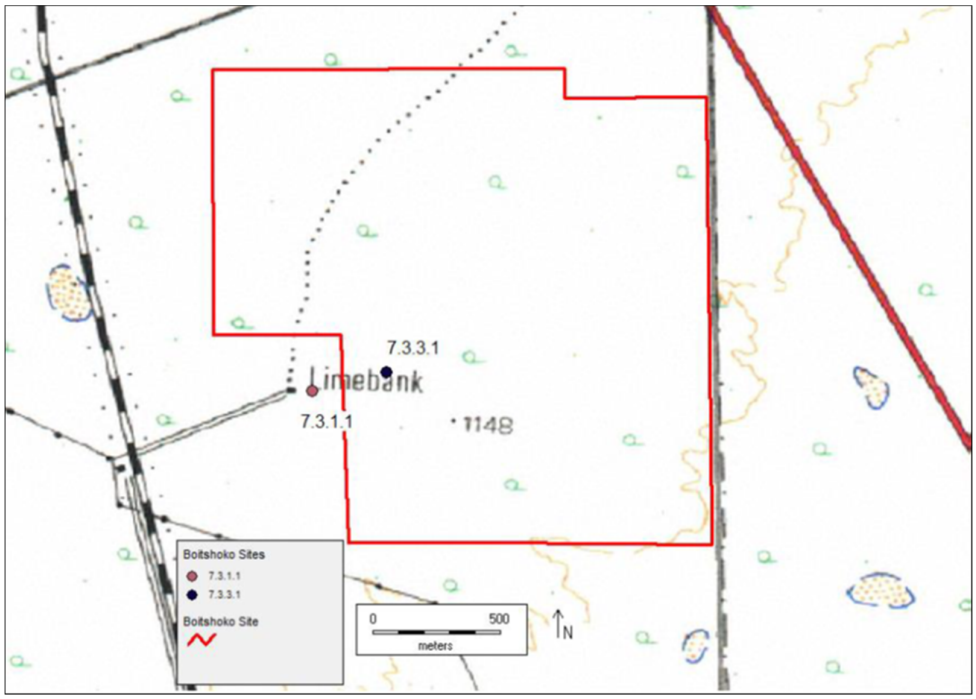

Figure 17: Location of the identified sites

From a heritage point of view, it is recommended that the proposed development be allowed to continue.

6.3.3 Issue 3: Ecological Impacts

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

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

The fauna and flora ecological study (refer to Appendix D2) confirmed that: The impacts associated with the newly proposed power line are considered to be relatively low since the actual footprints of disturbance of the power lines should be confined to the pylon bases. None the less, three expected impacts on the biodiversity and general habitat ecology within the study area were assessed. The low faunal and moderately high floristic species richness and density recorded would equate to a low impact to the regional biodiversity. Although the number of protected faunal species possibly occurring on or in close proximity to the site is low, these deserve consideration. When considering the area that was investigated during this study it is concluded that the site is suitable for the proposed development of a 110 m power line corridor extending northwards of the previously studied area for the proposed Boitshoko SPP.

6.3.4 Issue 4: Avifaunal Impacts

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

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

According to the Avifaunal Study (Appendix D3) concluded that the possible impacts are: (i) collision with the power lines (ii) disturbance by construction and maintenance activities, (iii) displacement through habitat removal and construction work and (iv) electrocution on the power line network. The

study concluded that is the mitigation measures are followed to minimize impacts to the threatened raptors, then we can recommend that this grid connection from solar site development to the Ferrum-Fox transmission lines can go ahead. When post-construction monitoring of the solar farm occurs, we suggest that the grid connection be surveyed by foot to determine any avian fatalities.

6.3.5 Issue 5: Visual Impacts

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

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

The Visual Impact Assessment (Refer to Appendix D4) concluded that the significance of the visual impact will remain a "Negative Medium Impact". The only receptors likely to be impacted by the proposed development are: Sishen Airport; R380 Regional Road; Sishen Iron Ore Mine Falls; Mine's Railway Line; Nearby Farmsteads; and the Diesel Depot.

Due to the height of the power lines (32m) and extent of the project, no viable mitigation measures can be implemented to eliminate the visual impact of the power lines. In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance although rural areas are clearly defined particularly from a distance and it is assumed that the majority of people would prefer rural views over views of heavy industrial development.

It is believed that renewable energy resources are essential to the environmental well- being of the country and planet (WESSA, 2012). Aesthetic issues are subjective, and some people find solar farms and their associated infrastructure pleasant and optimistic while others may find it visually invasive; it is mostly perceived as symbols of energy independence; and local prosperity.

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 (Power Plant and associated power line) will be insignificant and is suggested that the development commence, from a visual impact point of view. It is therefore Phala Environmental's recommendation that the EA be approved.

6.3.6 Issue 6: Agricultural / impacts on the soil

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

> *"To what extent will the proposed development compromise (negative impacts) or enhance (positive impacts) current and/or potential future agricultural production?"*

For agricultural impacts, the exact nature of the different infrastructure within a development has very little bearing on the significance of impacts. What is of most relevance is simply the occupation of the land, and whether it is being occupied by a pylon base or a substation makes no difference. What is of most relevance therefore is simply the total footprint of the facility.

According to the agricultural and Soils Impact Assessment (refer to Appendix D5) electrical grid infrastructure has negligible agricultural impact in this study area for two reasons:

1. Overhead transmission lines have no agricultural impact because all agricultural activities that are viable in this environment (grazing) can continue completely unhindered underneath transmission lines.

2. The direct, permanent, physical footprint of the development that has any potential to interfere with agriculture, is restricted to pylon bases and a small substation that, in the context of the agricultural environment of low density grazing on farms which are typically thousands of hectares large, is entirely insignificant.

The only possible source of impact is minimal disturbance to the land during construction and decommissioning. The single agricultural impact is therefore minimal soil and land degradation (erosion and topsoil loss) as a result of land disturbance. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during excavations. Soil degradation will reduce the ability of the soil to support vegetation growth. This is a direct, negative impact that applies to only two of the phases of the development (construction and decommissioning).

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site. The proposed development is therefore acceptable. This is substantiated by the following points:

- The proposed development is on land of very low agricultural potential.
- The amount of agricultural land loss is completely insignificant within the agricultural context.
- The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by mitigation management actions. In addition, the degradation risk is only to land of low agricultural value, and the significance of the impact is therefore low.

Therefore, from an agricultural impact point of view, it is recommended that the development be approved.

6.3.7 Issue 7: Socio-economic impacts

A Social Impact Assessment has been compiled in order to provide a description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed facility; to provide a description and assessment of the potential social issues associated with the proposed facility; and the identification of enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts (refer to Appendix D7). The main question which needs to be addressed is:

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

The findings of the SIA (Refer to Appendix D7) indicate that during the construction and the operational phase of the proposed development project, various employment opportunities, with different levels of skills will be created. In addition, this will also create local business opportunities benefitting the socio-economic development of the local community.

The challenges posed by climate change and global warming will be addressed by the investment in renewable energy facilities and associated infrastructure like the proposed power line. The establishment of the proposed power line will create a positive social benefit for society.

6.3.8 Issue 9: Paleontological Impacts

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person

may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. The main question which needs to be addressed is:

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

According to the Palaeontological Impact Assessment (Appendix D8) the proposed development footprint, including both the preferred and one alternative site is underlain by well-developed Kalahari Group surface limestones, 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 paleontologically significant karst features were identified within the boundaries of the Boitshoko SPP footprint and associated transmission line.

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

6.3.9 Issue 10: Traffic Impacts

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

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

According to the Traffic Impact Assessment (Appendix D9) the impact of the construction traffic for the SPP 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 Cape Town or Durban 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 Provincial Route 380 which will trigger the involvement of the Provincial Government and their approval for the construction of a new access and adequate traffic accommodation signage must be erected and maintained on either side of the access on R380 throughout the construction period.

The development of a solar farm and its associated infrastructure on Portion 1 of the farm Limebank 471 in the Northern Cape Province is therefore supported from a traffic engineering perspective.

6.4 METHOD OF ENVIRONMENTAL ASSESSMENT

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

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 6.6.

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

6.4.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

Table 6.6: The rating system

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

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

REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

7 CUMULATIVE EFFECTS ASSESSMENT

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

Appendix 1. (3)(i) An BAR (...) must include-

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

7.1 INTRODUCTION

The EIA Regulations (as amended in 2017) 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 Basic Assessment 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. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

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

7.2 GEOGRAPHIC AREA OF EVALUATION

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to figure 18 below.

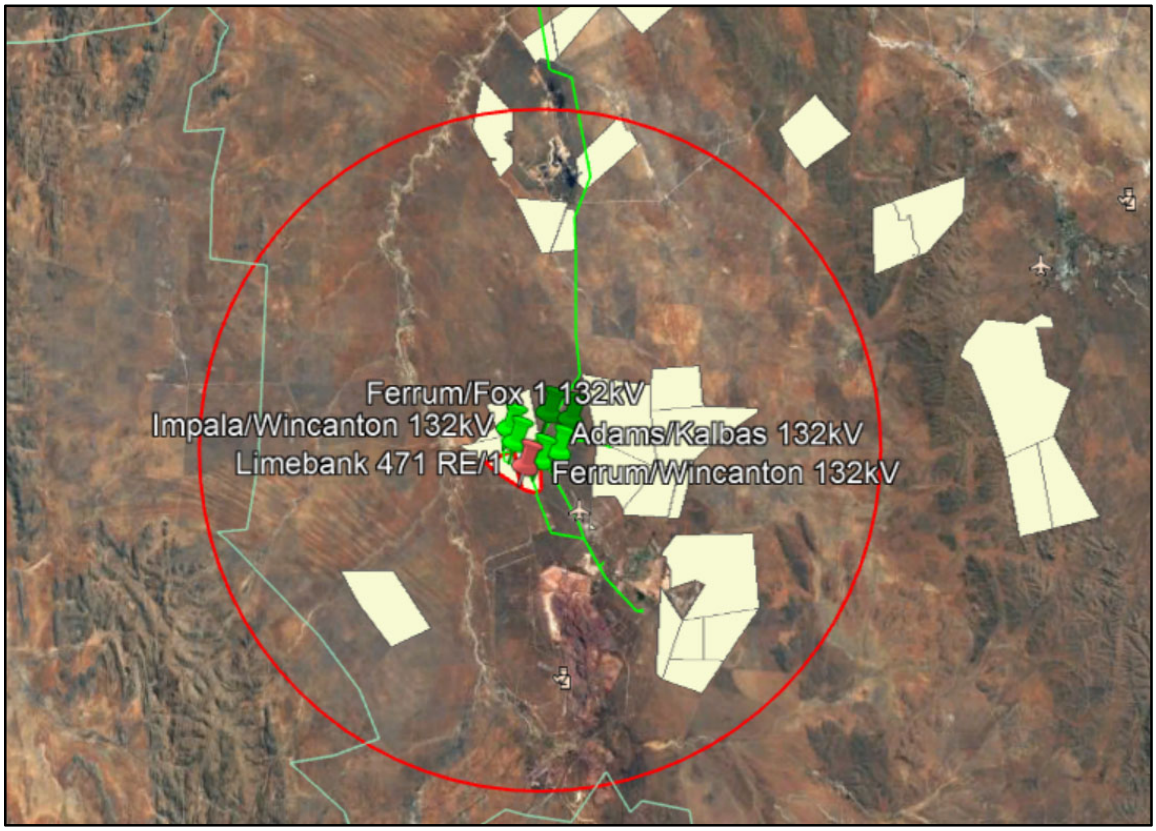

Figure 18: Geographic area of evaluation with utility-scale renewable energy generation sites and power lines

The geographic spread of PV solar projects, administrative boundaries and any environmental features (the nature of the landscape) were considered when determining the geographic area of investigation. It was argued that a radius of 30km would generally confine the potential for cumulative effects within this particular environmental landscape. The geographic area includes projects located within the Northern Cape Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socioeconomic cumulative analysis may include a larger area, as the construction workforce may draw from a much wider area. The geographic area of analysis is specified in the discussion of the cumulative impacts for that resource where it differs from the general area of evaluation described above.

7.3 TEMPORAL BOUNDARY OF EVALUATION

A temporal boundary is the timeframe during which the cumulative effects are reasonably expected to occur. The temporal parameters for this cumulative effects analysis are the anticipated lifespan of the Proposed Project, beginning in 2022 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

The following section provides details on existing and project being proposed in the geographical area of evaluation.

7.4.1 Existing projects in the area

The area within which the proposed power line corridor is proposed is characterised by existing Eskom transmission and distribution infrastructure and solar power facilities. Six (6) power lines surround the proposed site and according to the DEFF's database twelve (12) solar PV plant applications have been submitted to the Department within the geographic area of investigation – refer to table 7.1 and figure 18 and 19.

Power lines:

1. The Ferrum/Fox 1 132kV overhead power line.
2. The Ferrum/Wincanton 132kV overhead power line.
3. The Impala/Fox 132kV overhead power line.
4. The Fox/Umtu 132kV overhead power line.
5. The Adams/Kalbas 132kV overhead power line.
6. The Ferrum/Kalbas 132kV overhead power line.

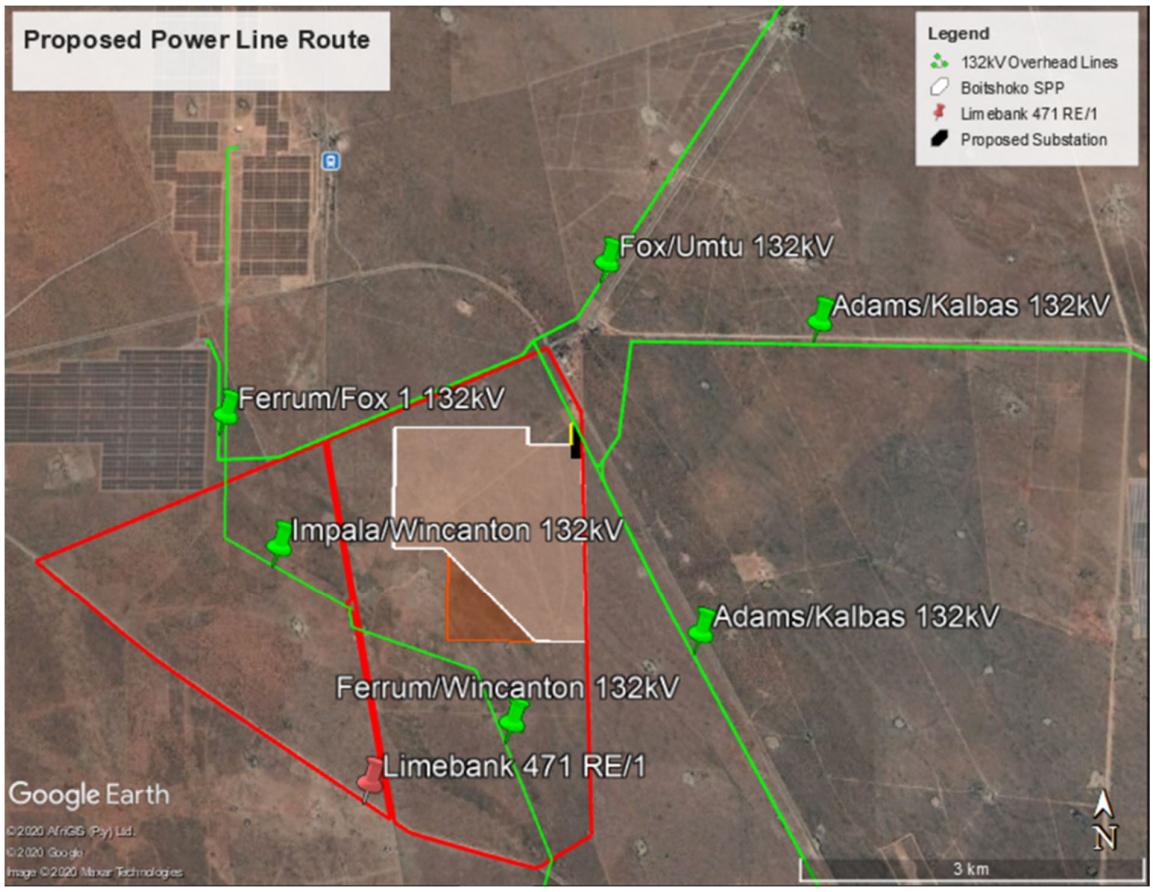

Figure 19: Existing Eskom transmission and distribution power lines

Table 7.1: A summary of related facilities, that may have a cumulative impact, in a 30 km radius of the study area

	APPLICANT	DISTANCE (KM)	MW	DEA REF	PROJECT STATUS
Proposed 25MW Kathu 2 Solar Energy Facility	Lokian Trading & Investments	~10	0	12/12/20/1858	Approved
The 75 MW AEP Mogobe Photovoltaic Solar Facility on portion 1 of the farm Legoko 460 and farm Sekgame 461	AEP Mogobe Solar (Pty) Ltd	~20	75	14/12/16/3/3/2/820	Approved
Proposed Mogara solar and associated infrastructure	Gaetsewe Solar K2018091758 (Pty) Ltd	~20	75	14/12/16/3/3/2/1082	Approved
The 75 MW AEP Legoko Photovoltaic Solar Facility on Portion 2 of the Farm Legoko 460	AEP Lekogo Solar (Pty) Ltd	~20	75	14/12/16/3/3/2/819	Approved
Proposed 75MW AEP Kathu Solar PV Energy Facility on the Remainder of the Farm 460 Legoko	AEP Kathu Solar (Pty) Ltd	~20	75	14/12/16/3/3/2/911	Approved
Proposed construction of solar farm for Bestwood	Kathu Property Developers Pty Ltd	~40	0	12/12/20/1906	Approved
Proposed development of the PV Hyperion solar development 1 near Kathu	Cyraguard (Pty) Ltd	~10	75	14/12/16/3/3/2/1109	Approved
The Proposed Construction of Kalahari Solar Power Project on the Farm Kathu 465	Group Five Construction Pty Ltd	~10	480	12/12/20/1994	Approved
Proposed development of the PV Hyperion solar development 3 near Kathu	Nomispark (Pty) Ltd	~10	75	14/12/16/3/3/2/1111	Approved
Proposed development of the PV Hyperion solar development 4 near Kathu	Nomispan (Pty) Ltd	~20	75	14/12/16/3/3/2/1112	Approved
Proposed renewable energy geneartion project on Portion 1 of the Farm Shirley No. 367, Shirley Solar Park	Danax Energy (Pty) Ltd	~20	75	14/12/16/3/3/2/616	Approved
The Proposed 150mw Adams Photo-Voltaic Solar Energy Facility on the Farm Adams 328 Near Hotazel	Aurora Power Solutions (Pty) Ltd	~20	0	12/12/20/2567/2/AM1	Approved

It is unclear whether other projects not related to renewable energy is or has been or will be constructed in this area. In general, development activity in the area is focused on industrial

development and agriculture. Agriculture in the area is primarily associated with cattle grazing. 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 DEFF mapped the location of all EIA applications submitted within South Africa. According to this database approximately 12 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.

7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

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

7.5.1 Geology

The desk top geotechnical study (refer to Appendix D1) confirmed that based on the available information a fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm. Soils on the site are predominantly of the Coega soil form, with lesser coverage of shallow Plooysburg form. The soils have a generally low water holding capacity and the soils are classified as having low to moderate susceptibility to water erosion, and as highly susceptible to wind erosion. The site should be regarded as suitable for the proposed development and no cumulative impacts are foreseen due to the limited footprint and disturbance associated with power lines.

7.5.2 Soil, Land Capability and Agricultural Potential

The Soil, Land Capability and Agricultural Potential Study (refer to Appendix D5) confirmed that the potential cumulative agricultural impact of importance is a regional loss or degradation of agricultural land, with a consequent decrease in agricultural production. The defining question for assessing the cumulative agricultural impact is this: *What level of loss of agricultural land is acceptable in the area, and will the loss associated with the proposed development, cause that level in the area to be exceeded?*

The projects within a 50km radius will have the same agricultural impacts in an almost identical agricultural environment. The aridity of the area is a significant agricultural constraint that seriously limits the level of agricultural production (including grazing) which is possible across the site. Shallow, sandy soils on underlying carbonate hardpan are a further agricultural limitation. As a result of these limitations, the study area is unsuitable for cultivation and agricultural land use is limited to grazing. The only possible agricultural impact is minimal soil and land degradation (erosion and topsoil loss) as a result of land disturbance during construction and decommissioning.

Overhead transmission lines have no agricultural impact because all agricultural activities that are viable in this environment (grazing) can continue completely unhindered underneath transmission lines. The direct, permanent, physical footprint of the development that has any potential to interfere with agriculture, is restricted to pylon bases and a small substation that, in the context of the agricultural environment of low density grazing on farms which are typically thousands of hectares large, is entirely insignificant.

Because of the negligible agricultural impact of the proposed development in such an agricultural environment, far more electricity grid infrastructure than currently exists, or is currently proposed, can be accommodated before acceptable levels of change are exceeded. Acceptable levels of change in terms of other types of impact, for example visual impact, would be exceeded long before the levels for agricultural impact became an issue. For the above reasons, the cumulative agricultural impact of the proposed development can confidently be assessed as negligible.

7.5.3 Ecology

The Ecological Fauna and Flora Habitat Survey (refer to Appendix D2) confirmed that the 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. 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 impacts associated with the newly proposed power line are considered to be relatively low since the actual footprints of disturbance of the power lines should be confined to the pylon bases. Although there are a number of solar power plants projects in a 30 km radius from the site, the impact of this power line is of such low significance that it will not have a significant cumulative impact on a local or regional scale.

7.5.4 Avifaunal

The cumulative impacts related to avifauna 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 in the avifaunal impact assessment viz: collision, avoidance and displacement. As a starting point, the number of renewable energy developments (proposed and approved and developed) around the region within a 30-km radius of the site needs to be determined, and secondly, to know their impact on avifauna.

The avifauna of the area may be affected by the power line infrastructure of the Solar Power (PV) plant but analysis of the number of birds on site suggests the impact will be minimal, based on two site visits in the wet and dry (spring) seasons in 2016. The low impact of either power line is expected to be minimal because of the very short length of either possibility (150 m -preferred, or 170m – alternate) and the low passage pate of the priority birds (Endangered Martial Eagle). With the use of the recommended mitigation measures the Boitshoko PV solar park and associated infra-structure will have minimal impact on the avifauna of the area, locally or cumulatively.

7.5.5 Social Impact Assessment

The Social Impact Assessment (refer to Appendix D7) indicate that the proposed Boitshoko SPP has the potential to result in a significant positive cumulative impact. The establishment of the proposed SPP coupled with the establishment of a number of proposed renewable energy facilities in the region will have the potential to make a positive socio-economic contribution to the province as well as the Gamagara Local Municipality. Additionally, a positive cumulative impact on the local economy of the

region will include the creation of local employment opportunities, skills and training development opportunities, downstream business opportunities and more movement will also be made toward the use of renewables. The local communities can also socially benefit from the establishment of a Community Trust, providing that is managed effectively.

However, the relevant issues that need to be taken into consideration when it comes to the impacts on rural sense of place is:

- Combined visibility (if two or more renewable energy facilities are visible from one location);
- Sequential visibility (seeing two or more renewable energy facilities along a road or trail);
- The perceived or actual change in the land use across a region;
- The loss of characteristic of the environment; and
- The visual compatibility of renewable energy facilities in the same vicinity.

It is further noted that cumulative impacts need to be considered in relation with dynamic and static viewpoints, and that aesthetic perception regarding the sense of place, are a key determinant of people's attitudes and is subjective of matter.

The potential social impact associated with the establishment of an SPP will have a visual impact on the environment and its surroundings, however the impact on the sense of place is likely to be low. The proposed Boitshoko SPP might slightly be visible from the R380, but the impact hereof on the sense of place is likely to be low. In addition, the transmission lines to the substation is also linked to visual impact and the areas sense of place. However, the potential social impacts associated with the transmission lines will be low. The farmers interviewed for the purpose of this SIA have no objection regarding the potential visual impact of the proposed Boitshoko SPP and the impact on the sense of place, because the site of the SPP is situated out of the public eye, and in general will only economically benefit the community. There is already an established SPP in the area, also contributing to the economy of the local community. The potential negative impact of the proposed development on the areas' sense of place still needs to be considered, because of South Africa's strong attachment to land and the number of SPPs are increasing. The sense of place has already been substantially altered due to a few already established SPP and power line infrastructure (as well as the diesel depot) in the area. Therefore, the new proposed powerline will have an insignificant cumulative impact on the sense of place of the region.

It is evident that there is a considerable number of renewable energy facility applications in this region of the Northern Cape Province. The establishment of such a number of renewable energy facilities may potentially place pressure on local services delivery of the local municipalities. Although the impact is likely to be low, the mitigation measures given below should be addressed to keep this cumulative impact low.

7.5.6 Visual

The Visual Impact Assessment (refer to Appendix D4) confirmed that the construction of the 150MW PV facility and the 132kV evacuation line may increase the cumulative visual impact together with existing electricity infrastructure on the site should any of the other PV facilities be constructed. Dust will be the main factor to take into account.

7.5.7 Heritage

The Heritage Impact Assessment (Refer to Appendix D6) identified a number of stone tools dating to the Fauresmith assemblage and Middle Stone Age on the rim of a small pan-like depression occurring adjacent to the old farmstead. This feature is viewed to have low significance on a local level. Based on current understanding of the proposed development, this site is located outside the development area and would not be impacted on by the power line or solar plant development. A single informal burial site with at least five graves were also identified and has a high significance on a local level. The study concluded that the cultural heritage profile of the larger region is very limited and consists of isolated findspots of Middle Stone Age (MSA) tools, farmsteads and burial sites. Consequently, the cumulative impact of the proposed development is viewed to be low.

7.5.8 Traffic

The traffic impact assessment (refer to Appendix D9) summarised the expected trips generated by the development of the solar plant and power line along with the background traffic on each of the major roadways. The projected trips per day for the scenario that includes six solar developments are deemed to be of no consequence to the LOS of the travelled route from Cape Town to Kuruman or Durban to Kuruman as it does not exceed or even approach the maximum ADT of 8 800vpd.

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 7.2. There have been 22 specific VECs identified with reference to the Solar Project (Table 6.2), which relates to the biophysical and socio-economic environments. Table 7.2 indicates the potential cumulative effects VECs and the rationale for inclusion/exclusion.

Table 7.2: 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.	- Medium

Avifauna	Development of multiple solar energy facilities in this region may have cumulative impacts on birds, this will happen via the same factors identified here viz: collision, avoidance and displacement.	- Low
Loss or fragmentation of habitats	The developments are located in an area with protected plant and tree species as well as Red Data Bird species. Removal of large areas of these habitats may have a significant effect on loss of habitats.	- Medium
Soil erosion	The largest risk factor for soil erosion will be during the construction phase. Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area. The specialist rated the cumulative impact of soil erosion as negligible.	- Low
Impacts of the geology on the proposed development	A fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm.	N/A
Generation of waste	An additional demand for landfill space could result in cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	- Low
Employment opportunities	The community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area.	+ Medium
Visual intrusion	The construction of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming and mining activities and people using the gravel road adjacent to site. Dust will be the main factor to take into account.	- Medium
Increase in construction vehicles	If damage to roads is not repaired, then this will affect the farming and mining activities in the area and result in higher maintenance costs for vehicles of locals and other road users. The costs will be borne by road users who were no responsible for the damage. However, the roads to be used from either	- Negligible

	Durban and Cape Town should be able to accommodate the construction vehicle traffic.	
Impact of construction workers on local communities & influx of job seekers	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	- Medium
Risk to safety, livestock and farm infrastructure	If fire spreads to neighbouring properties, the effects will be compounded. Negligible cumulative effects, provided losses are compensated for.	- Negligible
Increased risks of grass fires	The risk of grass fires can be mitigated and managed.	- Negligible
Operational Phase		
Loss of agricultural land	It is preferable to incur a higher cumulative loss in a region with low agricultural potential, than to lose agricultural land with a higher production potential elsewhere in the country. Because of the very low agricultural potential of the site considered in this report, its contribution to any cumulative impact is low.	- Low
Change in land use	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. The impacts can however be mitigated via relocation of farm workers and disturbed areas can be rehabilitated after the construction phase.	- Low
Visual intrusion	The operation of the 132kV evacuation line may increase the cumulative visual impact together with the existing Eskom power infrastructure, mining in the area and agricultural infrastructure.	- Low

Consumption of water	An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water. However, the power line will not use water during the operational phase.	- Negligible
Generation of additional electricity	The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).	+ Low
Establishment of a community trust	Promotion of social and economic development and improvement in the overall well-being of the community.	+ Medium
Change in the sense of place	The construction of the power line will increase the cumulative change in the sense of place due to industrial type infrastructure that is being proposed and the existing mining infrastructure in the region. Since the area is already largely transformed, the impact will be limited.	- Low
Development of infrastructure for the generation of clean, renewable energy	Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.	+ Medium
Decommissioning Phase		
Visual intrusion	The decommissioning of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming and people using the existing gravel roads adjacent to site. Dust and housekeeping will be the main factors to take into account.	- Low
Generation of waste	An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	- Medium

7.7 CONCLUSION

This chapter of the Basic Assessment Report (BAR) 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 (- Low)
- Avifauna (- Low)
- Loss or fragmentation of habitats (- Medium)
- Soil erosion (- Low)
- Generation of waste (- Low)
- Temporary employment (+ Medium)
- Visual intrusion (- Low)
- Impact of construction workers on local communities & influx of job seekers (- Medium)

- Cumulative effects during the operational phase:
- Change in land use (- Low)
- Visual intrusion (- Medium)
- Generation of additional electricity (+ Low)
- Establishment of a community trust (+ Medium)
- Change in the sense of place (- Low)
- Development of infrastructure for the generation of clean, renewable energy (+ Medium)

- Cumulative effects during the decommissioning phase:
- Visual intrusion (- Low)
- Generation of waste (- Medium)

8 ENVIRONMENTAL IMPACT STATEMENT

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

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

(l) an environmental impact statement which contains-

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

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

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

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

(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;

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

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

8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

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

- Impacts during construction phase:
    - Impacts associated with the geology of the site (- Low)
    - Loss of habitat for faunal and floral species (- Low)
    - Loss of indigenous faunal and floral species diversity (- Low)
    - Loss of faunal and floral species of conservation significance (- Low)
    - Impacts on avifaunal- direct collision (- Low)
    - Impacts on visual intrusion (- Low)
    - Soil erosion (- Low)
    - Impacts on heritage resources (- Low)
    - Creation of local employment and business opportunities, skills development and training (+ Medium)

- Technical support to local farmers and municipalities (+ Medium)
- Potential loss of productive farmland (- Low)
- In-migration or influx of job seekers (- Low)
- Presence of construction workers on the local communities (- Low)
- Heavy vehicles and construction activities (- Low)
- Risk to safety, livestock and farm infrastructure (- Low)
- Increased risk of veld fires (- Low)
- Temporary noise disturbance (- Low)
- Generation of waste - general waste, construction waste, sewage and grey water (- Low)

➢ Impacts during the operational phase:

- Impact mortality on transmission line for the Red-listed bird groups identified as at risk Impacts associated with the soil (- Low)
- Visual intrusion (- Medium)
- Soil erosion (- Low)
- Local employment and business opportunities (+ Medium)
- Potential loss of productive farmland (- Low)
- Establishment of a Community Trust (+ Medium)
- Change in the sense of place (- & + Low)
- Development of infrastructure for the generation of clean, renewable energy (+ Medium)

➢ Impacts during the decommissioning phase:

- Loss of habitat for faunal and floral species (- Low)
- Loss of indigenous faunal and floral species diversity (- Low)
- Loss of faunal and floral species of conservation significance (- Low)
- Soil erosion (- Low)
- Generation of waste (- Low)

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity (- Medium)

8.2 RECOMMENDATION OF EAP

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

- All key consultees have been consulted as required by Chapter 6 of the 2014 EIA Regulations - already approved by the environmental authority.
- The Basic Assessment process has been conducted as required by the 2014 EIA Regulations, Regulations 19 and Appendix 1.

- The EMPr was compiled in conjunction with the Generic EMPr for overhead electricity transmission and distribution infrastructure as per Government Notice 435, which was published in Government Gazette 42323 on 22 March 2019.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- Special recommendations must be adhered to at all times.
- No additional specialist studies are proposed on any environmental issue raised and thus, no terms of reference are provided for such studies.

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

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

The final recommendation of the EAP is that:

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

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

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

Carli Steenkamp

Environamics - Environmental Consultants

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