



## FINAL SCOPING REPORT

31 August 2021

# THE PROPOSED BOITUMELO SOLAR POWER PLANT NEAR LICHTENBURG, NORTH WEST PROVINCE.



## PROJECT DETAIL

**DFFE Reference No.** : 14/12/16/3/3/2/2083

**Project Title** : Proposed Boitumelo Solar Power Plant near Lichtenburg, North West Province

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## GLOSSARY OF TERMS AND ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DFFE	Department of Forestry, Fisheries and Environmental Affairs
DM	District Municipality
DMRE	Department of Mineral Resources and 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
LM	Local Municipality
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998

PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SPP	Solar Power Plant
VU	Vegetation Unit

## CONTEXT FOR THE DEVELOPMENT

According to Eskom, the demand for electricity in South Africa has been growing at approximately 3% per annum. This growing demand, fueled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of Mineral Resources and Energy's (DMRE) (previously referred to as the Department of Energy) 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 DMRE (Integrated Resource Plan Update 2010-2030). The IRP also identifies the preferred generation technologies required to meet the expected demand growth up to 2030 and incorporates government objectives including affordable electricity, reduced greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources and localisation and regional development. In terms of the Integrated Resource Plan Update (2019 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.

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy,

natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

In response to the above, Boitumelo 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 Portion 4 of the Farm Houthaaldoorns 2, Registration Division IP, North West Province situated within the Ditsobotla Local Municipality area of jurisdiction (refer to Figure A for the locality map). The project entails the generation of up to 150 MW electrical power through photovoltaic (PV) technology. The total development footprint of the project will approximately be 300 hectares (including supporting infrastructure on site and the grid connection to the national grid). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2152 kwh/m<sup>2</sup>.

## EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Ditsobotla Local Municipality faces a number of challenges in addressing the needs and improving the lives of the community such as low to medium income, high unemployment and low skills (IDP, 2020). The Ditsobotla Local Municipality's Integrated Development Plan (IDP, 2020) identifies the mission of the municipality as: "sustainable service delivery through transparent administration, dedicated staff, implementation of municipal programmes and consultation with communities". The IDP does not explicitly deal with renewable energy development, but since the Municipality has been categorized as a Priority 1 Investment Area in the Province, it may be argued that the proposed development will support the objective of economic growth and employment creation.

Boitumelo Solar Power Plant (RF) (Pty) Ltd intends to develop a 150MW photovoltaic solar facility and associated infrastructure on the Portion 4 of the farm Houthaaldoorns 2, Registration Division IP, North West Province situated within the Ditsobotla Local Municipality area of jurisdiction. The town of Lichtenburg is located approximately 15km south of the proposed development (refer to Figure A and B for the locality and regional map). The total footprint of the project will approximately be 300 hectares (including supporting infrastructure on site and the associated grid connection). The site was identified as being highly desirable due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access via a main road (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

In terms of the National Environmental Management Act (Act 107 of 1998), with specific reference to Sections 24 and 24D, as read with GNR 324-327, as amended (2017), Environmental Authorisation is required for the Boitumelo Solar Power Plant. The following listed activities have been identified with special reference to the proposed development and are listed in the EIA Regulations (as amended):

- Activity 11(i) (GN.R. 327): *"The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."*
- Activity 28(ii) (GN.R. 327): *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."*
- Activity 24 (ii) (GN.R 327): *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters"*

- Activity 56 (ii) (GN.R 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”*
- Activity 1 (GN.R. 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more...”*
- Activity 15 (GN.R. 325): *“The clearance of an area of 20 hectare or more of indigenous vegetation...”*
- Activity 4 (GN.R 324): *“The development of a road wider than 4 metres with a reserve less than 13,5 metres.”*
- Activity 12 (h)(iv) (GN.R. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation... ... (h) in the North West (iv) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (iv) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority.”*
- Activity 18 (h)(ix) (GN.R 324): *“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre...”*

Activities required for the development of the solar facility which are listed under Listing Notice 1, 2 and 3 (GNR 327, 325 and 324) implies that the development could potentially have an impact on the environment that will require mitigation. Subsequently a ‘thorough assessment process’ is required as described in Regulations 21-24. Environamics has been appointed as the independent consultant to undertake the EIA on behalf of Boitumelo Solar Power Plant (RF) (Pty) Ltd.

Regulation 21 of the EIA Regulations requires that a scoping report must contain the information set out in Appendix 2 of 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 2 of GNR326 requires that information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process undertaken be set out in the scoping report. It has been determined through the scoping process that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources and land, specifically where the affected landowner is experiencing challenges and limitations in terms of the current agricultural land use. All negative environmental impacts can be effectively mitigated through the recommended mitigation measures and no residual negative impacts are foreseen. The potentially most significant environmental impacts associated with the development are briefly summarised below.

#### Impacts during the construction phase:

During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of 18-24 months. The potentially most significant impacts relate to

habitat destruction caused by clearance of vegetation, increased soil erosion and sedimentation, spread and establishment of alien invasive species, displacement of priority avian species from important habitats, displacement of resident avifauna through increased disturbance, loss of important avian habitats, visual impact of construction activities, disturbance, damage or destruction of legally-protected fossil heritage as well as socio-economic impacts such as the creation of direct and indirect employment opportunities, economic multiplier effects from the use of local goods and services, in-migration of labourers in search of employment opportunities and increase in pressure on local resources and social networks, or existing services and infrastructure, temporary increase in safety and security risks, impacts on daily living and movement patterns, nuisance impact (noise and dust) and increased risk of potential veld fires.

#### Impacts during the operational phase:

During the operational phase the site will serve as a solar PV energy facility and the potential impacts will take place over a period of 20 – 25 years. The negative impacts are generally associated with impacts on the fauna and flora (habitat destruction caused by clearance of vegetation, displacement of priority avian species from important habitats, displacement of resident avifauna through increased disturbance, collisions with PV panels leading to injury or loss of avian life, collision when flying into power line infrastructure, electrocution when perched on power line infrastructure and visual impacts (road users and surrounding landowners, lighting and sense of place). The operational phase will have a direct positive impact through the provision of employment opportunities and skills development for its duration, the development of non-polluting, renewable energy infrastructure and the contribution to Local Economic Development (LED) and social upliftment.

#### Impacts during the decommissioning phase:

The negative impacts generally associated with the decommissioning phase include: habitat destruction caused by clearance of vegetation, increased soil erosion and sedimentation, spread and establishment of alien invasive species, continued loss of indigenous vegetation owing to poor recovery of vegetation, contamination of soil by leaving rubble/waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation and the loss of permanent employment. However, skilled staff will be eminently employable and a number of temporary jobs will also be created in the process. It is not expected that the facility will be decommissioned, but rather that the technology used will be upgraded.

#### Cumulative impacts:

Cumulative impacts could arise as other similar projects are constructed in the area. According to the Department's database nine (9) other solar plants have been proposed in relative close proximity to the proposed activity. Environamics are also in the process of applying for Environmental Authorisation for two (2) additional PV projects on Portion 4 of the farm Houthaaldoorns 2.

The potential for cumulative impacts may therefore exist. The Draft Scoping Report includes a detailed assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: habitat loss owing to clearing of vegetation, displacement of resident avifauna, loss of important avian habitats, impacts of employment opportunities, business opportunities and skills development and impact with large-scale in-migration of people. Cumulative impacts (negative medium) during the operational phase relate to: collisions when flying into power line infrastructure, electrocutions when perched on power line infrastructure and visual impacts related to the Boitumelo SPP and power line. The cumulative effect of the generation of waste was identified as being potentially significant during the decommissioning phase.

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



# 1 INTRODUCTION

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

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

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

## 1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

The National Environmental Management Act identifies listed activities (in terms of Section 24) which are likely to have an impact on the environment. These activities cannot commence without obtaining an Environmental Authorisation (EA) from the relevant competent authority. Sufficient information is required by the competent authority to make an informed decision and the project is therefore subject to an environmental assessment process which can be either a Basic Assessment Process or a full Scoping and Environmental Impact Assessment process.

The EIA Regulations No. 324, 325 and 327 outline the activities that may be triggered and therefore require EA. The following listed activities with special reference to the proposed development is triggered:

**Table 1.1: Listed activities**

Relevant notice:	Activity No (s)	Description of each listed activity as per the project description:
GNR. 327 (as amended in 2017)	Activity 11(i)	<ul style="list-style-type: none"><li>• <i>“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</i></li><li>• Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132 kV) and an on-site HV/MV substation (130 MVA). For the preferred power line corridor, the power line will be constructed in an ~12km long and 100 m wide corridor. It is expected that generation from the facility will tie in with the Eskom Watershed</li></ul>

		275/132/88 MTS substation.
GNR. 327 (as amended in 2017)	Activity 28(ii)	<ul style="list-style-type: none"> <li>• <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i></li> <li>• Activity 28(ii) is triggered as the portions of the affected farm has been previously used for grazing and the property will be re-zoned to “special” use. The development footprint of the solar power plant will be 300ha in extent.</li> </ul>
GNR. 327 (as amended in 2017)	Activity 24(ii)	<ul style="list-style-type: none"> <li>• <i>“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;”</i></li> <li>• Activity 24(ii) is triggered as the internal roads of the solar power plant will vary between 6 and 12 meters in width.</li> </ul>
GNR. 327 (as amended in 2017)	Activity 56 (ii):	<ul style="list-style-type: none"> <li>• <i>“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”</i></li> <li>• Activity 56 (ii) is triggered as the existing access road to the affected property does not have a reserve and will be widened by more than 6 metres.</li> </ul>
GNR. 325 (as amended in 2017)	Activity 1	<ul style="list-style-type: none"> <li>• <i>“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”</i></li> <li>• Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.</li> </ul>
GNR. 325 (as amended in 2017)	Activity 15	<ul style="list-style-type: none"> <li>• <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i></li> <li>• In terms of vegetation type the preferred site falls within the Carletonville Dolomite Grassland which is</li> </ul>

			<p>described by Mucina and Rutherford (2006) as 'vulnerable'. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 300 ha.</p>
GNR. 324 (as amended in 2017)	Activity 4(h)(vi)		<ul style="list-style-type: none"> <li>• <i>“The development of a road wider than 4 metres with a reserve less than 13,5 metres in the (h) North West Province (vi) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</i></li> <li>• Activity 4 is triggered since the site is located within 5km from a protected area identified in terms of NEMPAA. The internal roads will not have a reserve and will vary between 6 and 12 meters in width.</li> </ul>
GNR. 324 (as amended in 2017)	Activity 12 (h)(iv)	12	<ul style="list-style-type: none"> <li>• <i>“The clearance of an area of 300 square metres or more of indigenous vegetation... .. (h) in the North West (iv) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (iv) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority.”</i></li> <li>• Activity 12 (h)(iv)(iv) is triggered since the proposed development is located in the North West province. Portions of the power line routes cross over CBA2 (option 1).</li> </ul>
GNR. 324 (as amended in 2017)	Activity 18 (h)(ix)	18	<ul style="list-style-type: none"> <li>• <i>“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) in the North West within (ii) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</i></li> <li>• Activity 18 (h)(ix) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The project is located within the North West Province and the site is located within 5km from a</li> </ul>

		protected area identified in terms of NEMPAA.
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The activities triggered under Listing Notice 1, 2 and 3 (Regulation 327, 325 and 324) for the project implies that the development is considered as potentially having a significant impact on the environment. Subsequently a ‘thorough assessment process’ is required as described in Regulations 21-24. According to Appendix 2 of Regulation 326 the objective of the scoping process is to, through a consultative process:

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

The Draft Scoping Report was submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to Regulation 326 all registered I&APs and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the scoping report. The Draft Scoping Report was made available to I&APs and all relevant State Departments. They were requested to provide written comments on the report within 30 days of receiving it. All issues identified and comments received during the review period have been documented and compiled into a Comments and Response Report to be included as part of the Final Scoping Report.

## **1.2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)**

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

Contact person: Lisa Opperman  
Postal Address: 14 Kingfisher Street, Tuscan Ridge Estate, Potchefstroom, 2531  
Telephone: 084 920 3111 (Cell)  
Electronic Mail: [lisa@environamics.co.za](mailto:lisa@environamics.co.za)

And/or

Contact person: Christia van Dyk  
Postal Address: 14 Kingfisher Street, Tuscan Ridge Estate, Potchefstroom, 2531  
Telephone: 078 470 5252 (Cell)  
Electronic Mail: [christia@environamics.co.za](mailto:christia@environamics.co.za)

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

## **1.3 DETAILS OF SPECIALISTS**

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

**Table 1.2:** Details of specialists

Study	Prepared by	Contact Person	Postal Address	Tel	e-mail
Avifaunal Study	Agreenco	ASH Haagner	PO Box 19896 Noordbrug, 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Terrestrial biodiversity impact assessment	AGES Potchefstroom	Mari Van der Westhuizen	P.O. Box 19460 Noordbrug, 2522	Cell: 082 257 1715	mvdwesthuizen@ages-group.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	NATURA VIVA CC	Dr. John Almond	PO Box 12410 Mill Street Cape Town, 8010	Cell: 021 462 3622	naturaviva@universe.co.za
Agricultural & Soils Impact Assessment	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus 9515	Cell: 082 316 7749	phala.env@gmail.com
Social Impact Assessment	Phala Environmental Consultants	Marelle Botha	30 Fouche Street Steynsrus 9515	Cell: 082 493 5166	phala.env@gmail.com
Traffic Assessment Study	BVi Consulting Engineers	Liza van Zyl	Edison Square, Century City, 7441	Cell: 060 557 7467	dirkvdm@bviwc.co.za
Geotechnical Feasibility Investigation	SMEC	Richard Roberts	267 Kent Avenue, Ferndale, Randburg, 2194	Tel: 011 369 0600	johannesburg@smec.com

#### 1.4 STATUS OF THE EIA PROCESS

The EIA process is conducted strictly in accordance with the stipulations set out in Regulations 21-24 of Regulation No. 326. Table 1.2 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 to DFFE on 05 March 2021.
- The DFFE accepted the public participation plan in an email dated 18 March 2021.
- A newspaper advertisement was placed in the Noordwester, on 11 June 2021, informing the public of the EIA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 13 April 2021.
- Site notices were erected on site on 13 April 2021 for the informing the public of the commencement of the EIA process.
- An application form and the draft Scoping Report was submitted to DFFE on 23 July 2021.
- The draft Scoping Report has been made available for a 30-day review and comment period from 23 July 2021 to 23 August 2021.
- The final Scoping Report was submitted to the DFFE on 31 August 2021

It is envisaged that the Final Scoping Report will be submitted to the Department in August 2021 and that the Final Scoping Report will be accepted by the Department in October 2021. The EIA process should be completed within approximately nine months of submission of the Draft Scoping Report, i.e. by April 2022 – see Table 1.3.

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

Activity	Prescribed timeframe	Timeframe
Site visit		April 2021
Public participation (BID, press advert, site notice)	30 Days	11 June – 12 July 2021
Submit application form and DSR	-	By 23 July 2021
Public participation (DSR)	30 Days	24 July – 23 Aug 2021
Submit FSR	44 Days	31 Aug 2021
Department acknowledges receipt	10 Days	September 2021

Department approves/reject	43 Days	By Oct. 2021
Public participation (DEIR)	30 Days	Oct – Nov. 2021
Submission of FEIR & EMPr	-	Nov. 2021
Department acknowledges receipt	10 Days	Nov. 2021
Decision	107 Days	March 2022
Department notifies of decision	5 Days	March 2022
Registered I&APs notified of decision	14 Days	March 2022
Appeal	20 Days	April 2022

### 1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 2 of Regulation No.326. It consists of seven sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1.4.

Table 1.4: **Structure of the report**

Requirements for the contents of a scoping report as specified in the Regulations		Section in report
Appendix 2. (2) - A scoping report must contain all the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include-		
(a)	details of -	1
	(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
	(i) the 21-digit Surveyor General code of each cadastral land parcel;	
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	



	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered;	
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure.	
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	3
(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
(g)	a full description of the process followed to reach the proposed preferred activity, site and location of the development footprint 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.	5
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(ix) the outcome of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(g)	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified 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

	(vi) the methodology used in identifying 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;	
(i)	a plan of study for undertaking the environmental impact assessment process to be undertaken, including-	
	(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	
	(ii) a description of the aspects to be assessed as part of the EIA process;	
	(iii) aspects to be assessed by specialists;	
	(iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists;	
	(v) a description of the proposed method of assessing duration and significance;	
	(vi) an indication of the stages at which the competent authority will be consulted;	
	(vii) particulars of the public participation process that will be conducted during the EIA process; and	
	(viii) a description of the tasks that will be undertaken as part of the EIA process;	
	(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	8
(j)	an undertaking under oath or affirmation by the EAP in relation to-	
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs;	Appendix A to the report
(k)	an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and I&APs on the plan of study for undertaking the EIA;	
(l)	where applicable, any specific information required by the CA; and	N/A
(m)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

## 2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

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

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

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

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

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

### 2.1 THE LOCATION OF THE ACTIVITY AND PROPERTY DESCRIPTION

The activity entails the development of a photovoltaic solar facility and associated infrastructure on the Portion 4 of the farm Houthaaldoorns 2, Registration Division IP, North West Province situated within the Ditsobotla Local Municipality area of jurisdiction. The proposed development is located in the North West Province in the northern central interior of South-Africa (refer to Figure B for the regional map). The town of Lichtenburg is located approximately 15km south of the site (refer to Figure A for the locality map).

The project entails the generation of up to 150MW electrical power through photovoltaic (PV) panels. The total footprint of the project will approximately be 300 hectares (including supporting infrastructure on site) – refer to table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Boitumelo Solar Power Plant (RF) (Pty) Ltd from the property owner, Kuhn & Kuhn (Pty) Ltd for the life span of the project (minimum of 20 years). It is expected that generation from the facility will tie in with the Eskom Watershed 275/132/88 MTS substation. The preferred power line corridor will traverse the following properties: Portion 2 of Zamenkomst 4, Portion 10 of Lichtenburg Town & Townlands 27, RE of

Portion 10 of Lichtenburg Town & Townlands 27, Portion 25 of Houthaalboomen 31, Portion 23 of Houthaalboomen 31, Portion 3 of Houthaaldoorns 2 and RE of Houthaaldoorns 2.

Table 2.1: **General site information**

Description of affected farm portion	<p><u>Solar Power Plant:</u></p> <ul style="list-style-type: none"> <li>• Portion 4 of the farm Houthaaldoorns 2</li> </ul> <p><u>Power Line Corridor (Options 1 &amp; 2):</u></p> <ul style="list-style-type: none"> <li>• Portion 4 of the farm Houthaaldoorns 2</li> <li>• Portion 2 of Farm Zamekomst 4</li> <li>• Portion 23 of Farm Houthaalbomen 31</li> <li>• Portion 10 of Farm Lichtenburg Town and Townlands 27</li> <li>• Remaining Extent of Portion 1 of Farm Lichtenburg Town and Townlands 27</li> <li>• Remaining Extent of Farm Priem 30</li> <li>• Portion 25 of Farm Houthaalboomen 31</li> <li>• Remaining Extent of the Farm Houthaaldoorns 2</li> <li>• Portion 3 of Farm Houthaaldoorns 2</li> <li>• Portion 23 of Farm Houthaalboomen 31</li> <li>• Portion 25 of Farm Houthaalboomen 31</li> <li>• Portion 2 of the farm Houthaalboomen 31</li> <li>• Portion 3 of the farm Houthaalboomen 31</li> <li>• Portion 4 of the farm Houthaalboomen 31</li> <li>• Portion 5 of the farm Houthaalboomen 31</li> <li>• Portion 6 of the farm Houthaalboomen 31</li> <li>• Portion 7 of the farm Houthaalboomen 31</li> <li>• Portion 8 of the farm Houthaalboomen 31</li> <li>• Portion 9 of the farm Houthaalboomen 31</li> <li>• Portion 1 of Farm Talene 25</li> <li>• Portion 2 of Farm Talene 25</li> </ul>
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	<ul style="list-style-type: none"> <li>• Portion 3 of Farm Talene 25</li> <li>• Portion 4 of Farm Talene 25</li> </ul>
21 Digit Surveyor General codes	<p><u>Solar Power Plant:</u></p> <ul style="list-style-type: none"> <li>• Portion 4 of the farm Houthaaldoors 2 - TOIP0000000000200004</li> </ul> <p><u>Power Line Corridor (Options 1 &amp; 2):</u></p> <ul style="list-style-type: none"> <li>• Portion 4 of the farm Houthaaldoors 2 - TOIP0000000000200004</li> <li>• Portion 2 of Farm Zamekomst 4 - TOIP0000000000400002</li> <li>• Portion 23 of Farm Houthaalbomen 31 - TOIP00000000003100023</li> <li>• Portion 10 of Farm Lichtenburg Town and Townlands 27 - TOIP00000000002700010</li> <li>• Remaining Extent of Portion 1 of Farm Lichtenburg Town and Townlands 27 - TOIP00000000002700001</li> <li>• Remaining Extent of Farm Priem 30 - TOIP00000000003000000</li> <li>• Portion 25 of Farm Houthaalboomen 31 - TOIP00000000003100025</li> <li>• Remaining Extent of the Farm Houthaaldoors 2 - TOIP0000000000200000</li> <li>• Portion 3 of Farm Houthaaldoors 2 - TOIP0000000000200003</li> <li>• Portion 2 of the farm Houthaalboomen 31 - TOIP00000000003100002</li> <li>• Portion 3 of the farm Houthaalboomen 31 - TOIP00000000003100003</li> <li>• Portion 4 of the farm Houthaalboomen 31 - TOIP00000000003100004</li> <li>• Portion 5 of the farm Houthaalboomen 31 - TOIP00000000003100005</li> <li>• Portion 6 of the farm Houthaalboomen 31 -</li> </ul>

	<p>TOIP0000000003100006</p> <ul style="list-style-type: none"> <li>• Portion 7 of the farm Houthaalboomen 31 - TOIP0000000003100007</li> <li>• Portion 8 of the farm Houthaalboomen 31 - TOIP0000000003100008</li> <li>• Portion 9 of the farm Houthaalboomen 31 - TOIP0000000003100009</li> <li>• Portion 1 of Farm Talene 25 - TOIP0000000002500001</li> <li>• Portion 2 of Farm Talene 25 - TOIP0000000002500002</li> <li>• Portion 3 of Farm Talene 25 - TOIP0000000002500003</li> <li>• Portion 4 of Farm Talene 25 - TOIP0000000002500004</li> </ul>
Title Deed	T27977/2012
Photographs of the site	Refer to the Plates
Type of technology	Photovoltaic solar facility
Structure Height	<ul style="list-style-type: none"> <li>• Panels ~6m,</li> <li>• buildings ~ 6m,</li> <li>• power lines ~32m and</li> <li>• battery storage facility ~8m</li> </ul>
Battery storage	Within a 4ha area within the development footprint
Surface area to be covered	Approximately 300 ha
Structure orientation	The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
Laydown area dimensions	Assessed 300 hectares for the development of the solar power plant and an 12km long and 100 m wide corridor for the placement of the proposed power line. Where existing lines are located, a corridor of approximately 150m were assessed.
Generation capacity	Up to 150MW

Expected production	165-205 GWh per annum
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The site is located in a rural area and is bordered by agricultural land uses. The site survey revealed that the site currently consists of grazing for cattle – refer to plates 1-11 for photographs of the site. The property on which the development is to be established is owned by Kuhn & Kuhn (Pty) Ltd.

## 2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activities:

**Table 2.2:** Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per the project description:
GNR. 327 (as amended in 2017)	Activity 11(i)	<ul style="list-style-type: none"> <li>• <i>“The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</i></li> <li>• Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area. The infrastructure for the distribution of electricity will include a power line (132 kV) and an on-site HV/MV substation (130 MVA). For the preferred power line corridor, the power line will be constructed in an ~12km long and 100 m wide corridor. It is expected that generation from the facility will tie in with the Eskom Watershed 275/132/88 MTS substation.</li> </ul>
GNR. 327 (as amended in 2017)	Activity 28(ii)	<ul style="list-style-type: none"> <li>• <i>“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</i></li> <li>• Activity 28(ii) is triggered as the portions of the affected farm has been previously used for grazing and the property will be re-zoned to “special” use. The development footprint of the solar power plant will be</li> </ul>

		300ha in extent.
GNR. 327 (as amended in 2017)	Activity 24(ii)	<ul style="list-style-type: none"> <li>• <i>“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters;”</i></li> <li>• Activity 24(ii) is triggered as the internal roads of the solar power plant will vary between 6 and 12 meters in width.</li> </ul>
GNR. 327 (as amended in 2017)	Activity 56 (ii):	<ul style="list-style-type: none"> <li>• <i>“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”</i></li> <li>• Activity 56 (ii) is triggered as the existing access road to the affected property does not have a reserve and will be widened by more than 6 metres.</li> </ul>
GNR. 325 (as amended in 2017)	Activity 1	<ul style="list-style-type: none"> <li>• <i>“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”</i></li> <li>• Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 150 megawatts electricity through the use of a renewable resource.</li> </ul>
GNR. 325 (as amended in 2017)	Activity 15	<ul style="list-style-type: none"> <li>• <i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i></li> <li>• In terms of vegetation type the preferred site falls within the Carletonville Dolomite Grassland which is described by Mucina and Rutherford (2006) as ‘vulnerable’. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 300 ha.</li> </ul>
GNR. 324 (as amended in 2017)	Activity 4(h)(vi)	<ul style="list-style-type: none"> <li>• <i>“The development of a road wider than 4 metres with a reserve less than 13,5 metres in the (h) North West Province (vi) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a</i></li> </ul>



			<p><i>biosphere reserve.”</i></p> <ul style="list-style-type: none"> <li>• Activity 4 is triggered since the site is located within 5km from a protected area identified in terms of NEMPAA. The internal roads will not have a reserve and will vary between 6 and 12 meters in width.</li> </ul>
GNR. 324 (as amended in 2017)	Activity 12 (h)(iv)		<ul style="list-style-type: none"> <li>• <i>“The clearance of an area of 300 square metres or more of indigenous vegetation... .. (h) in the North West (iv) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (iv) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority.”</i></li> <li>• Activity 12 (h)(iv)(iv) is triggered since the proposed development is located in the North West province. Portions of the power line route cross over CBA2 (option 1).</li> </ul>
GNR. 324 (as amended in 2017)	Activity 18 (h)(ix)		<ul style="list-style-type: none"> <li>• <i>“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) in the North West within (ii) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</i></li> <li>• Activity 18 (h)(ix) is triggered since the existing access road to the site will need to be widened by more than 4 metres. The project is located within the North West Province and the site is located within 5km from a protected area identified in terms of NEMPAA.</li> </ul>

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

- Site clearing and preparation: Certain areas of the site and access road will need to be cleared of vegetation and some areas may need to be levelled.
- Civil works to be conducted:
  - Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.

- Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.
- Construction of access and inside roads/paths – Access will be obtained from the R505 Regional Road onto a proposed new gravel access road situated adjacent the development footprint where direct access will be obtained to the facility. An internal site road network will also be required to provide access to the solar field and associated infrastructure.
- Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layer where vehicles will pass.

### 2.3 PHOTOVOLTAIC TECHNOLOGY

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

- PV Panel Array - To produce up to 150MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.
- Wiring to Central Inverters - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.
- Connection to the grid - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid. Whilst Boitumelo Solar Power Plant (RF) (Pty) Ltd has not yet received a cost estimate letter from Eskom, it is expected that generation from the facility will tie in with Watershed 275/132/88 MTS Substation. The Project will inject up to 100MW into the National Grid. The installed capacity will be approximately 150MW.

One route is proposed from the onsite substation to the collector station situated on the property. Whereas two possible connection corridor routes are proposed from the

collector station to the Watershed 275/132/88 MTS Substation. Within the preferred corridor (South east of farm) a new line of approximately 12km will be constructed to the Watershed MTS or alternatively, one of the existing Eskom lines will be upgraded. For the alternative corridor (South west of the farm) a new line of approximately 14km will be constructed to the Watershed MTS. The proposed power line was assessed within a 100m wide corridor and where existing lines are located, approximately 150m. The area surrounding the substation was also assessed.

- Electrical reticulation network – An internal electrical reticulation network will be required and will be laid ~2-4m underground as far as practically possible.
- Supporting Infrastructure – The following auxiliary buildings with basic services including water and electricity will be required on site:
  - Office (~200 m<sup>2</sup>);
  - Switch gear and relay room (~400 m<sup>2</sup>);
  - Staff lockers and changing room (~200 m<sup>2</sup>); and
  - Security control (~60 m<sup>2</sup>)
- Battery Energy Storage System – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m<sup>3</sup> of batteries and associated operational, safety and control infrastructure.
- Roads – Access will be obtained from the R505 Regional Road onto a proposed new gravel access road situated adjacent the development footprint where direct access will be obtained to the facility. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 25-meter corridor.
- Fencing - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding properties. Fencing with a height of 2.5 meters will be used.

## 2.4 LAYOUT DESCRIPTION

The layout plan will consider and adhere to the limitations of the site and aspects such as environmentally sensitive areas, roads, fencing and servitudes on site – refer to figure H. The total surface area proposed for layout options include the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, power line, onsite substation and switching station and perimeter fences). Limited features of environmental significance exist on site apart from the heritage objects (refer to Figure F). Table 2.3 below provides detailed information regarding the layout for the proposed facility as per DFFE requirements.

**Table 2.3:** Technical details for the proposed facility

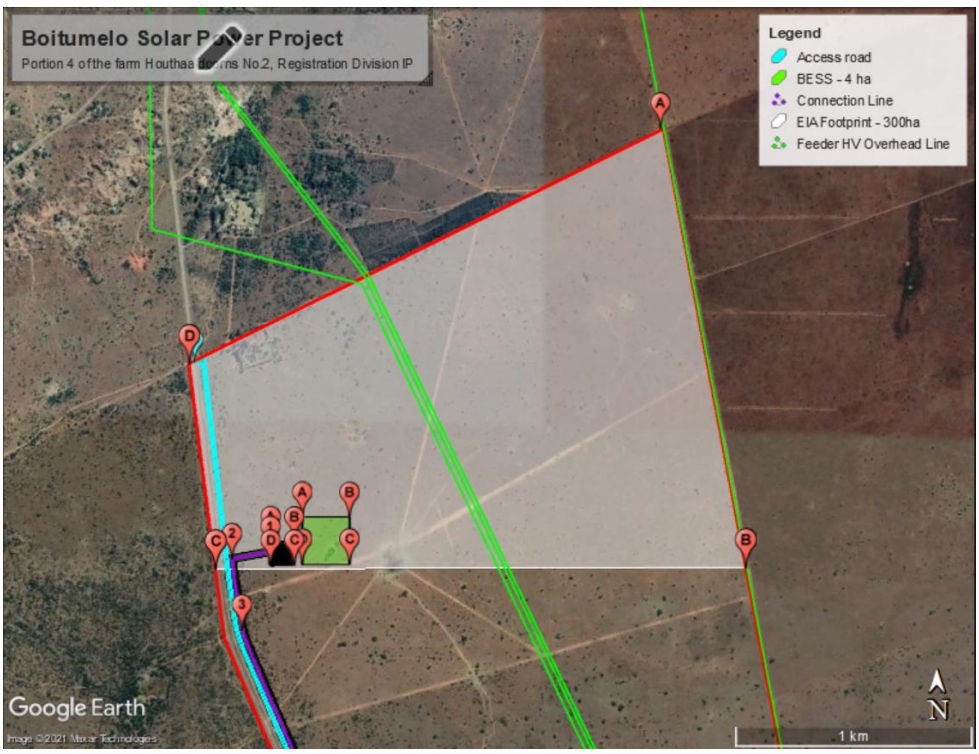
Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	300 Hectares (Development footprint)
Number of inverters required	Minimum 50
Area occupied by inverter / transformer stations / substations / BESS	Central inverters+ LV/MV trafo: 20 m <sup>2</sup> HV/MV substation with switching station: 15 000 m <sup>2</sup> BESS: 4 000 m <sup>2</sup>
Capacity of on-site sub- and switching station	Minimum 130MVA in HV/MV substation
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 300ha Construction Laydown Area: ~2000 m <sup>2</sup>
Area occupied by buildings	Security Room: ~60 m <sup>2</sup> Office: ~200 m <sup>2</sup> Staff Locker and Changing Room: ~200 m <sup>2</sup>
Battery storage facility	Maximum height: 8 m Maximum volume: 1740 m <sup>3</sup> Capacity: 500MW
Length of internal roads	Approximately 20 km
Width of internal roads	Between 6 & 12 meters
Proximity to grid connection	Approximately 12 kilometers (preferred alternative) or 14km (alternative route)
Height of fencing	Approximately 2.5 meters

Table 2.4 provide the coordinate points for the proposed project site and power line corridor.

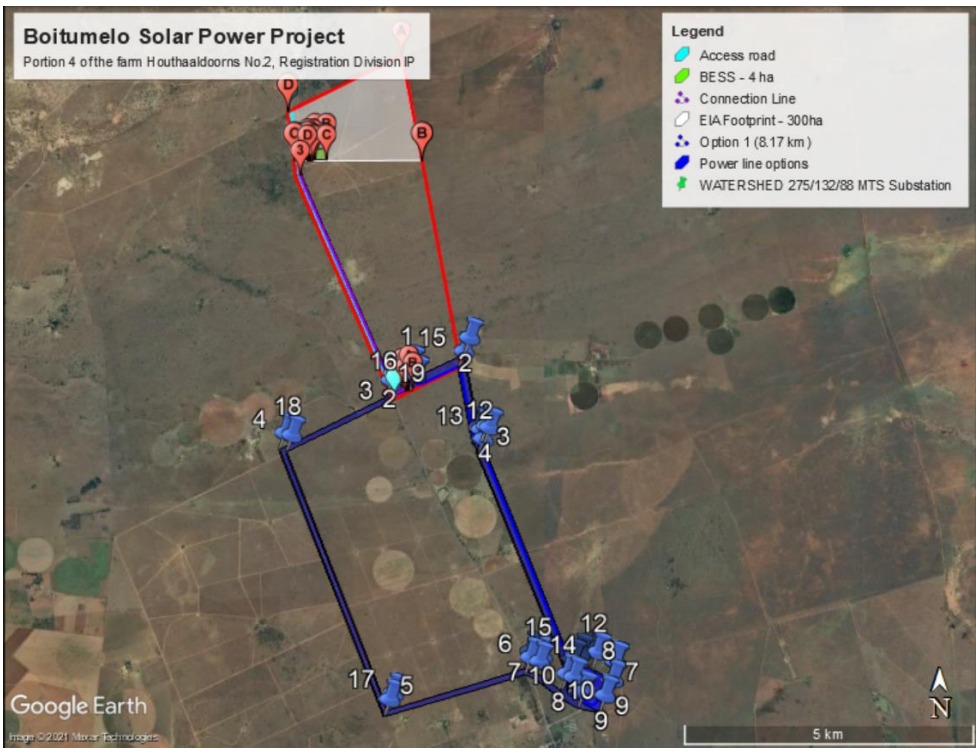
**Table 2.4:** Coordinates

Coordinates			
<b>Project Site</b>	A	25°59'27.26"S	26°06'41.97"E
	B	26°00'27.75"S	26°06'54.83"E
	C	26° 0'27.82"S	26° 5'34.62"E
	D	25°59'59.61"S	26° 5'30.57"E
<b>Proposed access (preferred alternative)</b>	1	26° 2'43.51"S	26° 6'37.90"E
<b>Proposed Access (alternative 1)</b>	1	25°59'59.41"S	26° 5'31.37"E
<b>100m wide Power Line Corridor (preferred)</b>	1	26° 2'35.50"S	26° 6'47.94"E
	2	26° 2'34.56"S	26° 6'50.08"E
	3	26° 2'34.76"S	26° 6'55.07"E

<b>alternative)</b>	4	26° 2'24.56"S	26° 7'18.91"E	
	5	26° 2'49.60"S	26° 7'24.23"E	
	6	26° 3'8.11"S	26° 7'28.02"E	
	7	26° 3'10.90"S	26° 7'33.00"E	
	8	26° 4'6.40"S	26° 7'57.51"E	
	9	26° 4'59.02"S	26° 8'21.20"E	
	10	26° 5'17.00"S	26° 8'29.28"E	
	11	26° 5'15.25"S	26° 8'37.08"E	
	12	26° 5'21.07"S	26° 8'49.76"E	
	13	26° 5'23.69"S	26° 8'49.58"E	
	14	26° 5'34.71"S	26° 8'42.64"E	
	15	26° 5'35.24"S	26° 8'40.64"E	
	16	26° 5'32.08"S	26° 8'34.54"E	
	17	26° 5'30.03"S	26° 8'35.78"E	
	<b>100m wide Power Line Corridor (alternative 1)</b>	1	26° 2'37.79"S	26° 6'44.20"E
		2	26° 2'43.23"S	26° 6'35.24"E
		3	26° 3'0.85"S	26° 5'57.03"E
4		26° 3'12.72"S	26° 5'28.82"E	
5		26° 3'26.15"S	26° 5'34.50"E	
6		26° 3'35.68"S	26° 5'38.57"E	
7		26° 3'57.10"S	26° 5'47.97"E	
8		26° 4'21.78"S	26° 5'58.74"E	
9		26° 4'47.41"S	26° 6'10.06"E	
10		26° 5'25.25"S	26° 6'26.64"E	
11		26° 5'39.89"S	26° 6'33.12"E	
12		26° 5'36.58"S	26° 6'46.37"E	
13		26° 5'30.91"S	26° 7'8.50"E	
14		26° 5'23.41"S	26° 7'35.25"E	
15		26° 5'16.82"S	26° 7'58.68"E	
16		26° 5'18.77"S	26° 8'4.85"E	
17		26° 5'30.18"S	26° 8'23.90"E	
18		26° 5'28.12"S	26° 8'31.23"E	
<b>Battery Energy Storage Facility (BESS)</b>	A	26° 0'20.74"S	26° 5'47.76"E	
	B	26° 0'20.75"S	26° 5'54.89"E	
	C	26° 0'27.16"S	26° 5'54.89"E	
	D	26° 0'27.19"S	26° 5'47.73"E	



**Figure 2.1:** Map indicating coordinate points of the proposed Boitumelo Solar Power plant (including project site, access road, power line corridors, substation and BESS)



**Figure 2.2:** Map indicating coordinate points of the proposed Boitumelo Solar Power Plant proposed power line corridor.

## **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. The Department of Water and Sanitation confirmed the water resource availability in the relevant catchment management area in order to ensure sustainable water supply (refer to Annexure F). A full assessment of the application for water use authorisation will only be undertaken in the event that the project proponent has obtained preferred bidder status by the Department of Mineral Resources and Energy.

The estimated maximum amount of water required during construction is 1200m<sup>3</sup> per month during the 12 - 18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 4200m<sup>3</sup> per annum. The majority of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning, the total amount of ~500 000 panels will require 1 000 000 litres per wash. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September). This totals approximately 4,000,000 litres per annum for washing, and allows 200,000 litres per annum (or 548 litres per day) for toilet use, drinking water, etc. This total to approximately 4 200m<sup>3</sup> of water required per annum.

Water saving devices and technologies such as the use of dual flush toilets and low-flow taps, the management of stormwater, 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.

The project company will not make use of Chemical Toilets and will rather consider safer alternative options proposed by the Ngaka Modiri Molema District Municipality by using biological based additives and/or enzymes.

A conservancy tank area is also proposed for the storage of sewage generated on site during the construction and operational phase of the project. The sewage will be stored on site in the conservancy tanks until it will be collected and transported off the site for off-site treatment at a registered Waste Water Treatment Works. The conservancy tank will be serviced by a licenced wastewater service provider or the Ditsobotla Local Municipality. As an alternative and if viable, provision will also be made for an onsite packaging plant for onsite sanitation treatment in order to recycle and reuse wate efficiently.

Water will be sourced from a registered water service provider and will be collected by trucks and stored on site in water storage tanks. As an alternative and long-term solution, boreholes will be investigated before construction or during the operational phase of the project. An application for all water authorizations will be submitted to the Department of Water and Sanitation and Ngaka Modiri Molema District Municipality for approval before any activity

commence. The Project Company will also engage with the Ngaka Modiri Molema District Municipality and Ditsobotla Local Municipality for all service delivery needs and authorizations (water, sewage, waste etc.)

### **2.5.2 Stormwater**

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures will be included in the Environmental Management Programme (EMPr) to be submitted as part of the EIR.

### **2.5.3 Sanitation and waste removal**

Portable chemical toilets will be utilised, that will be serviced privately or by the local municipality. Waste will be disposed at a licensed landfill site. The construction- and hazardous waste will be removed and disposed of at 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) will be contacted, to formally confirm that it has the capacity to provide the proposed development with these services for the lifetime of the project (20 years).

### **2.5.4 Electricity**

During the construction phase of the development, electricity will either be generated on site through a small solar system or through the use of generators or the existing Eskom supply on the farm will be utilised. This will depend on the Engineering, Procurement, and Construction (EPC) contractor appointed. During operation electricity use will be limited and will primarily be related to the lighting of the facility and domestic use. Design measures such as the use of energy saving light bulbs would be considered by the developer. During the day, electricity will be sourced from the photovoltaic plant, and from the electricity connection at night.

## **2.6 Decommissioning of the facility**

The operating period will be 20 years from the commencement date of the operation phase. 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 to improve the efficiency of the facility as the technology improves. The specifications of these new panels will be the same as the current panels under consideration, but the conversion efficiency of sunlight to energy will be greater (comparable to new computer chips, that are 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 decommissioning process will consist of the following steps:



- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- Wastewater storage conservancy tank would be responsibly removed and area would be rehabilitated.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.

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

- Removal of all structures and rubble;
- Breaking up compaction where required, loosening of the soil and the redistribution of topsoil; and
- Restoration of the surface to the original contours and application of hydro seeding.

## 3 LEGISLATIVE AND POLICY CONTEXT

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

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

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

### 3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the DFFE as well as comments from local and district authorities. Moreover, it is significant to note that they also inform strategic decision making reflected in the 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 White Paper on the Energy Policy of the Republic of South Africa (1998)
- The White Paper on Renewable Energy (2003)
- Integrated Energy Plan (IEP) (2016)
- Integrated Resource Plan (IRP) for South Africa (2010-2030) (2019)
- National Development Plan of 2030 (2012)
- National Infrastructure Plan of South Africa (2012)
- New Growth Path Framework (2010)
- Climate Change Bill (2018)
- Strategic Integrated Projects (SIPs) (2010 – 2030)
- North West Provincial Spatial Development Framework (PSDF) (2016)

- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Ngaka Modiri Molema DM Final Integrated Development Plan (IDP) 2020 – 2021 (2020)
- Ditsobotla Local Municipality Draft Integrated Development Plan (IDP) Review 2020-2021 (2020)
- Ditsobotla LM Spatial Development Framework 2018 (SDF) (2018)

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
<b>The Constitution of South Africa (Act No. 108 of 1996)</b>	National Government	1996	<p>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.</p> <p>The development of the Boitumelo Solar Power Plant and the aspects related thereto considers the creation of an environment which is not harmful or degraded through the implementation of appropriate mitigation measures.</p>
<b>The National Environmental Management Act (Act No. 107 of 1998)</b>	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) and	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 North West Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)		<p>The mandate for EIA lays with the National Environmental Management Act (107 of 1998) and the EIA Regulations No. 324, 325, 326, and 327 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.</p> <p>The EIA process undertaken for the Boitumelo Solar Power Plant is in-line with the requirements of NEMA for the Application for Environmental Authorisation.</p>
<b>The National Energy Act (Act No. 34 of 2008)</b>	Department of Mineral Resources and Energy	2008	<p>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).</p> <p>Considering that the Boitumelo Solar Power Plant is proposed to make use of PV technology and the solar resource for the generation of electricity, the proposed project is in-line with the Act.</p>
<b>The National Water Act (Act No. 36 of 1998)</b>	Department of Water Affairs (now known as Department of Water and Sanitation)	1998	<p>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.</p> <p>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</p>

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 is located within the C31A and D41A quaternary catchment and is situated in the Lower Vaal Water Management Area. Should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.

<p><b>National Environmental Management: Waste Act (Act No. 59 of 2008)</b></p>	<p>National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)</p>	<p>2008</p>	<p>NEMWA has been developed as part of the law reform process enacted through the White Paper on Integrated Pollution and Waste Management and the National Waste Management Strategy (NWMS). The objectives of the Act relate to the provision of measures to protect health, well-being and the environment, to ensure that people are aware of the impact of waste on their health, well-being and the environment, to provide for compliance with the measures, and to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.</p> <p>Regulations No. R921 (of 2013) promulgated in terms of Section 19(1) of the National Environmental Management: Waste Act (59 of 2008) determines 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 as no listed activities in terms of waste management are expected to be triggered.</p>
<p><b>National Environment Management: Air Quality Act (Act No. 39 of 2004)</b></p>	<p>National Department Environmental Affairs (DEA) (now known as the Department of Forestry, Fisheries and the Environment)</p>	<p>2004</p>	<p>The object of this Act is to protect the environment by providing reasonable measures for the protection and enhancement of the quality of air in the Republic; the prevention of air pollution and ecological degradation; and securing ecologically sustainable development while promoting justifiable economic and social development.</p> <p>Regulations No. R248 (of 31 March 2010) promulgated in terms of Section 21(1)(a) of the National Environmental Management Act: Air Quality Act (39 of 2004) determine that an Atmospheric Emission License (AEL) is required for certain listed activities, which result in</p>

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.

<b>The National Heritage Resources Act (Act No. 25 of 1999)</b>	South African Heritage Resources Agency (SAHRA)	1999	<p>The Act aims to introduce an integrated and interactive system for the management of heritage resources, to promote good governance at all levels, and empower civil society to nurture and conserve heritage resources so that they may be bequeathed to future generations and to lay down principles for governing heritage resources management throughout the Republic. It also aims to establish the South African Heritage Resources Agency together with its Council to co-ordinate and promote the management of heritage resources, to set norms and maintain essential national standards and to protect heritage resources, to provide for the protection and management of conservation-worthy places and areas by local authorities, and to provide for matters connected therewith.</p> <p>The Act protects and manages certain categories of heritage resources in South Africa. For the purposes of the Heritage Resources Act, a “heritage resource” includes any place or object of cultural significance. In this regard the Act makes provision for a person undertaking an activity listed in Section 28 of the Act to notify the resources authority. The resources authority may request that a heritage impact assessment be conducted if there is reason to believe that heritage resources will be affected.</p> <p>A case file has been opened on SAHRIS for the Boitumelo Solar Power Plant and all relevant documents were submitted for their comments and approval. The Heritage Impact Assessment undertaken for the solar power plant is included as Appendix E6.</p>
<b>Conservation of Agricultural Resources Act (Act No. 85 of 1983)</b>	National and Provincial Government	1983	<p>The objective of the Act is to provide control over the utilisation of the natural agricultural resources of the Republic in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants; and for matters connected therewith.</p>

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Consent will be required from the Department of Agriculture, Forestry and Fisheries (now known as the Department of Forestry, Fisheries and the Environment) in order to confirm that the proposed development is not located on high potential agricultural land and to approve the long term lease agreement.

An Agricultural Compliance statement will be undertaken for the Boitumelo Solar Power Plant and is included as part of the EIR.

**The National Forests Act, 1998 (Act 84 of 1998)**

Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)

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.

A Terrestrial biodiversity impact assessment has been undertaken for the Boitumelo Solar Power Plant and is included in Appendix E3.



<b>North West Nature Conservation Ordinance, 1983 (Act 12 of 1983)</b>	North West Province Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA)	1983	<p>The Act provides for the conservation of fauna and flora and the hunting of animals causing damage and for matters incidental thereto. This includes wild animals, fish, indigenous plants, as well as nature reserves. The Act also provides for the permitting of the disturbance of such species.</p> <p>A Terrestrial biodiversity impact assessment has been undertaken for the Boitumelo Solar Power Plant and is included in Appendix E3.</p>
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### 3.3 POLICY CONTEXT

**Table 3.2:** Policy context for the construction of photovoltaic solar plants

<b>POLICY</b>	<b>ADMINISTERING AUTHORITY</b>	<b>DATE</b>	<b>SUMMARY / IMPLICATIONS FOR PROPOSED DEVELOPMENT</b>
<b>The White Paper on the Energy Policy of the Republic of South Africa</b>	Department of Mineral Resources and Energy	1998	<p>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:</p> <ul style="list-style-type: none"> <li>• Increasing access to affordable energy services</li> <li>• Improving energy governance</li> <li>• Stimulating economic development</li> <li>• Managing energy-related environmental and health impacts</li> <li>• Securing supply through diversity</li> <li>• Energy policy priorities</li> </ul> <p>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.</p>

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 Boitumelo Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.

**The White Paper on Renewable Energy**

Department of Mineral Resources and Energy

2003

This White Paper on Renewable Energy supplements the *White Paper on Energy Policy*, which recognises that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa.

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).*

The Boitumelo Solar Power Plant is in line with this paper as it proposes the generation of renewable energy from the solar resource.

<b>Integrated Energy Plan (IEP) (2016)</b>	Department of Mineral Resources and Energy	2016	<p>The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.</p> <p>The 8 key objectives of the integrated energy planning process, are as follows:</p> <ul style="list-style-type: none"> <li>• Objective 1: Ensure security of supply.</li> <li>• Objective 2: Minimise the cost of energy.</li> <li>• Objective 3: Promote the creation of jobs and localisation.</li> <li>• Objective 4: Minimise negative environmental impacts from the energy sector.</li> <li>• Objective 5: Promote the conservation of water.</li> <li>• Objective 6: Diversify supply sources and primary sources of energy.</li> <li>• Objective 7: Promote energy efficiency in the economy.</li> <li>• Objective 8: Increase access to modern energy.</li> </ul> <p>The Boitumelo Solar Power Plant is in line with this policy as it proposes the generation of renewable energy from the solar resource.</p>
<b>Integrated Resource Plan (IRP) for South Africa</b>	Department of Mineral Resources and Energy	2019	<p>The Integrated Resource Plan (IRP) for Electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa’s National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.</p> <p>The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October</p>

2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a 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.

The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas. Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom’s existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018. According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.

The Boitumelo Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource and will contribute to the energy mix of the country as set out in this plan.

<b>National Development Plan of 2030</b>	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 needs 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
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energy was identified as a key intervention strategy to address this challenge.

The development of the Boitumelo Solar Power Plant will contribute to the intervention strategy as identified within the plan.

**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 aims to *“expand the transmission and distribution network to address historical imbalances, provide access to electricity for all and support*

*economic development” (RSA, 2012:20).*

The Boitumelo Solar Power Plant is in line with this plan as it proposes the generation of renewable energy from the solar resource which supports socio-economic development and will contribute to meeting the electricity demand of the country as set out in this plan.

<b>New Growth Path Framework</b>	Department of Economic Development	-	<p>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).</p> <p>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:</p> <ul style="list-style-type: none"> <li>- Identify the possible areas of employment creation; and</li> <li>- 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).</li> </ul> <p>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 of and investment in renewable energy technologies like solar (RSA, 2011b). In this regard it will also assist creating employment opportunities over the medium- and long-term.</p> <p>Considering that the construction of and investment in renewable energy is a key are identified within the framework, the Boitumelo Solar Power Plant is considered to be in-line with the framework.</p>
<b>Climate Change Bill</b>	National Department of Environmental	2018	<p>On 08 June 2018 the Minister of Environmental Affairs published the Climate Change Bill (“the Bill”) for public comment. The Bill provides a framework for climate change regulation in South Africa aimed at governing South Africa’s sustainable transition to a climate resilient, low carbon economy and society.</p>

Affairs (now known as the Department of Forestry, Fisheries and the Environment)

The Bill provides a procedural outline that will be developed through the creation of frameworks and plans. The following objectives are set within the Bill:

- Provide for the coordinated and integrated response to climate change and its impacts by all spheres of government in accordance with the principles of cooperative governance;
- Provide for the effective management of inevitable climate change impacts through enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to building social, economic, and environmental resilience and an adequate national adaptation response in the context of the global climate change response;
- Make a fair contribution to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe and in a manner that enables economic, employment, social and environmental development to proceed in a sustainable manner.

Boitumelo Solar Power Plant comprises a renewable energy generation facility and would not result in the generation or release of emissions during its operation.

**Strategic Integrated Projects (SIPs)**

The Presidential Infrastructure Coordinating Committee  
2010 - 2030

The Presidential Infrastructure Coordinating Committee (PICC) is integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have five core functions: to unlock opportunity, transform the economic landscape, create new jobs, strengthen the delivery of basic services and support the integration of African economies. A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration. SIP 8 and 9 of the energy SIPs supports the development of the solar energy facility:

- SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010 – 2030) and supports bio-fuel production facilities.

- SIP 9: Electricity generation to support socio-economic development: The proposed Springbok Solar Power Plant is a potential SIP 9 Project as electricity will be generated and social and economic upliftment, development and growth will take place within the surrounding communities. It would become a SIP 9 project if selected as a Preferred Bidder project by the Department of Energy. SIP 9 supports the acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy and address historical imbalances.

Boitumelo Solar Power Plant could be registered as a SIP project once selected as a preferred bidder under the REIPPP Programme. The project would then contribute to the above-mentioned SIPs

<b>Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa</b>	National Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment)	2014	<p>The then Department of Forestry, Fisheries and the Environment (DFFE) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives.</p> <p>This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms 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).</p> <p>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 the likely to be the most important factor determining the success of REDZs. Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit.</p>
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<b>North West Provincial Spatial Development Framework (PSDF)</b>	North West Provincial Government	2012	<p>The North West PSDF is a policy document that promotes a ‘developmental state’ in accordance with national and provincial legislation and directives. It aligns with the North West Provincial Growth and Development Strategy which has committed the North West to ‘building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development’.</p> <p>The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the Province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF:</p> <ul style="list-style-type: none"> <li>• Adopt a holistic approach to spatial development in order to minimise the long-term negative impacts of current land use or development decisions.</li> <li>• Ensure that spatial planning serves national, provincial and/or local interest.</li> <li>• Support the long-term adequacy or availability of physical, social and economic resources to support or carry development.</li> <li>• Protect existing natural, environmental, and cultural resources.</li> <li>• Ensure that land which is currently in agricultural use would only be reallocated to other uses where real need exists, and prime agricultural land should remain in production.</li> <li>• Support mining as a vital economic driver in the province without jeopardizing the biodiversity value of the environment.</li> <li>• Adopt a climate change strategy that will provide for responsible actions to curb the effect of global warming and climate change.</li> </ul> <p>The Spatial Challenges and Opportunities provide the crucial components that underlie sustainable development, i.e., need for basic infrastructure and development for the poor, economic growth and development, environmental conservation, and improved livelihoods. These spatial development priorities form the basis for guiding specific decisions regarding the desired spatial development and</p>
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arrangement of broad land uses within North West and investment and development spending.

The PSDF provides Spatial Framework and Development Strategies that will manage future growth and associated change in a way that protects and enhance the use of natural resources, biodiversity, and lifestyle values. This requires a highly sustainable pattern of development based on the efficient utilisation of land and infrastructure, supported by management decisions over ad hoc and dispersed forms of development.

The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the North West, and builds upon international best-practice and technology.

The development of the Boitumelo Solar Power Plant is in-line with the framework based on the contributions and opportunities presented by a development of this nature.

<b>Ngaka Modiri Molema District Municipality Draft Integrated Development Plan (IDP) 2020-2021</b>	Ngaka Modiri Molema District Municipality	2020	<p>The long-term vision of the Ngaka Modiri Molema DM is to be the: “Leaders in integrated municipal governance”. The above stated vision defines what the Ngaka Modiri Molema DM would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is: “To provide a developmental municipal governance system for a better life for all”.</p> <p>The SIPS provide an integrated framework for the delivery and implementation of social and economic infrastructure across the face of South Africa. Some of the SIPSs include catalytic projects that can be used to fast-track growth, address unemployment and reduce poverty and inequality. Due to the various nature and geographic spatial locations, the municipality is only involved in a few of the SIPS. The municipality’s plans will be aligned with these SIPs in an effort to respond to national government’s service delivery initiatives. Furthermore, work is to be done to align key cross-cutting areas, namely human settlement planning and skills development in line with each of the Strategic Infrastructure Projects, especially:</p> <ul style="list-style-type: none"><li>- Green Energy in support of the South African economy (SIP 8): Supporting sustainable green energy initiatives on a national scale through a diverse range of clean energy options as</li></ul>
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envisaged in the Integrated Resource Plan (IRP 2010).

- Electricity Generation to support socio-economic development (SIP 9): acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy; and addressing historical imbalances.

Considering the plans for the alignment of the DM’s plans with SIP 8 and SIP 9 it is confirmed that the Boitumelo Solar Power Plant is in line with the plan.

<p><b>Ditsobotla Local Municipality Final Integrated Development Plan (IDP) 2020-2021</b></p>	<p>Ditsobotla Local Municipality</p>	<p>2020</p>	<p>The vision of the Naledi LM is to be “A developmental municipality dedicated to the social and economic upliftment of its communities.” The Mission Statement is: “Sustainable service delivery through: transparent administration, dedicated staff, implementation of municipal programmes and consultation with communities”.</p> <p>The development of the Boitumelo Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) to socio-economic growth.</p>
<p><b>Ditsobotla Local Municipality Spatial Development Framework</b></p>	<p><b>Ditsobotla Local Municipality</b></p>	<p><b>2018</b></p>	<p>The spatial development vision is aligned with the municipal general vision and mission statements: “A developmental Municipality dedicated to the social and economic upliftment of its communities”. Its mission is: “Sustainable service delivery through transparent administration, dedicated staff, implementation of municipal programmes and consultation with communities”.</p> <p>The municipal area is characterised by low to medium income, high unemployment and low skills. Because of the high level of needs in the area, the Municipality has been categorized as a Priority 1 Investment Area in the Province. Taking also into account the National Spatial Development perspective which states that economic growth and employment creation should be focussed in areas where it will be most effective and sustainable in terms of local potential, and supporting restructuring (addressing the mismatch where people have to live and work), the spatial development vision for Ditsobotla LM was formulated: “Address key national, provincial and local priorities by focussing the provision of socio-economic infrastructure in areas with the highest growth potential (with prospects of the highest return on capital and social upliftment) but still attending to the basic needs of people elsewhere.”</p>

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The development of the Boitumelo Solar Power Plant will contribute to the local economy of the area and therefore assist (albeit to a limited extent) to socio-economic growth and the alleviation of poverty.

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### **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)
- 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
- DEA, (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 EIA was undertaken in accordance with the EIA Regulations (2017) published in GNR 326, in terms of Section 24(5) and 44 of the NEMA as amended as well as all relevant National legislation, policy documents and national guidelines.

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 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 and therefore it is concluded that there is support for the development of the Boitumelo Solar Power Plant. 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 supply 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 generation in South Africa is allocated to renewable energy applications. On a District and Local level limited 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 as well as socio-economic growth. At Provincial, District and Local level the policy documents support the applications of renewables.

The review of the relevant policies and documents related to the energy sector therefore 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 Boitumelo Solar Power Plant is therefore supported by the related policy and planning documents reviewed in this section of the report.

## 4 THE NEED AND DESIRABILITY

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

**Appendix 2.** (2) A scoping report (...) must include – (f) a motivation for the need and desirability of the activity in the context of the preferred location.

### 4.1 THE NEED FOR THE PROPOSED ACTIVITY

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

Over 90% of South Africa's electricity generation is coal based, the World bank estimates that these results in an annual, per capita carbon emission of ~8.9 tons per person. Based on 2008 fossil-fuel CO<sub>2</sub> emissions statistics released by the Carbon Dioxide Information Analysis Centre, South Africa is the 13<sup>th</sup> largest carbon dioxide emitting country in the world and the largest emitter in Africa (Boden, et al. 2011).

The proposed project is intended to form part of the Department of Mineral Resources and Energy's (DMREs) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 4.1 below:

**Table 4.1:** Published Draft IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
<b>TOTAL INSTALLED</b>	<b>33 847</b>	<b>1 860</b>	<b>4 696</b>	<b>2 912</b>	<b>7 958</b>	<b>11 442</b>	<b>600</b>	<b>11 930</b>	<b>499</b>	<b>2600</b>
<b>Installed Capacity Mix (%)</b>	<b>44.6</b>	<b>2.5</b>	<b>6.2</b>	<b>3.8</b>	<b>10.5</b>	<b>15.1</b>	<b>0.9</b>	<b>15.7</b>	<b>0.7</b>	

Installed Capacity  
 Committed / Already Contracted Capacity  
 New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.

#### 4.2 THE DESIRABILITY OF THE PROPOSED ACTIVITY

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

- Lesser dependence on fossil fuel generated power - The deployment of the facility will have a positive macro-economic impact by reducing South Africa’s dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.
- Increased surety of supply - By diversifying the sources of power in the country, the surety of supply will increase. The power demands of South Africa are ever increasing and by adding solar power this demand can be met, even exceeded without increasing pollution in relation to the use of fossil fuels. The project has the potential of “securing” economic activity by assisting in removing supply constraints if Eskom generation activities result in a supply shortfall. When supply is constrained it represents a limitation to economic growth. When a supply reserve is available, it represents an opportunity for economic growth.
- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. The project will likely encounter widespread support from government, civil society and businesses,



all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment. The location of the proposed development within the Ditsobotla Local Municipality is desirable since this municipality has been categorized as a Priority 1 Investment Area in the Province. (Ditsobotla IDP, 2018).

- 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 14 725 MW of electricity from renewable energy as per the Renewable Energy Independent Power Producer Procurement (REIPPP) Programme of the Department of Mineral Resources and Energy. The Government will soon be initiating the procurement of an additional 11 800 MW of renewable energy as stated during the 2021 State of the Nation Address.
- 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 CO<sub>2</sub> 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 800 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 – Due to the climate limitations, the site is totally unsuitable for cultivated crops, and viable agricultural land use is limited to grazing only. 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 landowner with increased cash flow and rural livelihood, and thereby improve the financial sustainability of agricultural activities.
- Increased access to electricity: The Ngaka Modiri Molema District Municipality's IDP (2020) highlights that according to the 2016 Community Survey, 89,4% of households have access to electricity for lighting. This figure declines for the local municipality where 88,1% have access to electricity for lighting.
- Cumulative impacts of low to medium significance – No cumulative impacts with a high residual risk have been identified. In terms of the desirability of the development of sources of renewable energy therefore, it may be preferable to incur a higher cumulative loss in such a region as this one, than to lose land with a higher environmental value elsewhere in the country.

## 5 DESCRIPTION OF ENVIRONMENTAL ISSUES

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

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

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

(i) details of all the alternatives considered;

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

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

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

(ix) the outcome of the site selection matrix;

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

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

### 5.1 CONSIDERATION OF ALTERNATIVES

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

An initial site assessment (refer to Appendix D) was conducted by the developer on the Portion 4 of the farm Houthaaldoors 2 and the farm was found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. The site selection also took the site geology, land capability, water availability and land use into consideration before deciding on the specific site. A single alternative site on the same farm has been identified (Subsolar, 2021).

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

### **5.1.1 No-go alternative**

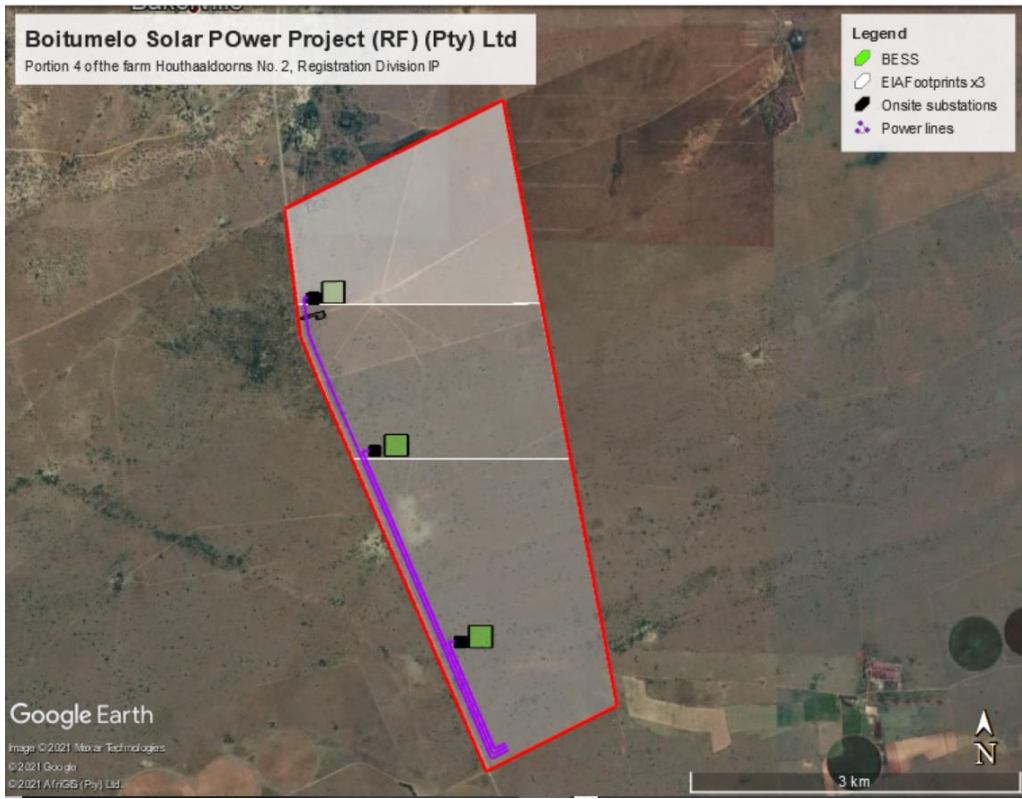
This alternative considers the option of 'do nothing' and maintaining the status quo. The description provided in section 3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for grazing for livestock farming (refer to the photographs of the site). The area has limited agricultural potential and is unsuitable for cultivation. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

### **5.1.2 Location alternatives**

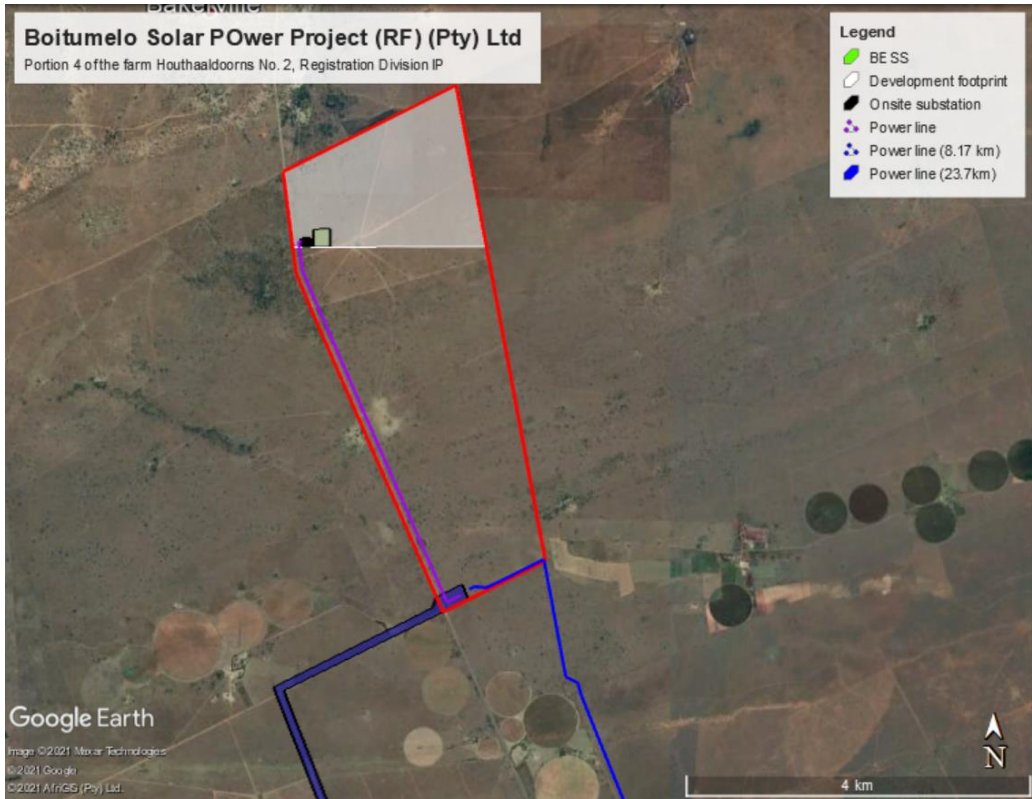
This alternative asks the question, if there is not, from an environmental perspective, a more suitable location for the solar power plant. No other properties have at this stage been secured by Boitumelo Solar Power Plant (RF) (Pty) Ltd in the Lichtenburg area to potentially establish the Boitumelo solar power plant. From a local perspective, the Portion 4 of the farm Houthaaldoors 2 is preferred due to its suitable climatic conditions, topography (i.e. in terms of slope), environmental conditions (i.e. agricultural potential, ecological sensitivity and archaeology), proximity to a grid connection point (i.e. for the purpose of electricity evacuation), as well as site access (i.e. to facilitate the movement of machinery, equipment, infrastructure and people during the construction phase).

The proposed development falls within an area used for grazing and the site is therefore considered to have limited environmental sensitivity as a result. In terms of the DFFE screening tool the entire proposed site is classified as less than high (low to medium) sensitive for impacts on agricultural resources (refer to Appendix B for the screening report). The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability. Therefore, the agricultural potential is limited on site and the land use change is unlikely to result in significant impacts on national agricultural production.

No alternative areas on the Portion 4 of the farm Houthaaldoors 2 have been considered. The development footprint of this project together with two additional proposed developments will cover the entire area of the farm (refer to figure 5.1). However, provision was made after the initial investigation and specialist studies to exclude any sensitive areas or no-go areas recommended by the specialist, such as the heritage objects. Therefore, a single preferred location alternative was assessed – refer to Figure 5.2. The size of the site made provision for the exclusion of any sensitive environmental features that arose as part of the EIA proses.



**Figure 5.1:** Location of the three SPP development footprints on the Portion 4 of the farm Houthaalddoorns 2



**Figure 5.2:** Location of the preferred alternative for the Boitumelo Solar Power Plant on the Portion 4 of the farm Houthaalddoorns 2

### 5.1.3 Activity alternatives

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

- Photovoltaic (PV) solar facility – Boitumelo Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Boitumelo Solar Power Plant (RF) (Pty) Ltd is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values for of the Lichtenburg area – refer to Figure 5.3. The technology furthermore entails low visual impacts, have relatively low water requirements, is a simple and reliable type of technology and all the components can be recycled.

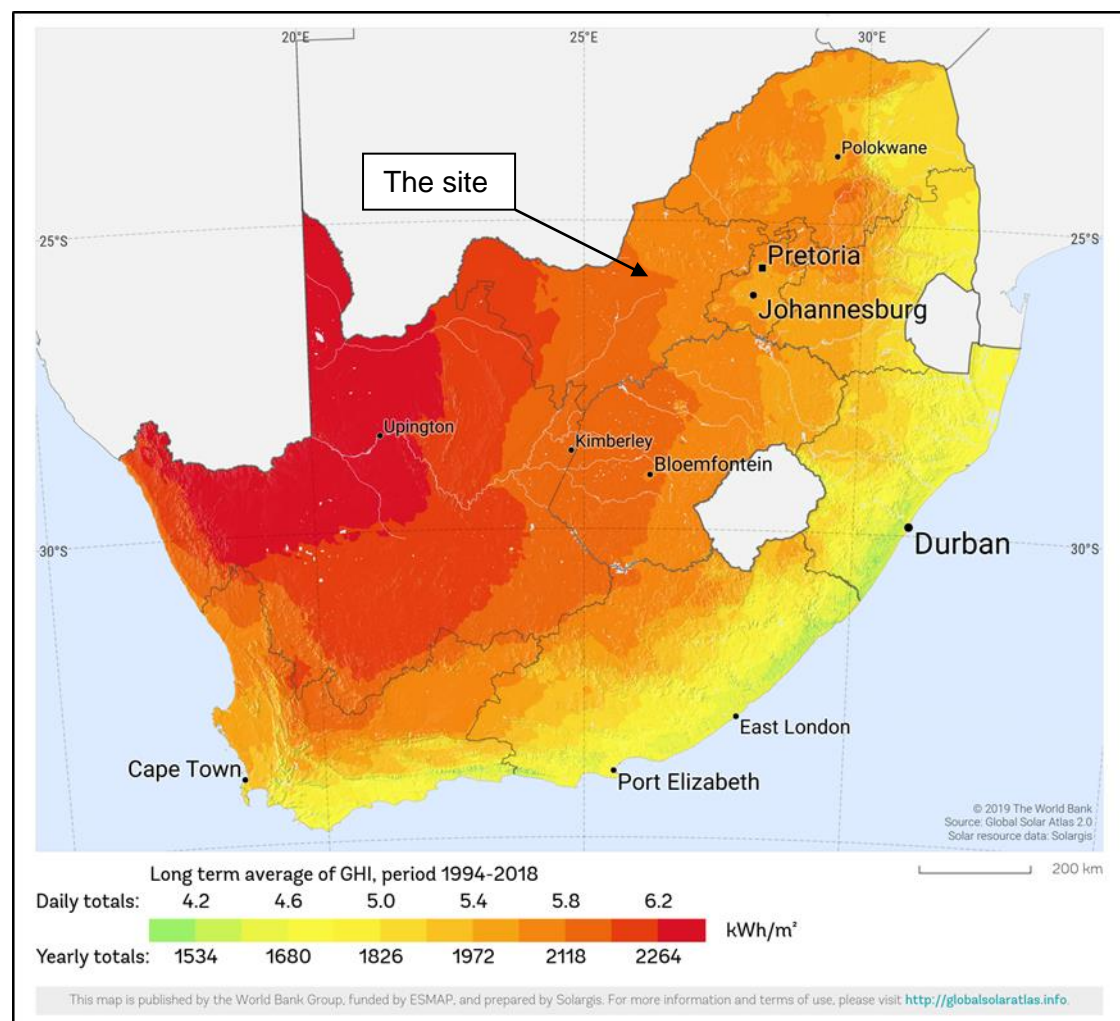


Figure 5.3: Global horizontal irradiation values for South Africa (SolarGIS, 2021)

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

- Concentrated solar power (CSP) technology - CSP technology requires large volumes of water and this is a major constraint for this type of technology considering the water challenges and limitation experienced not only in the country but also the local area. While the irradiation values are high enough to generate sufficient solar power, the water constraints render this alternative not feasible. It must also be noted that the IRP no longer includes the use of CSP as part of the energy mix of the country. Therefore, this alternative will not be considered further in this report.

#### 5.1.4 Technical alternatives

Possible technical alternatives for the development of a solar PV facility needs to be considered during the EIA process.

##### 5.1.4.1 Distribution lines

It is expected that generation from the facility will tie in with the Watershed 275/132/88 MTS Substation. One route is proposed from the onsite substation to the collector station situated on the property. Whereas two possible connection corridor routes are proposed from the collector station to the Watershed 275/132/88 MTS Substation. Within the preferred corridor (South east of farm) a new line of approximately 12km will be constructed to the Watershed MTS or alternatively, one of the existing Eskom lines will be upgraded. For the alternative corridor (South west of the farm) a new line of approximately 14km will be constructed to the Watershed MTS. The proposed power line was assessed within a 100m wide corridor and where existing lines are located, approximately 150m. The area surrounding the substation was also assessed to allow for micro siting. At this stage the shortest route is the preferred alternative. A 132kV overhead distribution line is the only preferred alternative for the applicant due to the following reasons:

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

The overall weather conditions in the North West Province are unlikely to cause damage and faults on the proposed overhead distribution 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 associated with overhead distribution lines these 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 Distribution Lines** - Underground cables have generally been used where it is impossible to use overhead lines (for example due to space constraints). Underground cables are oil cooled and are also at risk of groundwater contamination. Maintenance is also difficult on underground lines compared to overhead lines. When a fault occurs in an underground cable circuit, it is almost exclusively a permanent fault due to poor visibility. Underground lines are also more expensive to construct than overhead lines.

#### **5.1.4.2 Battery Energy Storage Facility (BESS)**

It is proposed that a nominal up to 500 MWh Battery Energy Storage Facility for grid storage would be housed in stacked containers, or multi-storey building, with a maximum height of 8m and a maximum volume of 1,740m<sup>3</sup> of batteries and associated operational, safety and control infrastructure. Three types of battery technologies are being considered for the proposed project: Lithium-ion, Sodium-sulphur or Vanadium Redox flow battery. While there are various battery storage technologies available, the preferred alternative is the utility-scale Lithium-ion (Li-ion) battery energy storage. Li-ion batteries have emerged as the leading technology in utility-scale energy storage applications because it offers the best mix of performance specifications, such as high charge and discharge efficiency, low self-discharge, high energy density, and long cycle life (Divya KC et al., 2009).

Battery storage offers a wide range of advantages to South Africa including renewable energy time shift, renewable capacity firming, electricity supply reliability and quality improvement, voltage regulation, electricity reserve capacity improvement, transmission congestion relief, load following and time of use energy cost management. In essence, this technology allows renewable energy to enter the base load and peak power generation market and therefore can compete directly with fossil fuel sources of power generation and offer a truly sustainable electricity supply option.

#### **5.1.5 Design and layout alternatives**

Design alternatives were considered throughout the planning and design phase (i.e. what would be the best design option for the development?). In this regard discussions on the design were held between the EAP and the developer, which also included the consideration of sensitive environmental areas and features present as identified by the independent specialists that needs to be avoided by the placement of infrastructure. A draft layout plan is included as figure H but it should be noted that the final layout plan will be submitted as part of the EIA Report.

The layout follows the limitations of the site and aspects such as environmental sensitive areas (supported by specialist input), roads, fencing and servitudes are considered. The total surface area proposed for layout options include the PV panel arrays spaced to avoid shadowing, access and maintenance roads and associated infrastructure (buildings, power inverters, power lines, BESS and perimeter fences). With regards to the structure orientation, the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.



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:

#### Steel lattice towers:

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 than 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:

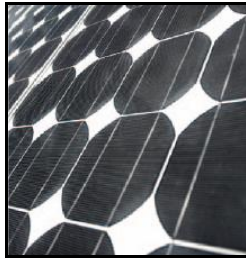
Wood pole structures are only used in extreme circumstances where a visual impact needs to be avoided. Wood pole structures may be cheaper to produce and to construct, but they have one tenth of the lifespan of the metal counterparts and are far more susceptible to weather conditions which makes them 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.

### **5.1.6 Technology alternatives**

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

- Crystalline (high efficiency technology at higher cost):

Crystalline silicon panels are constructed by first putting a single slice of silicon through a series of processing steps, creating one solar cell. These cells are then assembled together in multiples to make a solar panel. Crystalline silicon, also called wafer silicon, is the oldest and the most widely used material in commercial solar panels. Crystalline silicon modules represent 85-90% of the global annual market today. There are two main types of crystalline silicon panels that can be considered for the solar facility:



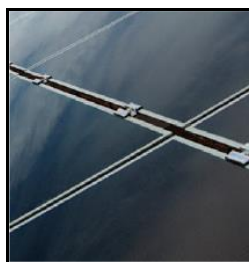
- Mono-crystalline Silicon - mono-crystalline (also called single crystal) panels use solar cells that are cut from a piece of silicon grown from a single, uniform crystal. Mono-crystalline panels are among the most efficient yet most expensive on the market. They require the highest purity silicon and have the most involved manufacturing process.



- Poly-crystalline Silicon – poly-crystalline panels use solar cells that are cut from multifaceted silicon crystals. They are less uniform in appearance than mono-crystalline cells, resembling pieces of shattered glass. These are the most common solar panels on the market, being less expensive than mono-crystalline silicon. They are also less efficient, though the performance gap has begun to close in recent years (First Solar, 2011).

- Thin film (low-cost technology with lower efficiency):

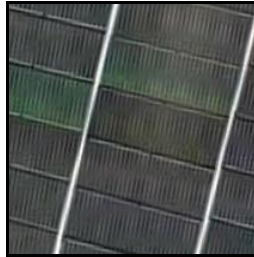
Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief, most thin film panels are not flexible. Overall, thin film solar panels offer the lowest manufacturing costs, and are becoming more prevalent in the industry. Thin films currently account for 10-15% of global PV module sales. There are three main types of thin film used:



- Cadmium Telluride (CdTe) - CdTe is a semiconductor compound formed from cadmium and tellurium. CdTe solar panels are manufactured on glass. They are the most common type of thin film solar panel on the market and the most cost-effective to manufacture. CdTe panels perform significantly better in high temperatures and in low-light conditions.



- Amorphous Silicon - Amorphous silicon is the non-crystalline form of silicon and was the first thin film material to yield a commercial product, first used in consumer items such as calculators. It can be deposited in thin layers onto a variety of surfaces and offers lower costs than traditional crystalline silicon, though it is less efficient at converting sunlight into electricity.



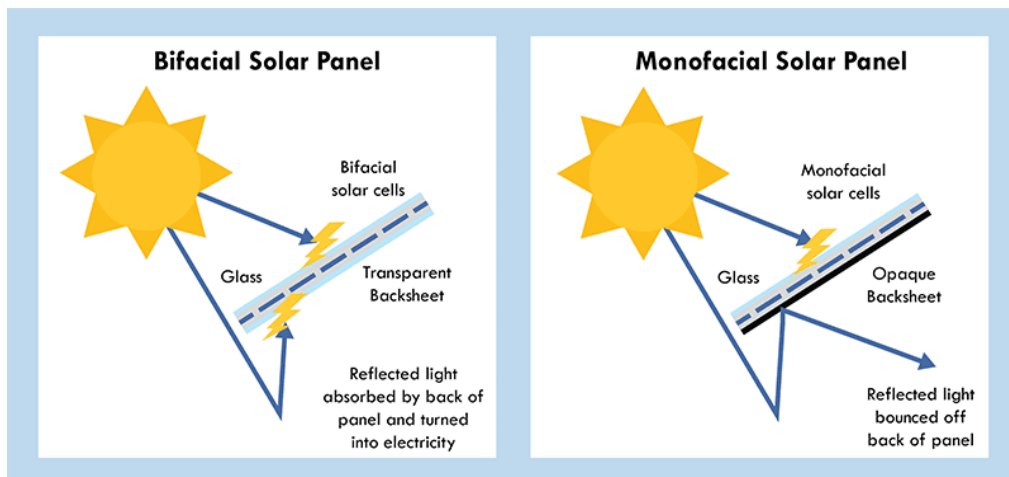
- Copper, Indium, Gallium, Selenide (CIGS) - CIGS is a compound semiconductor that can be deposited onto many different materials. CIGS has only recently become available for small commercial applications, and is considered a developing PV technology (First Solar, 2011).

- **Bifacial panels:**

As the name suggests, bifacial solar panels have two faces, or rather, they can absorb light from both sides of the panel. A lot of potential energy transfer is lost in traditional solar cells when the light hits the back of a solar panel. Most bifacial solar panels use monocrystalline cells, whereas traditional cells use polycrystalline materials. The monocrystalline materials, alongside the clear light pathway on both sides of the panel, enable the light to be absorbed from either side of the cell, and it is thought that, that the overall efficiency of these cells can be up to 30% greater in commercial applications. Although, the exact amount is variable depending on the surface that they are installed on. The front side of the solar panel still absorbs most of the solar light, but the back side of the solar panel can absorb between 5-90% of the light absorbed by the front of the solar panel.

Traditional solar panels use an opaque back sheet. By comparison, bifacial solar panels either have a clear/reflective back sheet or have dual panes of glass. Most of these solar panels are frameless so any issues with potential-induced degradation (PID) are reduced. To efficiently convert light into electricity from both sides, bifacial solar cells have selective-area metallization schemes that enable light to pass between the metallized areas, rather than the conventional thick metal collectors as seen with monofacial solar panels.

The technology that (at this stage) proves to be most feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.



**Figure 5.4:** Bifacial vs Monofacial Solar Panel absorption.

### 5.1.6.1 Overhead power line

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 many years for the existing environmental conditions and terrain as specified in the 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; and
- 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 minimise 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 offline as one of the double circuit lines would still be able to supply electricity. However, due to the rapid requirement changes, this will only be determined before construction.

## 5.2 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; and
- 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 in line with the approved public participation plan (refer to Appendix C1):

- 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 (Noordwester) on the 11 June 2021 (see Appendix C2) 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 (by 12 July 2021).

- Site notices

Site notices were placed on site in Afrikaans, English and Setswana on 13 April 2021 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 17 May 2021. Photographic evidence of the site notices is included in Appendix C3.

- Direct notification of identified I&APs

Identified I&APs, including key stakeholders representing various sectors, has been directly informed of the EIA process via registered post, telephone calls, WhatsApps and emails. For a complete list of I&APs with their contact details see Appendix C4 to this report. It was expected from I&APs to provide their inputs and comments by 5 July 2021. To date comments have been received from SAHRA.

- Direct notification of surrounding landowners and occupiers

Written notices were also provided via registered post, WhatsApp or email to all surrounding landowners and occupiers on 4 June 2021. The surrounding landowners were given the opportunity to raise comments within 30 days. Eight farmer's contact details could be obtained – refer to figure 5.5. For a list of surrounding landowners see Appendix C4. The surrounding landowners were given the opportunity to raise comments by 5 July 2021. To date comments have been received from Afrisam cement.



Figure 5.5: Surrounding Landowners

- Circulation of Draft Scoping Report

Copies of the draft Scoping report were provided to all I&APs via couriers, Dropbox and/or email. Hard copies of the report were made available on request. I&AP's and organs of state were requested to provide their comments on the report from 24 July 2021 until 23 August 2021. All issues identified have been recorded and documented and compiled into a Comments and Response Report included as part of the Final Scoping Report.

### **5.2.2 Consultation process**

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

### **5.2.3 Registered I&APs**

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

This report is the Draft Scoping Report and will be made available to all potential and/or registered I&APs and State Departments. They will be provided with a copy of the Draft Scoping Report and will be requested to provide written comments on the report within 30 days. All issues identified during this review period will be documented and compiled into a Comments and Response Report to be included as part of the Final Scoping report.

### **5.2.4 Issues raised by I&APs and consultation bodies**

To date comments have been received from some consultation bodies and is summarised in the Comments and Response Report included in Appendix C5. Any comments received during the circulation of the draft Scoping Report will be summarised in the final Scoping Report. The full wording and original correspondence are 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.

#### **5.3.1.1 Geology**

A review of the geological map of Rustenburg (map series 2526, scale 1: 250 000) and West and (map series 2626, scale 1: 250 000) indicates the site to be underlain by chert-rich dolomite, with much of the site (Watershed 2 and 3) also with interbedded banded chert, of the Monte Christo Formation, Malmani Subgroup, Chuniespoort Group. The sites are directly underlain by dolomitic rocks of the Malmani Subgroup. Thus, this site is considered to be dolomitic. A topographical survey of the sites, provided by the Client, was analysed for the presence of typical dolomitic features, such as circular or linear depressions associated with sinkhole or doline formation. None were observed.

The specialist conducted the fieldwork on 4-5 March 2021. It comprised the mechanical excavation of trial pits by Bell 35SL tractor loader backhoe (TLB). The trial pit profiles were logged from surface by observing the excavation progress and examination of the exposed in-situ profiles and soil arisings. Representative samples were recovered from the individual strata within the trial pits for laboratory testing. The profile over the Watershed sites comprises a thin cover of generally gravelly topsoil overlying loose to medium dense and medium dense to dense sandy gravel with cobble and boulder sized inclusions. As is typical for a dolomite profile, the gravel, cobbles and boulders comprised weathered chert (chert rubble). Approximately half of the trial pit excavations either extended to full depth (~3.0 m below EGL) or were stopped at approximately 2.5 m below EGL due to access hinderances by protruding boulders from the excavation faces or slow progress in cobble layers. Within the remaining trial pits, refusal occurred on boulders at depths of between 0.7-2.4 m below EGL. Where the trial pits were excavated to full depth some sidewall instability was observed. At 2no. locations in Watershed 2 (LW/T14 and LW/T16), very soft to soft rock dolomite was observed at the base of the trial pits. No groundwater was encountered within the trial pits.

Laboratory tests were scheduled to confirm the observations made during on-site investigations, to establish indicative engineering parameters and identify any problem soils that may be present. The various tests and pertinent information from these tests are summarised in geotechnical report (refer to Appendix E2).

The sample material type descriptions indicated in Table 4-1 are taken from the laboratory testing results and purely based on the grading percentages. In general, and in reality, soils exhibiting greater than 30% clay particles will act as a clay from the point of view of potential expansion and materials properties. The tests generally showed the soils to be of low plasticity or non-plastic.

The soils subsequently generally classify as “Low” potential expansiveness, according to the Van der Merwe method (The Prediction of Heave from the Plasticity Index and Percentage Clay Fraction of Soils, D.H. Van der Merwe, 1964). However, the Van der Merwe method of clay expansiveness assessment is known to be problematic when predicting heave in certain soil types (Expansive Soils – State of the Art, AAB Williams, JT Pidgeon and PW Day, 1985). The low linear shrinkage and low clay content indicates this is not likely to influence the expansiveness characteristics of the soils.

#### Ground Conditions

The profile over the 3no. Watershed sites comprises a thin cover of generally gravelly topsoil overlying loose to dense sandy gravel with cobble and boulder sized inclusions. As is typical for a dolomite profile, the gravel, cobbles and boulders comprised weathered chert (chert rubble). Generally, the trial pits were excavated to full depth (~3 m below EGL) or were stopped at approximately 2.5 m due to hinderances, such as slow excavation or boulders in the pit side wall.

Within the trial pits clustered at the southern boundary of Watershed 1 and the boundary between Watershed 2 and 3, extending approximately halfway into Watershed 3, refusal occurred on boulders at depths of between 0.7-2.4 m below EGL. It is assumed that the boulder layer indicates the transition between the soil and rock mass profiles and shallow rock mass is anticipated underlying the boulders.

The thickness of the boulder layer, and thus depth to rock mass should be identified during the percussion borehole drilling for the dolomite stability investigation as part of the detailed design phase.

Where the trial pits were excavated to full depth some sidewall instability was observed.

At two locations in Watershed 2 very soft to soft rock dolomite was observed at the base of the trial pits and is likely to be relatively shallow (<4 m below EGL) across the sites, likely directly underlying the cobble and boulder layers that were unable to be penetrated by the TLB.

Laboratory testing undertaken on soil samples indicate the gravelly soils across the site to be low- and non-expansive and good quality construction materials (G5-G6, COLTO, 1998).

#### Groundwater Conditions

No groundwater was observed within the trial pits. However, shallow/surface perched water tables are anticipated to form at the interface between soils and rock mass following heavy and/ or sustained rainfall.

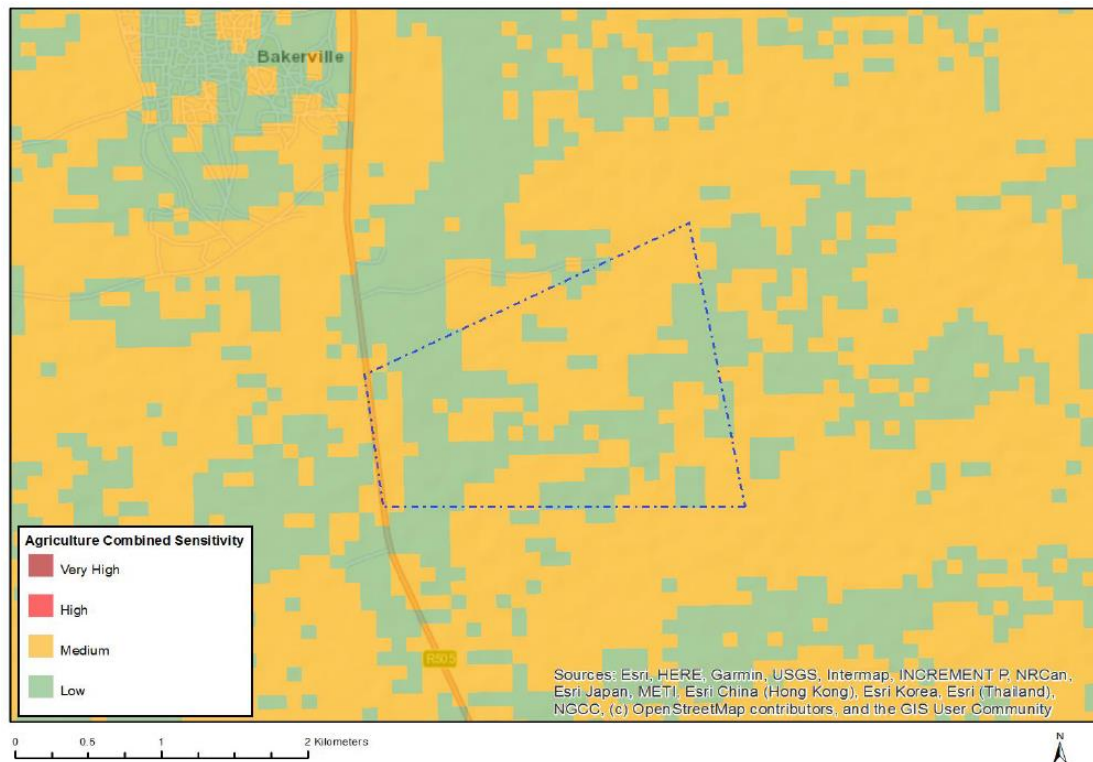
Foundation recommendations are provided in the geotechnical study (refer to Appendix E2).

#### **5.3.1.2 Soils and agricultural potential**

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A Land type unit is a unique combination of soil pattern,

terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type unit represented within the study area is the Fa10 land type (Land Type Survey Staff, 1987) (ENPAT, 2001). The soils of this land type is Glenrosa and/or Mispah forms (other soils may occur), lime rare or absent in the entire landscape (refer to Appendix E3 for the terrestrial biodiversity report).

The entire proposed site is classified on the screening tool as less than high (low to medium) sensitivity for impacts on agricultural resources (refer to figure 5.6). The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability. This has been confirmed by the site sensitivity verification. The level of agricultural assessment that is required for sites of less than high sensitivity is an Agricultural Compliance Statement. Because of the less-than-high sensitivity of the site, agricultural impacts are of low significance and are acceptable. The agricultural compliance statement must be applicable to the preferred site and proposed development footprint. The statement will therefore be complete once the layout of the facility has been finalised based on the sensitivities identified for the other specialist disciplines during the scoping phase. The statement will therefore be included as part of the EIR.



**Figure 5.6:** The proposed development site (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium).

### 5.3.1.3 Vegetation and landscape features

The proposed site is situated in the Grassland biome (Mucina & Rutherford, 2006), which is characterised by herbaceous vegetation of relatively short and simple structure that is dominated by graminoids, usually of the family Poaceae. Woody plants are rare (usually low to medium-sized shrubs) or absent or are confined to specific habitats, such as smaller

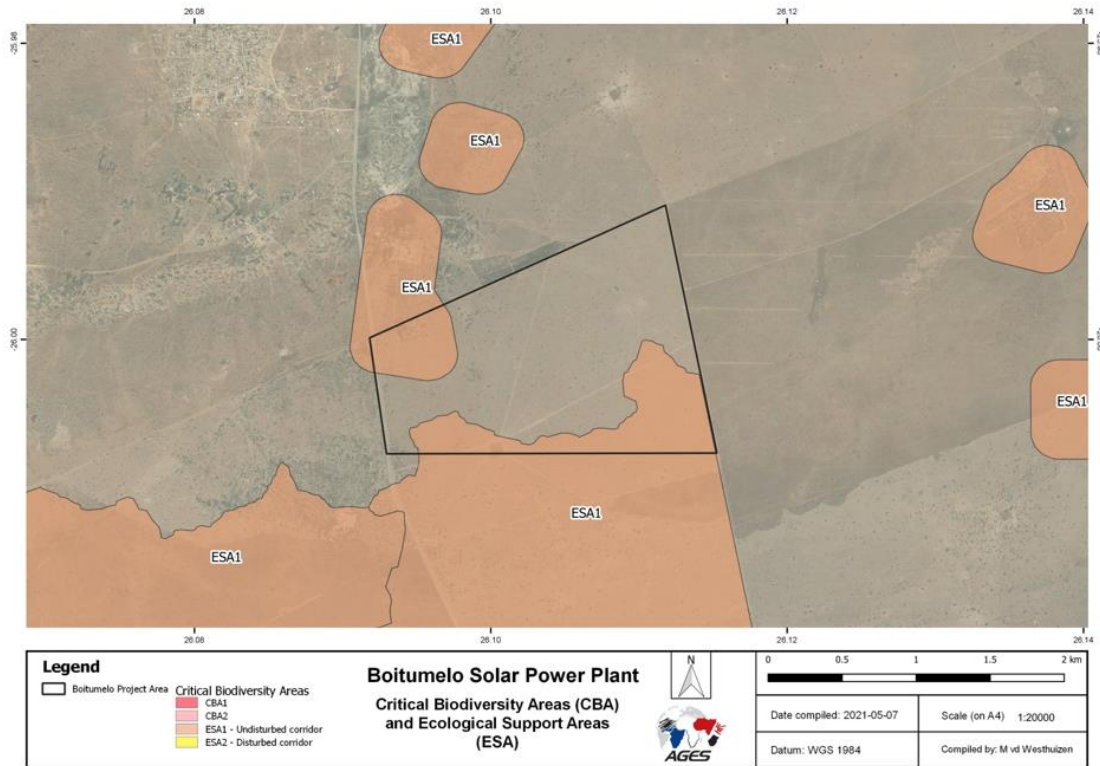
escarpments or koppies. Core grassland areas usually have deep, fertile soils although a wide spectrum of soil types occurs. Precipitation is strongly seasonal, and the growing season lasts approximately half the year (Mucina & Rutherford, 2006).

Mucina and Rutherford (2006) describes the Carletonville Dolomite Grassland as slightly undulating plains dissected by prominent rocky chert ridges. It is species-rich grasslands forming a complex mosaic pattern dominated by many species. Dominant species includes *Vachellia karroo*, *Eucalyptus camaldulensis*, *Asparagus laricus*, *Elephantorrhiza elephantina*, *Physalis viscosa*, *Verbena officinale*, *Panicum maximum*, *Heteropogon contortus*, *Loudetia simplex* and *Themeda triandra*. The conservation status of the Carletonville Dolomite Grassland vegetation unit is Least Concern according to the newest Vegetation Map classification (SANBI, 2018). The project area is not located in a threatened ecosystem, it is however located 15 km north of the Endangered Western Highveld Sandy Grassland, (SANBI, 2011).

#### Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes (SANBI Biodiversity Advisor, 2017).

Sections of the project area (approximately 30%) falls into an Ecological Support Area 1 (ESA1) (Schaller & Desmet, 2015; North West Province of Rural, Environment and Agriculture Department, 2015) (refer to figure 5.7).



**Figure 5.7:** CBAs and Ecological Support Areas

Protected Areas (PA) and National Protected Area Expansion Strategy (NPAES)

Officially protected areas, either Provincially or Nationally that occur close to a project site could have consequences as far as impacts on these areas are concerned. The Lichtenburg Game Breeding Centre is located approximately 5 km south of the development site. The breeding centre is operated by the National Zoological Gardens of South Africa, and is there mainly to further the breeding programmes of endangered species already in place by the National Zoo, and to supplement the populations of local and international zoos.

The National Protected Area Expansion Strategy (NPAES) sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The project area does not fall into a National Protected Area Expansion Strategy (NPAES) area, but it is located 14 km south of the Gauteng Bushveld NPAES (Government of South Africa, 2008).

Red Data, Protected and Endemic Plant Species

According to the Terrestrial biodiversity impact assessment (refer to Appendix E3), no nationally protected plants (NEMBA listed species, 2005) were recorded on site. The following plants that are protected according to North West Biodiversity Management Act No. 4 of 2016 were recorded at the project area:



**Figure 5.8:** Protected plant species *Euphorbia clavarioides*, *Euphorbia inaequilatera*, *Euphorbia schinzii* and *Pellaea calomelanos*

A permit should be obtained from authorities should any of these species be eradicated during the construction process. In terms of a part of section 15(1) of the National Forests Act No. 84 of 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister. No protected trees were recorded.

Six endemic species were recorded, namely: *Anacampseros filamentosa*, *Cucumis heptadactylus*, *Dipcadi ciliare*, *Euphorbia clavarioides*, *Gymnosporia polyacantha* and *Hermannia cordata*.

#### Alien Invasive Species

According to the Terrestrial biodiversity impact assessment (refer to Appendix E3) five category 1b declared invaders were recorded in the site. Category 1 plants are prohibited plants which must be controlled or eradicated. These plants serve no economic purpose and possess characteristics that are harmful to humans, animals or the environment. Category 1b plants are widespread invasive species controlled by a management program. The five invaders recorded include: *Cirsium vulgare*, *Flaveria bidentis*, *Malvastrum coromandelianum*, *Verbena bonariensis* and *Verbena brasiliensis*. Alien invasive weeds are widespread and are a reflection of human induced impacts.

#### National Freshwater Ecosystem Protected Areas (NFEPAs)

There is no NFEPAs wetlands or rivers in the proposed development footprint or within the 500 m buffer around the footprint (Nel et al., 2011).

#### **5.3.1.4 Climate**

Lichtenburg is 1486m above sea level and the climate of the area is a local steppe climate. There is not much rainfall in Lichtenburg all year long. The Köppen-Geiger climate classification is BSk. The temperature here averages 17.3 °C. The rainfall is around 609 mm per year (Climate-data.org, 2021).

#### **5.3.1.5 Biodiversity**

The primary cause of loss of biological diversity is habitat degradation and loss (IUCN, 2004; Primack, 2006). In the case of this study special attention was given to the identification of

sensitive species or animal life and birds on site. The following section will discuss the state of biodiversity on the site in more detail.

#### **5.3.1.5.1 Avifaunal**

According to the Avifaunal Assessment conducted in April 2021 (refer to Appendix E4), the resident avifaunal community is diverse, with relatively high species richness and moderate abundances. The site surveys yielded 69 bird species. The typical species occurring on the SPP site are common across the western Highveld, with good representation from the widespread larks, cisticolas, finches, shrikes, and whydahs in particular. Aerial feeding bee-eaters, swallows, and swifts were not well represented; however, gamebirds and raptors were reasonably well represented on site. Many palearctic migrants were still present on the site, however, most intra-African migrants appear to have departed.

Some priority species were recorded on the site (Cape Vulture, White-backed Vulture); some have been confirmed for the wider SABAP2 pentads in similar habitats (Lanner Falcon, Secretarybird, European Roller, Lappet-faced Vulture, Marabou Stork, Martial Eagle) or have a reasonable chance of at least occasional occurrence based on habitat and distribution (Red-footed Falcon, Pallid Harrier, Tawny Eagle, Blue Crane, Black-winged Pratincole, Abdim's Stork). The Red Data species listed above as occurring in the wider area or having reasonable likelihood of even occasional occurrence will be considered in the impact assessment and the methodology for mitigations.

There were two endemic or near-endemic species that were recorded on site during survey transects (Cloud Cisticola, Pied Starling) and many more had been previously recorded in the wider SABAP2 pentads (Cape White-eye, Fiscal Flycatcher, Karoo Thrush, South African Cliff Swallow) in similar habitat. All of the endemic or near-endemic species listed above have wide distributional ranges and reportedly healthy populations and should not present any substantial threats as a result of development of this site.

#### **5.3.1.5.2 Ecological**

The Terrestrial biodiversity impact assessment (refer to Appendix E3) confirmed that no animals were restricted or endemic to the area. The vegetation is characterised by grassland with bush clumps. There are some burrowing species, probably aardvarks (*Orycteropus afer*) and ground squirrels (*Xerus inauris*), which in turn provides burrows systems and bolt holes for other species, such as suricates and snakes to live in.

Much of the large and medium-sized mammal fauna that previously occurred on the project site is now locally extinct or occurs in small fragmented populations in reserves. The majority of the habitat types on the respective study site are fragmented. Therefore, the expected mammalian richness on these areas is considered low. Predators that may still roam freely in the area include larger predators such brown hyena, while smaller predators such as caracal, serval and honey badger are common throughout the larger area. Antelope species such as duiker and steenbok will roam freely through the area and are not restricted by game fences. Smaller mammal species such as honey badgers and serval can become habituated to anthropogenic influences, while other species such as brown hyena will rather move away

from the construction activities and will seldom use the area. Most mammal species are highly mobile and will move away during construction.

Breeding habitat of frogs and toads can be found in temporary ponds after rain in the grassland. Amphibian species potentially occurring in the larger area include Common River Frog, Gutteral Toad, Raucous Toad and Bubbling Kassina. These species are non-threatened and widespread, and as such the development will not have any impact on amphibian conservation within the region.

Several reptile species are likely to be present in the area. They are common and widespread, and as such the development will not have any impact on reptile conservation within the region.

#### **5.3.1.6 Visual landscape**

The visual impact of photovoltaic facility depends on the complex relationship between the visual environment (landscape), the development (object), and the observer/receptor (e.g. farmer). The establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area. Furthermore, the technology considered for this development will be non-reflective.

The site is located in an area with a low significance in elevation, meaning that the site is not located on a mountain or at the foot of a mountain, with an insignificant difference in elevation. The preferred site is located at an above mean sea level (amsl) of approximately 1527m at the highest elevation and at an amsl of 1516m at the lowest elevation. The landform and drainage described above is unlikely to limit visibility. The proposed development is not visible from the town of Lichtenburg or Bakerville, due to the elevation. Areas within 5km from the proposed development might have a clear view without taking existing screening into account. The only receptors likely to be impacted by the proposed development are the nearby property owners and on nearby roads (refer to figures 5.9 – 5.11).



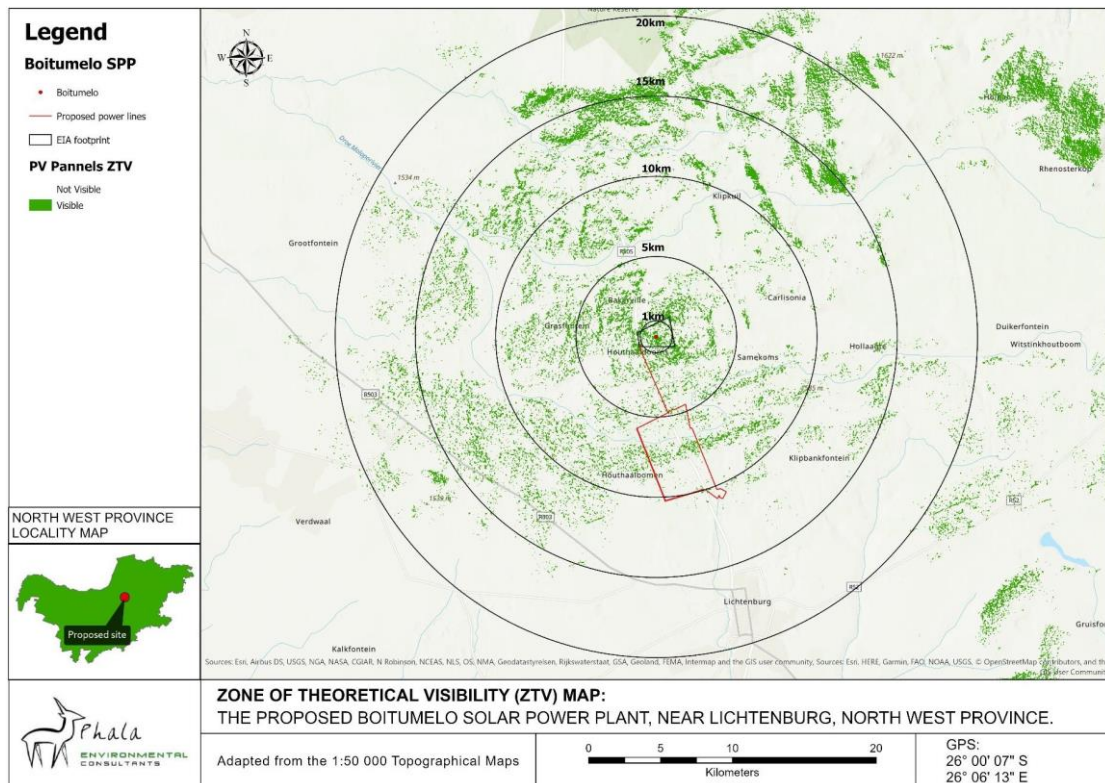


Figure 5.9: Zone of Theoretical Visibility (ZTV) for the Solar Power Plant

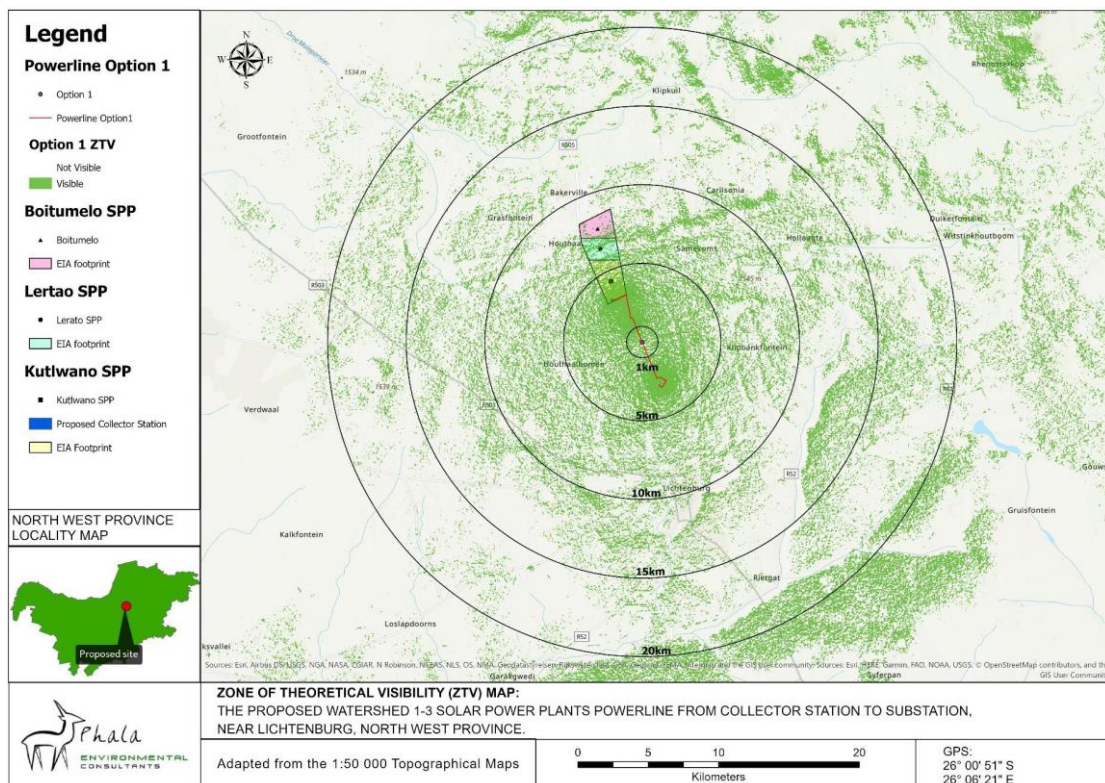
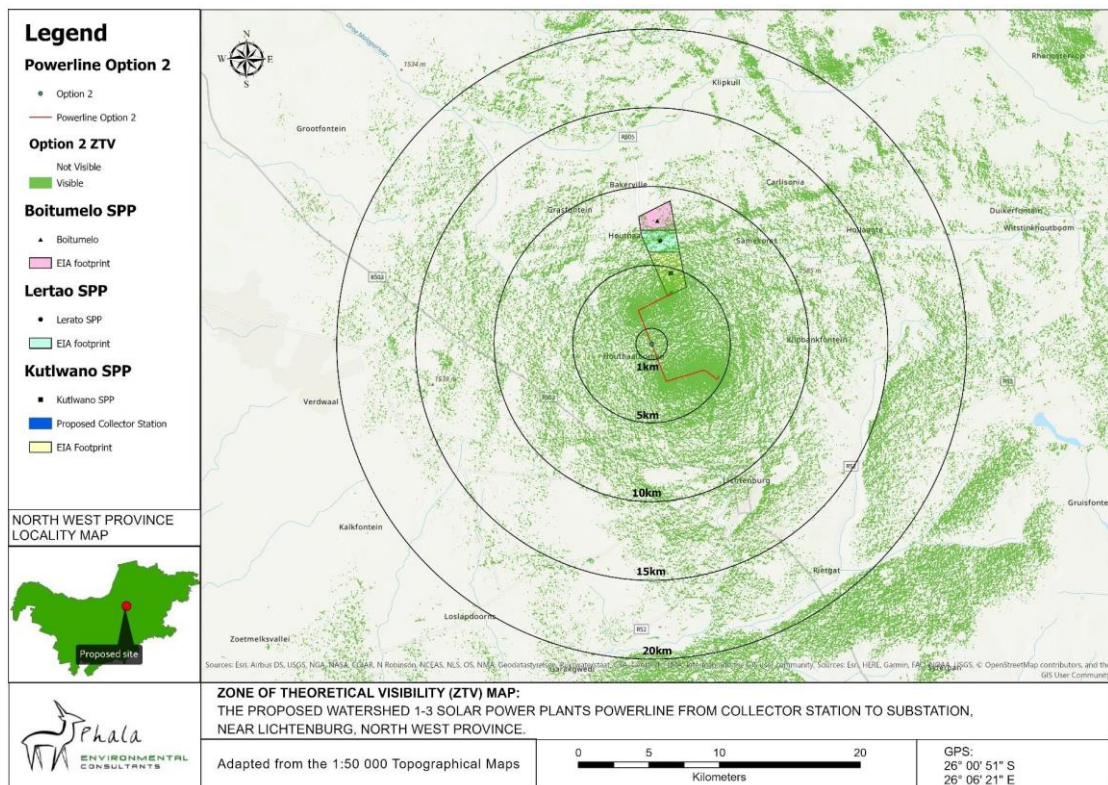


Figure 5.10: Zone of Theoretical Visibility (ZTV) for the preferred power line



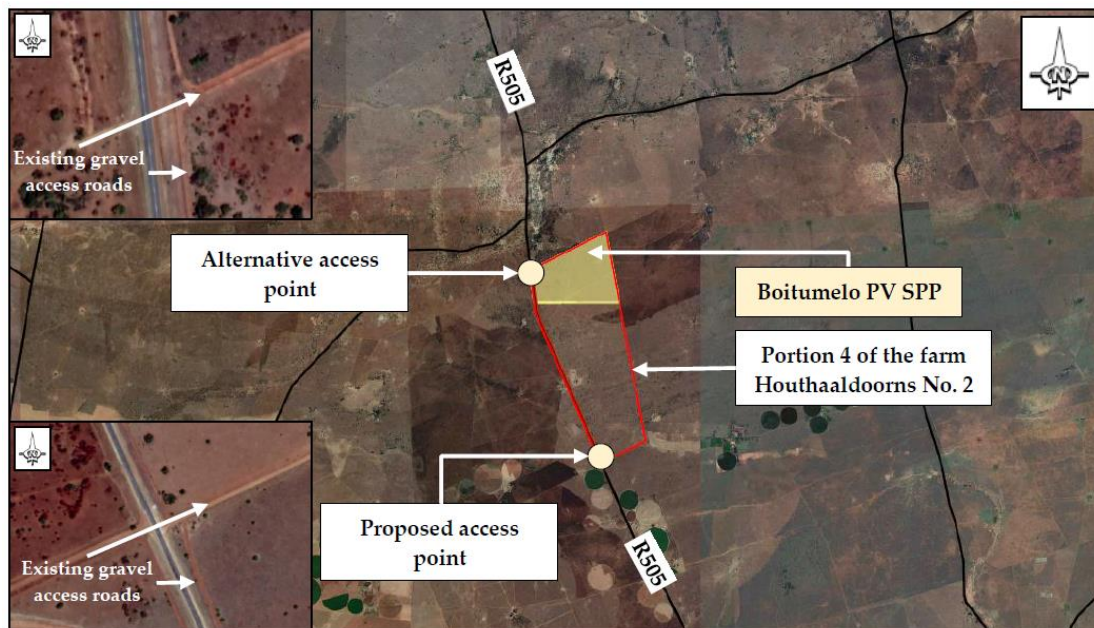
**Figure 5.11:** Zone of Theoretical Visibility (ZTV) for the power line alternative

In terms of possible landscape degradation, the landscape does not appear to have any specific protection or importance and is characterised by agricultural activities. No buffer areas or areas to be avoided are applicable for this development.

### 5.3.1.7 Traffic consideration

The site for the Boitumelo Solar Power Plant is located off Regional Road R505, where an existing gravel road will be utilised to access portion 4 of the farm Houthaaldoors No. 2. The existing gravel track is approximately 5.4 km in length. This gravel road will need to be suitably maintained. Re-gravelling may be necessary as a maintenance measure, from time to time, throughout the operational life of the solar power plant. The site access road is provided in Figure 5.12 below.





**Figure 5.12:** Site access road

According to the Traffic Impact Study (Appendix E9) the photovoltaic (PV) equipment and relevant components will be transported to portion 4 of the farm Houthaaldoorns No. 2 over a distance of 1420 km or 870 km from either the Port of Saldanha or the Port of Durban, respectively. The proposed Boitumelo SPP will generate additional traffic on the surrounding road network in three (3) distinct phases, namely: construction, operational and decommissioning. It must be noted that these three phases will generate traffic consecutively and not simultaneously, and therefore will be considered separately from each other.

Construction phase:

Trips generated during the construction phase will primarily comprise of transporting equipment, power plant components, personnel, construction and other facility materials. These trips will comprise of normal, medium and heavy vehicles. Another contributor to trips generated during the construction phase will be daily commuters/workers. The construction phase of Boitumelo SPP will generate approximately 23 329 trips over the fourteen (14) month period.

Operational phase:

The traffic impact during the operational phase will therefore be insignificant, as only thirty-five (35) people will work at the PV solar power plant.

Decommissioning phase:

The decommissioning phase will start at the end of the Boitumelo SPP lifetime (25 – 30 years) and will last approximately six (6) months, involving a team of fifty (50) workers. Same as with the operational phase, the traffic impact will be insignificant.

### **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**

According to the Social Impact Assessment (attached as Appendix E8) the construction phase for an entire SPP will extend over a period of 12-18 months. The anticipated capital expenditure value of the proposed Boitumelo SPP on completion will be approximately R1.5 Billion. The construction phase in terms of employment will employ approximately 800 workers and of those employment opportunities likely to be generated, approximately 60% will accrue to low skilled workers, 25% to semiskilled workers, and 15% to skilled workers. It is anticipated that the operation of the project is likely to create between 35-99 employment opportunities, comprising of low-skilled, semi-skilled, and skilled opportunities. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew.

The Ngaka Modiri Molema DM is a Category C municipality located in the North West Province. It is situated centrally within the province and shares an international border with Botswana. It is comprised of five local municipalities: Mahikeng, Ratlou, Ramotshere Moiloa, Ditsobotla and Tswaing.

The Ngaka Modiri Molema DM covers an area of 28 114km<sup>2</sup> and is home to Mahikeng (previously Mafikeng), the capital of the province. Aptly named, the capital is nicknamed 'The City of Goodwill', which is also the city's slogan. It is a rapidly growing, modern, residential, administrative and commercial town, which contrasts with its fascinating history. The municipality has a total population of 889 108 according to the 2016 Community Survey, living in 269 977 households of which 89,4% have access to electricity for lighting and 41,2% are female headed. The DM had an unemployment rate of 33,78% and a youth unemployment rate of 44,1% in 2011 which contributed to a Dependency ratio of 64.5. The main economic sectors include: Agriculture, tourism and mining.

The Ditsobotla Local Municipality is a Category B municipality situated within the Ngaka Modiri Molema District in the North West Province. It is one of the five municipalities in the district, making up almost a quarter of its geographical area and covering 6 387km<sup>2</sup>. The seat of the local municipality is Lichtenburg. The municipality was established through the amalgamation of the former Lichtenburg, Coligny and Biesiesvlei Transitional Councils.

Its main attractions are cultural, heritage and agricultural museums; the burning vlei – a unique vlei consisting of the thick layers of subterranean peat that burnt for years, creating a rare natural phenomenon; the Lichtenburg Game Breeding Centre; Eufees and Duch Roode Dams, situated between the CBD and Burgersdorp; and Molopo Oog/Wondergat.

The LM has a total population of 181 865 according to the 2016 Community Survey, living in 54 154 households of which 88,1% have access to electricity for lighting, 31,1% have access to piped water inside the dwelling and 33,5% are female headed. The LM had a Dependency ratio of 46,1 in 2016.

The main economic sectors in the municipality are Manufacturing (38.5%), agriculture (16.5%), wholesale and retail (7.4%).

### **5.3.2.2 Cultural and heritage aspects**

According to the Heritage Impact Assessment (attached as Appendix E6) the cultural landscape qualities of the region essentially consist of a rural area in which the human occupation is made up of a limited Stone Age occupation. This was followed much later by Tswana-speaking agro-pastoralist that settled in the larger region. They were soon followed by a colonial (farmer) component, which gave rise to the development of small villages and towns that dot the larger landscape. The final transformation was brought about by the development of infrastructure in the region, such as roads and railway lines, which was extended due to large scale diamond mining activities.

#### Stone Age

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

Tools dating to the ESA and MSA periods are found in the vicinity of watercourses, e.g., the Molopo River and large numbers were also unearthed by the diamond mining activities in the Bakerville area.

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

#### Iron Age

Iron Age people started to settle in southern Africa c. AD 300, with one of the oldest known sites at Broederstroom south of Hartebeespoort Dam dating to AD 470. Having only had cereals (sorghum, millet) that need summer rainfall, Early Iron Age (EIA) people did not move outside this rainfall zone, and neither did they occupy the central interior highveld area.

As yet, no sites dating to the Early Iron Age have been reported from the region and most sites date to the Late Iron Age. The occupation of the larger geographical area (including the study area) did not start much before the 1500s. By the 16th century things changed, with the climate becoming warmer and wetter, creating conditions that allowed Late Iron Age

(LIA) farmers to occupy areas previously unsuitable, for example the treeless plains of the Free State.

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1957). To the east of them is found the baTloung, who, it is said, originally are of Ndebele origin. They left the Pretoria region and settled in the Rustenburg region, from where they moved to the Klerksdorp area. By the early 1800s they moved to the farm Putfontein, where the Hermannsburg Mission Society had established a mission station.

#### Historic period

The area was occupied by white farmers since the 1850s. As resources were few they depended on farming and hunting to survive. The town of Lichtenburg was founded in 1866 and proclaimed in 1873.

During the Anglo-Boer War, a number of skirmishes took place in the larger region. Most famous of these was the siege of Mafikeng, although a short battle was also fought in the town of Lichtenburg in March 1901 (Van den Berg 1996).

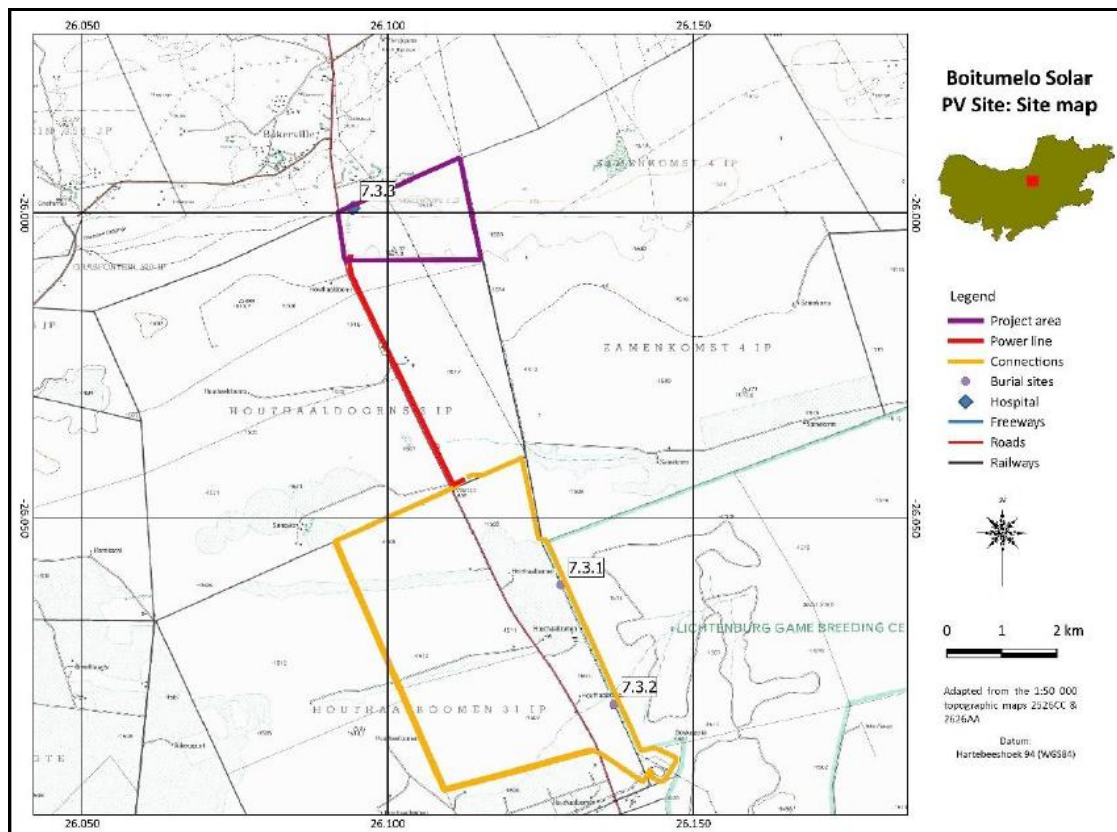
In the early twentieth century, diamonds were found in various places in the Lichtenburg district of the former Transvaal Province. However, it was only during the early 1920s that large quantities of diamonds were found, resulting in the proclamation of the Bakerville diamond fields (more correctly: the Lichtenburg-diamond field) in 1926. Thousands of miners swarmed to the area in search of wealth. At the height of activity, in 1927, an estimated 90 000 people were involved at the diamond fields. Bakerville was the most important of a number of settlements where the miners congregated. It was laid out in 1927 and is named after A W Baker, the then owner of the farm Uitgevonden 355JP. As early as 1928, activities started to decline - and continued to decline. Currently only a few people are involved in diamond mining in this area.

#### Site specific review

From a review of the available old maps and aerial photographs it can be seen that the project area has always been open space, with the main activity being grazing or the making of agricultural fields. The Imperial Map of South Africa indicates the farm Houthaaldoorns, but shows the road to Mafikeng located to the east of the farm.

South of Bakerville, the area is so devoid of natural as well as human made features, that it makes the georectification of the images virtually impossible. This is also the case even until the 1972 version of the 1:50 000 topographic map, where no built features are shown in the project area. This is even the case on the 2021 Google Earth image of the project area.

During the survey, the following sites, features and objects of cultural significance were identified in the project area (Fig. 5.13).



**Figure 5.13:** Location of heritage sites in the project area

No sites, features or objects of cultural significance dating to the Stone Age or the Iron Age were identified in the project area. However, the following were found from the historic period:

- Burial site: An informal burial site with probably more than 30 graves. Most are only marked with stone cairns. It is not fenced off and occur in close proximity of some houses.
- Burial site: An informal burial site with probably 50 graves, most marked only with stone cairns. The site is not fenced off and seems to be abandoned and no houses occur in it immediate vicinity.
- Hospital: The ruins of what has been determined to be the old Bakerville hospital. From aerial photographs it still seems to have been in operation during the 1940s. It probably served the diamond diggers community, which was located a short distance to the north and northwest.

### ***Palaeontology***

The solar facility and grid connection project areas are underlain near-surface and at depth by shallow marine carbonate bedrocks of the Monte Christo Formation (Malmani Subgroup, Chuniespoort Group, Transvaal Supergroup) of Precambrian age that are known to contain fossil stromatolites (laminated microbial bio-sedimentary structures) of various shapes and sizes (domes, columns etc). Desktop studies as well as a palaeontological site visit indicate

that exposure levels of Precambrian bedrocks within the project area (i.e. solar facility plus associated grid connection corridor) are generally poor due to low topographic relief and karstic weathering across an ancient land surface, widespread sandy soil and residual gravel cover and dense grassy vegetation. The stromatolite assemblages recorded within the solar power plant project area comprise common types that are likely to be widely distributed within the extensive outcrop area of the Monte Christo Formation. Unique, well-preserved occurrences of stromatolites of high scientific or conservation value have not been recorded here. Resistant-weathering silcrete bodies at surface might be of Late Cretaceous / Neogene age associated with the "African Land Surface" (unconfirmed). No occurrences of ancient (Cretaceous / Neogene) fluvial gravels or Late Cenozoic bone breccia within karstic solution hollows (best detected by geophysical surveying) were encountered during the short palaeontological field survey.

Pending the potential discovery of fossiliferous karst breccias or ancient (Cretaceous / Neogene) fluvial gravels, it is concluded that the palaeontological sensitivity of the site - including the solar power plant, 132kV grid connection corridor and all associated infrastructure - is Low.

#### **5.4 SITE SELECTION MATRIX**

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

The receptiveness of the site to PV Development includes the presence of optimal conditions for the siting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The Portion 4 of the farm Houthaaldoorns 2 where the project is proposed to be located is considered favorable and suitable from a technical perspective due to the following characteristics:

- Climatic conditions: Climatic conditions determine if the project will be viable from an economic perspective as the solar energy facility is directly dependent on the annual direct solar irradiation values of a particular area. The North West receives the highest average of direct normal and global horizontal irradiation daily. This is an indication that the regional location of the project includes a low number of rainy days and a high number of daylight hours experienced in the region. Global Horizontal Radiation of 2152 kWh/m<sup>2</sup>/year is relevant in the area.
- Site availability and access: The land is available for lease by the developer and consent has been provided by the affected landowner for the undertaking of the EIA process. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be easily obtained from the R505 Regional Road.
- Grid connection: In order for the PV facility to connect to the national grid a 132kV power line will be constructed within two identified 100m wide corridors towards



the Watershed 275/132/88 MTS Substation. Available grid connections are becoming scarce and play a huge role when selecting a viable site.

- Environmental sensitivities: From an environmental perspective the proposed site is considered highly desirable due to limited environmental sensitivities in terms of geology, and soils, agricultural potential, vegetation and landscape features, climate, biodiversity and the visual landscape – refer to Section 5.3.1 of this report. Due to the fact that the area proposed for development exclusively consists of land used for grazing, nothing of note was identified from an ecological or conservation point of view on the site apart from the heritage objects.

It is evident from the discussion above that the Portion 4 of the farm Houthaaldoorns 2 may be considered favourable and suitable in terms of these site characteristics. As mentioned previously, no alternative areas on Portion 4 of the farm Houthaaldoorns 2 have been considered. The development footprint of this project together with two additional proposed developments will cover the entire area of the farm. However, provision was made after the initial investigation and specialist studies to exclude any sensitive areas that may arise.

## **5.5 CONCLUDING STATEMENT ON ALTERNATIVES**

When considering the information provided by the specialists with regards to the site selection criteria, the site is identified as preferred due to fact that the opportunities presented on the site to develop the project in such a way which avoids the areas and features (including the associated buffers) of environmental sensitivity.

Therefore, development of the 150 MW Boitumelo Solar Power Plant on Portion 4 of the farm Houthaaldoorns 2, is the preferred option. The final layout will be included as part of the Environmental Impact Report EIR). It may be concluded that this is the only location that will be assessed in further detail.

## 6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

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

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

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

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

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

### 6.1 SCOPING METHODOLOGY

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

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

#### 6.1.1 Checklist analysis

The independent consultant conducted a site visit on 13 April 2021. The site visit was conducted to ensure a proper analysis of the site specific characteristics of the site. 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
<b>1. Are any of the following located on the site earmarked for the development?</b>				
I. A river, stream, dam or wetland		X		None.
II. A conservation or open space area	X			A portion of the site falls within an Ecological Support Area 1 as described in bioregional plans.
III. An area that is of cultural importance	X			The Heritage Impact Assessment (refer to Appendix E6) found two burials sites and ruins of a hospital from the historic period.
IV. Site of geological significance		X		None.
V. Areas of outstanding natural beauty		X		None.
VI. Highly productive agricultural land		X		None.
VII. Floodplain		X		None.
VIII. Indigenous forest		X		None.
IX. Grass land		X		None.
X. Bird nesting sites	X			The Avifaunal Study (refer to Appendix E4) states that large trees may serve as nesting and roosting sites for raptors and vultures.
XI. Red data species	X			The Avifaunal Study (refer to Appendix E4) identified some priority species on the site (Cape Vulture, White-backed Vulture) and some have been confirmed for the wider SABAP2 pentads in similar habitats or have a reasonable chance of at least occasional occurrence based on habitat and distribution.
XII. Tourist resort		X		None.
<b>2. Will the project potentially result in potential?</b>				
I. Removal of people		X		None.

II. Visual Impacts	×			The VIA (refer to Annexure H5) confirmed that the establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low. The visual landscape is already degraded due to the large number of mines and Eskom electricity infrastructure in the area.
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 and will be managed on site as required.
IV. Construction of an access road	×			Access will be obtained from the R505 Regional Road. An internal site road network will also be required. The access and internal roads will be constructed within a 25-meter corridor.
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 800 employment opportunities will be created during the construction phase and 99 employment opportunities during the operation phase of the SPP project.
VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the facility's 20 years of production is approximately 4200 m <sup>3</sup> per annum.
VIII. Job creation	×			Approximately 800 employment opportunities will be created during the construction and 99 employment opportunities during the operational phases for the SPP.

IX. Traffic generation		×		It is estimated that the construction phase of Boitumelo SPP will generate approximately 23 329 trips over the fourteen (14) month period.
X. Soil erosion		×		The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potentially soil erosion. The time that these areas are left bare will be limited to the construction phase, since vegetation will be allowed to grow back after construction.
XI. Installation of additional bulk telecommunication transmission lines or facilities			×	None.
<b>3. Is the proposed project located near the following?</b>				
I. A river, stream, dam or wetland			×	None.
II. A conservation or open space area	×			The Lichtenburg Game Breeding Centre is also located approximately 5 km south of the development site.
III. An area that is of cultural importance			×	None.
IV. A site of geological significance			×	None.
V. An area of outstanding natural beauty			×	None.
VI. Highly productive agricultural land			×	None.
VII. A tourist resort			×	None.
VIII. A formal or informal settlement			×	None.

### 6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in depth assessment during the EIA process. An indication is provided of the specialist studies being conducted and which informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered less significant 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 E** (specialist studies) 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:



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		
<b>CONSTRUCTION PHASE</b>															
<p><u>Activity 11(i) (GN.R. 327):</u> “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.”</p> <p><u>Activity 28 (ii) (GN.R. 327):</u> “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p><u>Activity 24 (ii) (GN.R. 327):</u> “The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”</p> <p><u>Activity 56 (ii) (GN.R. 327):</u> “The widening of a road by</p>	<p><u>Site clearing and preparation</u> Certain areas of the site will need to be cleared of vegetation and some areas may need to be levelled.</p> <p><u>Civil works</u> The main civil works are:</p> <ul style="list-style-type: none"> <li>• Terrain levelling if necessary– Levelling will be minimal as the potential site chosen is relatively flat.</li> <li>• Laying foundation- The structures will be connected to the ground through cement pillars, cement slabs or metal screws. The exact method will depend on the detailed geotechnical analysis.</li> <li>• Construction of access and inside roads/paths – existing paths will be used where reasonably possible. Additionally, the turning circle for trucks will also be taken into consideration.</li> </ul>	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> <li>• Loss of habitat, loss of indigenous species.</li> <li>• Fragmentation of the landscape and loss of connectivity.</li> <li>• Increased soil erosion and sedimentation.</li> <li>• Soil, water or air pollution.</li> <li>• Spread and establishment of alien invader species.</li> <li>• Human impacts / road mortalities.</li> </ul>	-	-	S	L	D	PR	ML	Yes	- See Table 6.3	L	Terrestrial biodiversity impact assessment (Appendix E3)
			Avifauna	<ul style="list-style-type: none"> <li>• Displacement of priority avian species from important habitats.</li> <li>• Displacement of resident avifauna through increased disturbance.</li> <li>• Loss of important avian habitats.</li> </ul>	-	-	S	M	Pr	PR	ML	Yes	- See Table 6.3	L	Avifaunal Assessment (Appendix E4)
			Air	<ul style="list-style-type: none"> <li>• Air pollution due to the increase of traffic of construction vehicles and the undertaking of construction activities.</li> </ul>	-	-	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	L	-

<p>more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”</p> <p><u>Activity 1 (GN.R 325):</u> “The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”</p> <p><u>Activity 15 (GN.R 325):</u> “The clearance of an area of 20 hectares or more of indigenous vegetation.”</p> <p><u>Activity 4 (h)(iv) (GN.R 324):</u> “The development of a road wider than 4 metres with a reserve less than 13,5 metres in the (h) North West Province (vi) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve.”</p> <p><u>Activity 12 (h)(iv) (GN.R. 324):</u> “The clearance of an area of 300 square metres or more of indigenous vegetation... (h) in the North West (iv) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (iv) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority.”</p> <p><u>Activity 18 (h)(ii) (GN.R 324):</u> “The widening of a road by more than 4 metres, or the</p>	<p><u>Transportation and installation of PV panels into an Array</u> The panels are assembled at the supplier’s premises and will be transported from the factory to the site on trucks. The panels will be mounted on metal structures which are fixed into the ground either through a concrete foundation or a deep-seated screw.</p> <p><u>Wiring to the Central Inverters</u> Sections of the PV array would be wired to central inverters which have a maximum rated power of 2000kW each. The inverter is a pulse width mode inverter that converts DC electricity to alternating electricity (AC) at grid frequency.</p>											transport sand and building materials are fitted with tarpaulins or covers.		
		Soil	<ul style="list-style-type: none"> <li>• Loss of agricultural potential by occupation of land.</li> <li>• Loss of agricultural potential by soil degradation.</li> <li>• Soil degradation, including erosion.</li> <li>• Disturbance of soils and existing land use (soil compaction).</li> <li>• Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills).</li> <li>• Loss of topsoil.</li> </ul>	-		S	S	Pr	PR	ML	Yes	- See Table 6.3	L	Agricultural and Soils Compliance Statement To be provided as part of the EIR.
		Geology	<ul style="list-style-type: none"> <li>• Collapsible soil.</li> <li>• Seepage.</li> <li>• Active soil (high soil heave).</li> <li>• Erodible soil.</li> <li>• Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving solar panel columns.</li> <li>• The presence of undermined ground.</li> <li>• Instability due to soluble rock.</li> <li>• Steep slopes or areas of unstable natural slopes.</li> <li>• Areas subject to seismic activity.</li> </ul>	-	-	S	S	Pr	CR	NL	Yes	<ul style="list-style-type: none"> <li>- 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.</li> <li>- Retention of vegetation where possible to avoid soil erosion.</li> </ul>	L	Geotechnical Report
		Existing services infrastructure	<ul style="list-style-type: none"> <li>• Generation of waste that need to be accommodated at a licensed landfill site.</li> <li>• Generation of sewage that need to be accommodated by the local sewage plant.</li> <li>• Increase in construction vehicles on existing roads.</li> </ul>	-		L	S	D	PR	ML	Yes	-	L	Confirmation from the Local Municipality
Groundwater	<ul style="list-style-type: none"> <li>• Pollution due to construction vehicles and</li> </ul>	-		S	S	Pr	CR	ML	Yes	- A groundwater monitoring program	L	-		



lengthening of a road by more than 1 kilometre (h) in the North West within (ii) areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve."			the storage and handling of dangerous goods.									(quality and groundwater levels) should be designed and installed for the site. - Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. - Full construction details of monitoring boreholes must be recorded when they are drilled. - Sampling of monitoring boreholes should be done according to recognized standards.		
		Surface water	<ul style="list-style-type: none"> <li>Increase in stormwater run-off.</li> <li>Pollution of water sources due to soil erosion.</li> </ul>	-		L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> <li>Silt fences should be used to prevent any soil entering the storm water drains.</li> <li>New storm water construction must be developed strictly according to specifications from engineers in order to ensure efficiency.</li> <li>Restrict impacts to proposed footprints.</li> </ul>	L	-
		Local unemployment rate	<ul style="list-style-type: none"> <li>Job creation.</li> <li>Business opportunities.</li> <li>Skills development.</li> </ul>		+	P	S	D	I	N/A	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
		Visual landscape	<ul style="list-style-type: none"> <li>Potential visual impact on residents of farmsteads and motorists in close proximity to proposed facility.</li> <li>Lighting impacts.</li> <li>Solar glint and glare impacts.</li> <li>Visual sense of place</li> </ul>	-		L	S	D	CR	NL	Yes	- See Table 6.3	M	Visual Impact Assessment (Appendix E5)



			industry	facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.													
			Heritage resources	<ul style="list-style-type: none"> <li>The destruction of sites, features or objects of cultural significance.</li> </ul>		-	L	P	Pr	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E6)		
			Paleontological Heritage	<ul style="list-style-type: none"> <li>Disturbance, damage or destruction of legally-protected fossil heritage* within the development footprint during the construction phase</li> </ul>		-	S	P	U	IR	ML	Yes	N/A	L	Paleontological Impact Assessment (Appendix E8)		
<b>OPERATIONAL PHASE</b>																	
<p><u>Activity 11(i) (GN.R. 327):</u>  <i>"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."</i></p> <p><u>Activity 1 (GN.R. 325):</u>  <i>"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."</i></p>	<p>The key components of the proposed project are described below:</p> <ul style="list-style-type: none"> <li><u>PV Panel Array</u> - To produce 150 MW, the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility. The PV panels will be tilted at a northern angle in order to capture the most sun.</li> <li><u>Wiring to Central Inverters</u> - Sections of the PV array will be wired to central inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.</li> </ul>	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> <li>Loss of habitat, loss of indigenous species.</li> <li>Fragmentation of the landscape and loss of connectivity.</li> <li>Increased soil erosion and sedimentation.</li> <li>Soil, water or air pollution.</li> <li>Spread and establishment of alien invader species.</li> <li>Human impacts / road mortalities.</li> </ul>		-	L	L	Po	PR	ML	Yes	- See Table 6.3	L	Terrestrial biodiversity impact assessment (Appendix E3)		
			Avifauna	<ul style="list-style-type: none"> <li>Displacement of priority avian species from important habitats.</li> <li>Displacement of resident avifauna through increased disturbance.</li> <li>Collisions with PV panels leading to injury or loss of avian life.</li> <li>Collision when flying into power line infrastructure.</li> </ul>		-	S	L	Pr	PR	ML	Yes	- See Table 6.3	M	Avifaunal Impact Assessment (Appendix E4)		
			Air quality	<ul style="list-style-type: none"> <li>The proposed development will not result in any air pollution during the operational phase.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

<ul style="list-style-type: none"> <li>• <u>Connection to the grid</u> - Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. An onsite substation will be required on the site to step the voltage up to 132kV, after which the power will be evacuated into the national grid.</li> <li>• <u>Supporting Infrastructure</u> – Auxiliary buildings with basic services such as water and electricity will be constructed on the site and will have an approximate footprint 820m<sup>2</sup>. Other supporting infrastructure includes voltage and current regulators and protection circuitry.</li> <li>• <u>Roads</u> – Access will be obtained from the R505 Regional Road onto a proposed new gravel access road situated adjacent the development footprint where direct access will be obtained to the facility. An internal site road network will also be required to provide access to the solar field and associated infrastructure.</li> </ul>	Soil	<ul style="list-style-type: none"> <li>• Soil degradation, including erosion.</li> <li>• Disturbance of soils and existing land use (soil compaction).</li> <li>• Loss of agricultural potential (low significance relative to agricultural potential of the site).</li> </ul>	-	L	L	D	PR	SL	Yes	- See Table 6.4	L	Agricultural and Soil Compliance Statement (to be included in the EIR)
	Geology	<ul style="list-style-type: none"> <li>• Collapsible soil.</li> <li>• Active soil (high soil heave).</li> <li>• Erodible soil.</li> <li>• Hard/compact geology. If the bedrock occurs close to surface it may present problems when driving power line columns.</li> <li>• The presence of undermined ground.</li> <li>• Instability due to soluble rock.</li> <li>• Steep slopes or areas of unstable natural slopes.</li> <li>• Areas subject to seismic activity.</li> <li>• Areas subject to flooding.</li> </ul>	-	S	S	Po	PR	ML	Yes	<ul style="list-style-type: none"> <li>- Surface drainage should be provided to prevent water ponding.</li> <li>- Mitigation measures proposed by the detailed engineering geological investigation should be implemented.</li> </ul>	L	-
	Groundwater	<ul style="list-style-type: none"> <li>• Leakage of hazardous materials. The development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies.</li> </ul>	-	L	L	Po	PR	ML	Yes	<ul style="list-style-type: none"> <li>- All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.</li> </ul>	L	-
	Surface water	<ul style="list-style-type: none"> <li>• Destruction of watercourses</li> <li>• Compacted and exposed soils are prone to further degradation and erosion.</li> <li>• Alien invasive plant species</li> </ul>	-	L	L	Pr	PR	ML	Yes	<ul style="list-style-type: none"> <li>- Continued monitoring and eradication of alien invasive plant species are imperative at the footprint proposed</li> </ul>	L	-

	<p>The access and internal roads will be constructed within a 25-meter corridor.</p> <ul style="list-style-type: none"> <li>• <u>Battery Energy Storage System</u> – Up to 500 MW Battery Storage Facility with a maximum height of 8m and a maximum volume of 1740 m3 of batteries and associated operational, safety and control infrastructure.</li> <li>• <u>Fencing</u> - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding farm.</li> </ul>		infest hitherto cleared areas and occupy habitat which is then unavailable for indigenous species.									for the development. A rehabilitation plan would be necessary which include the combating of alien invasive plant species.				
		SOCIAL/ECONOMIC	Visual landscape	<ul style="list-style-type: none"> <li>• Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the SPP.</li> <li>• Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.</li> <li>• Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility.</li> <li>• Visual impacts of glint and glare on sensitive visual receptors in close proximity to the proposed facility.</li> <li>• Visual impacts on observers travelling along the roads and residents at homesteads in close proximity to the power line structures.</li> <li>• Visual impacts and sense of place impacts associated with the operation phase of Boitumelo SPP.</li> </ul>									- See Table 6.3	L	Visual Impact Assessment (Appendix E5)	
			Traffic volumes	<ul style="list-style-type: none"> <li>• The proposed development will not result in any traffic impacts during the operational phase.</li> </ul>			L	L	Po	CR	NL	Yes		-	L	Traffic Impact Assessment (Appendix E9)
			Health & Safety	<ul style="list-style-type: none"> <li>• The proposed development will not result in any health</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		-	N/A	N/A

				and safety impacts during the operational phase.												
			Noise levels	<ul style="list-style-type: none"> <li>The proposed development will not result in any noise pollution during the operational phase.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
			Heritage resources	<ul style="list-style-type: none"> <li>It is not foreseen that the proposed activity will impact on heritage resources during this phase.</li> </ul>	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E6)	
			Electricity supply	<ul style="list-style-type: none"> <li>Generation of additional electricity. The power line will transport generated electricity into the grid.</li> </ul>	+		I	L	D	I	N/A	Yes	-	N/A	-	
			Electrical infrastructure	<ul style="list-style-type: none"> <li>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.</li> </ul>	+		I	L	D	I	N/A	Yes	-	N/A	-	
<b>DECOMMISSIONING PHASE</b>																
-	<p><u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar PV Energy facility and its associated infrastructure will be dismantled.</p> <p><u>Rehabilitation of biophysical environment</u> The biophysical environment will be rehabilitated.</p>	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"> <li>Poor recovery of habitat owing to clearance of site.</li> <li>An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.</li> <li>Contamination of soil during decommissioning.</li> </ul>		-	S	L	Po	N/A	N/A	Yes	- See Table 6.3	L	Terrestrial biodiversity impact assessment (Appendix E3)	
			Air quality	<ul style="list-style-type: none"> <li>Air pollution due to the increase of traffic of construction vehicles.</li> </ul>	-		S	S	D	CR	NL	Yes	- Regular maintenance of equipment to ensure reduced exhaust emissions.	L	-	
			Soil	<ul style="list-style-type: none"> <li>Soil degradation, including erosion.</li> <li>Disturbance of soils and existing land use (soil compaction).</li> <li>Physical and chemical degradation of the soils by</li> </ul>		-	S	S	Pr	PR	M	Yes	- See Table 6.3	L	Agriculture and Soils Compliance Statement (to be included in the EIR)	

			construction vehicles (hydrocarbon spills).												
		Geology	<ul style="list-style-type: none"> <li>It is not foreseen that the decommissioning phase will impact on the geology of the site or vice versa.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Existing services infrastructure	<ul style="list-style-type: none"> <li>Generation of waste that needs to be accommodated at a licensed landfill site.</li> <li>Generation of sewage that needs to be accommodated by the municipal sewerage system and the local sewage plant.</li> <li>Increase in construction vehicles.</li> </ul>	-		L	S	D	I	NL	Yes	-	L	-	
		Groundwater	<ul style="list-style-type: none"> <li>Pollution due to construction vehicles.</li> </ul>	-		S	S	Pr	CR	ML	Yes	-	L	-	
		Surface water	<ul style="list-style-type: none"> <li>Increase in stormwater run-off.</li> <li>Pollution of water sources due to soil erosion.</li> </ul>			L	S	Pr	PR	ML	Yes	<ul style="list-style-type: none"> <li>Removal of any historically contaminated soil as hazardous waste.</li> <li>Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks.</li> <li>Removal of all substances which can result in groundwater (or surface water) contamination.</li> </ul>	M	-	
		Visual landscape	<ul style="list-style-type: none"> <li>Potential visual impact on visual receptors in close proximity to proposed facility.</li> <li>The decommissioning phase of the project will result in the same visual impacts experienced during the construction phase of the project. However, in the case of Boitumelo SPP it is</li> </ul>	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Visual Impact Assessment (Appendix E5)	

			anticipated that the proposed facility will be refurbished and upgraded to prolong its life.											
		Traffic volumes	<ul style="list-style-type: none"> <li>Increase in construction vehicles.</li> </ul>	-		L	S	Pr	CR	NL	Yes	- Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	L	Traffic Impact Assessment (Appendix E9)
		Health & Safety	<ul style="list-style-type: none"> <li>Air/dust pollution.</li> <li>Road safety.</li> <li>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.</li> </ul>	-		L	S	Pr	PR	ML	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
		Noise levels	<ul style="list-style-type: none"> <li>The generation of noise as a result of construction vehicles, the use of machinery and people working on the site.</li> </ul>	-		L	S	D	CR	NL	Yes	- See Table 6.3	L	Social Impact Assessment (Appendix E8)
		Tourism industry	<ul style="list-style-type: none"> <li>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.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Heritage resources	<ul style="list-style-type: none"> <li>It is not foreseen that the decommissioning phase will impact on any heritage resources.</li> </ul>	-		S	S	U	PR	ML	Yes	- See Table 6.3	L	Heritage Impact Assessment (Appendix E6)



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

## 6.2 KEY ISSUES IDENTIFIED

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

### 6.2.1 Impacts during the construction phase

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

- Activity 11(i) (GN.R. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”*
- Activity 28 (ii) (GN.R. 327): *“Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”*
- Activity 24 (ii) (GN.R 327): *“The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters”*
- Activity 56 (ii) (GN.R 327): *“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres...”*
- Activity 1 (GN.R 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”*
- Activity 15 (GN.R 325): *“The clearance of an area of 20 hectares or more of indigenous vegetation.”*
- Activity 4 (GN.R 324): *“The development of a road wider than 4 metres with a reserve less than 13,5 metres in the (h) North West Province (vi) areas within 5 kilometers from protected areas identified in terms of NEMPAA or from a biosphere reserve.”*
- Activity 12 (h)(iv) (GN. R. 324): *“The clearance of an area of 300 square metres or more of indigenous vegetation... ... (h) in the North West (iv) within critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority and (iv) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority.”*
- Activity 18 (h)(ix) (GN.R 324): *“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre (h) in the North West (ix) areas*

*within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”*

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
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation.	Negative High	Negative Medium	<ul style="list-style-type: none"> <li>Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum, while the rehabilitation of the site should be prioritised after construction has been completed.</li> <li>During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.</li> <li>An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future.</li> <li>All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather than imposing rigid geometries. The entire development footprint should be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development.</li> <li>The Environmental Site Officer (ESO) should advise the construction</li> </ul>

				<p>team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation.</p> <ul style="list-style-type: none"> <li>• Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling during planting of the poles along the lines.</li> <li>• Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.</li> <li>• Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.</li> <li>• Monitoring should be implemented during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area.</li> </ul>
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance.</li> <li>• During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.</li> <li>• Construction activities must remain within defined construction areas.</li> </ul>

				No construction / disturbance will occur outside these areas.
	Increased Soil Erosion and Sedimentation	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time.</li> <li>• Cover disturbed soils as completely as possible, using vegetation or other materials.</li> <li>• Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.</li> <li>• Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> <li>• Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>• Gravel roads to the construction sites must be well drained to limit soil erosion.</li> <li>• Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> <li>• Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> </ul>
	Soil, Water and air Pollution	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously.</li> <li>• Hazardous chemicals to be stored on an impervious surface protected</li> </ul>

				<p>from rainfall and storm water run-off.</p> <ul style="list-style-type: none"> <li>• Spill kits should be on-hand to deal with spills immediately.</li> <li>• All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.</li> <li>• A speed limit should be enforced on dirt roads (preferably 30-40km/h).</li> <li>• Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.</li> </ul>
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys.</li> <li>• Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the</li> </ul>

				<p>control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated.</p> <ul style="list-style-type: none"> <li>• Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.</li> <li>• Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.</li> </ul>
	<p>Negative effect of human activities on fauna and road mortalities</p>	<p>Negative Low</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> <li>• No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site.</li> <li>• The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals.</li> <li>• Maintain proper firebreaks around the entire development footprint.</li> <li>• Educate construction workers regarding risks and correct disposal of cigarettes.</li> <li>• More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences).</li> <li>• Travelling at night should be avoided or limited as much as possible.</li> </ul>



Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Medium	<ul style="list-style-type: none"> <li>Limit the construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas must be placed only on disturbed zones, construct in shortest timeframe possible, control noise to minimum.</li> </ul>
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Medium	<ul style="list-style-type: none"> <li>Limit construction footprint and retain indigenous vegetation wherever possible, limit access to the remainder of area, avoid breeding season (summer), lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, control noise to minimum.</li> </ul>
	Loss of important avian habitats	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Limit construction footprint, limit access to the remainder of the area, lay-down areas only to be placed in zones that have been disturbed, construct in shortest timeframe possible, use existing roads as far as possible, rehabilitate with indigenous vegetation.</li> </ul>
Visual Impact Assessment	Visual impact of construction activities on sensitive visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Planning</li> <li>Retain and maintain natural vegetation immediately adjacent to the development footprint.</li> <li>Construction</li> <li>Ensure that vegetation is not unnecessarily removed during the construction phase.</li> <li>Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.</li> <li>Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.</li> <li>Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site.</li> <li>Reduce and control dust during construction by utilising dust</li> </ul>

				<p>suppression measures.</p> <ul style="list-style-type: none"> <li>• Limit construction activities to between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting.</li> <li>• Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.</li> </ul>
Agricultural and Soils Compliance Statement	Loss of agricultural potential by occupation of land	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• No mitigation measures are proposed.</li> </ul>
	Loss of agricultural potential by soil degradation	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Loss of topsoil can result from poor topsoil management during construction related excavations. Topsoil should be stored for later use.</li> <li>• Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Spillage and contamination of soil should be avoided.</li> <li>• Due to the very low slope of the land, the site has a low susceptibility to soil degradation.</li> </ul>
	Erosion	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion.</li> <li>• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li> </ul>
	Topsoil loss	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire</li> </ul>

				<p>surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</p>
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Due to the location of the burial sites in close proximity to the boundary of the proposed power line route, the following mitigation measure is proposed:</li> <li>• Avoidance/Preserve: This is viewed to be the primary form of mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</li> <li>• If it is decided to retain the burial site, and its exact size has been determined it should be fenced off permanently by means of a wire fence or brick wall, with a buffer zone of at least 20m.</li> <li>• Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no accidental damaged is caused to the features or that undetected heritage/remains are destroyed.</li> <li>• In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5.</li> <li>• Due to the location of the hospital ruins in close proximity to the boundary of the proposed project area, the following mitigation measure is proposed:</li> <li>• Avoidance/Preserve: This is viewed to be the primary form of</li> </ul>

				<p>mitigation and applies where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</p> <ul style="list-style-type: none"> <li>• The site should be retained in situ and should be fenced off, with a buffer zone of at least 20m, which should include the windbreak of trees planted around the site.</li> <li>• Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no accidental damaged is caused to the features or that undetected heritage/remains are destroyed.</li> <li>• In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites.</li> </ul>
Palaeontological Impact Assessment	Disturbance, damage or destruction of legally-protected fossil heritage (Refers essentially to impacts on well-preserved and / or rare fossils of scientific and conservation value within the development footprint during the construction phase)	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• The ECO responsible for the construction phase of the solar facility should be aware of the potential for important fossil finds (e.g. well-preserved stromatolites, karstic-related bone breccias) and the necessity to conserve them for possible professional mitigation.</li> <li>• The ECO should monitor all substantial surface clearance operations and excavations into sedimentary rocks for fossil remains on an on-going basis during the construction phase.</li> <li>• Before start of construction phase: <ul style="list-style-type: none"> <li>○ Compilation of photographic record of representative stromatolite assemblages within SPP project area by palaeontological specialist (winter season);</li> <li>○ Specialist palaeontological field study of any substantial karst</li> </ul> </li> </ul>

				<p>breccias or bodies of ancient fluvial gravels identified by geophysical surveys or other means.</p> <ul style="list-style-type: none"> <li>Recommended mitigation of chance fossil finds during the construction phase of the solar facility and associated grid connection involves safeguarding of the fossils (preferably in situ) by the responsible ECO and reporting of finds to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Phone: +27 (0)21 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). Where appropriate, judicious sampling and recording of fossil material and associated geological data by a qualified palaeontologist, appointed by the developer, may be required by the relevant heritage regulatory authority.</li> </ul>
Social Impact Assessment	Creation of direct and indirect employment opportunities.	Positive Low	Positive Medium	<ul style="list-style-type: none"> <li>A local employment policy should be adopted to maximise opportunities made available to the local labour force.</li> <li>Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Naledi LM, Dr Ruth S Mompoti DM, North West Province, South Africa, or elsewhere.</li> <li>Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase.</li> <li>As with the labour force, suppliers should also as far as possible be sourced locally.</li> <li>As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used.</li> <li>The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.</li> </ul>
	Economic multiplier effects from the use of local goods and services.	Positive Low	Positive Medium	<ul style="list-style-type: none"> <li>It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy.</li> <li>A database of local companies, specifically Historically Disadvantaged</li> </ul>

				<p>Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable.</p> <ul style="list-style-type: none"> <li>Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.</li> </ul>
	Potential loss in productive farmland	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>The proposed site for the Boitumelo SPP needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area.</li> <li>Livestock grazing on the proposed site need to be relocated.</li> <li>All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO).</li> <li>Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.</li> <li>Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.</li> </ul>
	In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work.</li> <li>Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.</li> <li>Provide transportation for workers (from Lichtenburg) to ensure workers can easily access their place of employment and do not need to move closer to the project site.</li> <li>Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the</li> </ul>

				<ul style="list-style-type: none"> <li>relevant authorities.</li> <li>• Compile and implement a grievance mechanism.</li> <li>• Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.</li> <li>• Prevent the recruitment of workers at the site.</li> <li>• Implement a method of communication whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process.</li> <li>• Establish clear rules and regulations for access to the proposed site.</li> <li>• Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours.</li> <li>• Inform local community organisations and policing forums of construction times and the duration of the construction phase.</li> <li>• Establish procedures for the control and removal of loiterers from the construction site.</li> </ul>
	Temporary increase in safety and security concerns associated with the influx of people	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.</li> <li>• Provide transportation for workers to prevent loitering within or near the project site outside of working hours.</li> <li>• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.</li> <li>• The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.</li> <li>• Access in and out of the construction site should be strictly controlled by a security company appointed to the project.</li> <li>• A CLO should be appointed as a grievance mechanism. A method of</li> </ul>

				<p>communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.</p> <ul style="list-style-type: none"> <li>• The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security.</li> <li>• The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.</li> <li>• The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.</li> </ul>
	Impacts on daily living and movement patterns	Negative Medium	Negative Medium	<ul style="list-style-type: none"> <li>• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.</li> <li>• Heavy vehicles should be inspected regularly to ensure their road worthiness.</li> <li>• Provision of adequate and strategically placed traffic warning signs and control measures along the R505 Regional Road to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.</li> <li>• Implement penalties for reckless driving to enforce compliance to traffic rules.</li> <li>• Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work).</li> <li>• The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.</li> <li>• The developer and EPC Contractor must ensure that the roads utilised</li> </ul>



				<p>for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.</p> <ul style="list-style-type: none"> <li>• The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase.</li> <li>• A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.</li> </ul>
	Nuisance impact (noise and dust)	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible.</li> <li>• 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.</li> <li>• Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues.</li> <li>• A CLO should be appointed, and a grievance mechanism implemented.</li> </ul>
	Increased risk of potential veld fires	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site.</li> <li>• Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment.</li> <li>• No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site.</li> <li>• The use of cooking or heating implements should only be used in designated areas.</li> </ul>

				<ul style="list-style-type: none"> <li>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.</li> <li>Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.</li> <li>The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.</li> </ul>
	Impacts on the sense of place	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project.</li> <li>Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.</li> <li>The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible.</li> <li>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.</li> <li>All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.</li> <li>Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the site.</li> </ul>
Traffic Impact Assessment	Increase in traffic on the Durban or Saldanha delivery routes	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>It can be seen that the delivery and construction trips will be insignificant when compared to the Average Daily Traffic (ADT) and will not affect the existing Level of Service (LOS). It can therefore be concluded that, on both routes, no mitigation measures will be</li> </ul>

				necessary.
	Increase in traffic for commuter trips	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>It can be concluded from the table above that the estimated additional traffic generated by the construction staff, when travelling to/ from the SPP, can be accommodated on the existing road network. Therefore, no mitigation measures will be necessary.</li> </ul>

### 6.2.2 Impacts during the operational phase

During the operational phase the site will serve as a solar plant. The potential impacts will take place over a period of 20 – 25 years. During the operational phase the following activities will have various potential impacts on the biophysical and socio-economic environment:

- Activity 11(i) (GN.R. 327): *“The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”*
- Activity 1 (GN.R 325): *“The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.”*

During the operational phase minor negative impacts are foreseen over the long term. The latter refers to at least a 20-year period. Table 6.4 summarises the potentially most significant impacts and the mitigation measures that are proposed during the operational phase.

**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
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation.	Negative High	Negative Medium	<ul style="list-style-type: none"> <li>• Peripheral impacts around the development footprint, on the surrounding vegetation of the area, should be avoided and a monitoring programme should be implemented to ensure the impacts are kept to a minimum.</li> <li>• An avifauna specialist should be consulted to conduct a specialist study for the project area and monitoring of the potential impact of the solar plant in the future.</li> <li>• All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas.</li> <li>• The Environmental Site Officer (ESO) should advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO should enforce any measures that he/she deem necessary.</li> <li>• Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.</li> <li>• Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions</li> </ul>

				and stipulations for terrestrial and aquatic applications.
Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low		<ul style="list-style-type: none"> <li>Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance.</li> </ul>
Increased Soil Erosion and Sedimentation	Negative Low	Negative Low		<ul style="list-style-type: none"> <li>Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.</li> <li>Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> </ul>
Soil, Water and air Pollution	Negative Low	Negative Low		<ul style="list-style-type: none"> <li>Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously.</li> <li>Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.</li> <li>Spill kits should be on-hand to deal with spills immediately.</li> <li>All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.</li> <li>A speed limit should be enforced on dirt roads (preferably 30-40km/h).</li> </ul>
Spread and establishment of alien invasive species	Negative Low	Negative Low		<ul style="list-style-type: none"> <li>Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative</li> </ul>

				<p>plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys.</p> <ul style="list-style-type: none"> <li>• Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated.</li> <li>• Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.</li> </ul>
	<p>Negative effect of human activities on fauna and road mortalities</p>	<p>Negative Low</p>	<p>Negative Low</p>	<ul style="list-style-type: none"> <li>• No staff should be accommodated on the site.</li> <li>• The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals.</li> <li>• Maintain proper firebreaks around the entire development footprint.</li> </ul>

				<ul style="list-style-type: none"> <li>• More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 40 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences).</li> <li>• Travelling at night should be avoided or limited as much as possible.</li> </ul>
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Medium	<ul style="list-style-type: none"> <li>• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.</li> </ul>
	Displacement of resident avifauna through increased disturbance	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• Limit ongoing human activity to the minimum required for ongoing operation, control noise to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds.</li> </ul>
	Collisions with PV panels leading to injury or loss of avian life	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.</li> </ul>
	Collision when flying into power line infrastructure	Negative very High	Negative Medium	<ul style="list-style-type: none"> <li>• Require walk-through after power line pole positions are determined to demarcate sections requiring bird deterrents/flappers, install flappers on all required sections of power lines (as directed by avifaunal specialist) on or directly adjacent to site, quarterly fatality monitoring.</li> </ul>
	Electrocution when perched on power line infrastructure	Negative High	Negative Medium	<ul style="list-style-type: none"> <li>• Pole designs to discourage bird perching and to be signed off by avifaunal specialist, quarterly fatality monitoring.</li> </ul>
Visual Impact Assessment	Visual impact on observers travelling along the roads and residents at homesteads within a 5km radius of the	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• Planning</li> <li>• Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.</li> <li>• Where insufficient natural vegetation exists next to the</li> </ul>



SPP.			<ul style="list-style-type: none"> <li>property, a 'screen' can be planted using endemic, fast growers that are water efficient.</li> <li>Operations</li> <li>Maintain general appearance of the facility as a whole.</li> </ul>
Visual impact on observers travelling along the roads and residents at homesteads within a 5-10km radius of the SPP.	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>Planning</li> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.</li> <li>Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient.</li> <li>Operations</li> <li>Maintain general appearance of the facility as a whole.</li> </ul>
Visual impacts of lighting at night on visual receptors in close proximity to the SPP.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Shield the source of light by physical barriers (walls, vegetation etc.)</li> <li>Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights.</li> <li>Make use of minimum lumen or wattage in fixtures.</li> <li>Make use of down-lighters, or shield fixtures.</li> <li>Make use of low-pressure sodium lighting or other types of low impact lighting.</li> <li>Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.</li> </ul>
Glint and glare on sensitive visual receptors in close proximity to the proposed facility.	Negative Low	N/A	<ul style="list-style-type: none"> <li>No mitigation measures applicable</li> </ul>
Visual impacts on observers travelling along the roads	Negative	Negative	<ul style="list-style-type: none"> <li>Planning</li> <li>Retain/re-establish and maintain natural vegetation</li> </ul>

	and residents at homesteads in close proximity to the power line structures.	Medium	Medium	<p>immediately adjacent to the power line servitude.</p> <ul style="list-style-type: none"> <li>• Operations</li> <li>• Maintain the general appearance of the servitude as a whole.</li> </ul>
	Visual impact and impacts on sense of place	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• 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. This can be achieved by also hosting an ‘open day’ where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area.</li> </ul>
Agricultural and Soils Compliance Statement	Enhanced agricultural potential through increased financial security for farming operations	Positive Low	Positive Low	<ul style="list-style-type: none"> <li>• No enhancement measures are proposed.</li> </ul>
	Dust impact	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Implement dust suppression during the construction phase.</li> </ul>
	Erosion	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points, and it must prevent any potential down slope erosion.</li> <li>• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion</li> </ul>
	Topsoil Loss	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-</li> </ul>

				<p>spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</p>
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Due to the location of the burial sites in close proximity to the boundary of the proposed power line route, the following mitigation measure is proposed:</li> <li>• If it is decided to retain the burial site, and its exact size has been determined it should be fenced off permanently by means of a wire fence or brick wall, with a buffer zone of at least 20m.</li> <li>• Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no accidental damaged is caused to the features or that undetected heritage/remains are destroyed.</li> <li>• In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5.</li> <li>• Due to the location of the hospital ruins in close proximity to the boundary of the proposed project area, the following mitigation measure is proposed:</li> <li>• The site should be retained in situ and should be fenced off, with a buffer zone of at least 20m, which should include the windbreak of trees planted around the site (see Fig. 14 above).</li> </ul>

				<ul style="list-style-type: none"> <li>• Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation to ensure that no accidental damaged is caused to the features or that undetected heritage/remains are destroyed.</li> <li>• In the event of an impact occurring on the identified site or feature, a permit for mitigation and/or destruction must be obtained from SAHRA/PHRA prior to any work being carried out. The appropriate steps to take are indicated in Section 9 of the report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5.</li> </ul>
Social Impact Assessment	Creation of employment opportunities and skills development	Positive Low	Positive Medium	<ul style="list-style-type: none"> <li>• It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community.</li> <li>• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.</li> <li>• Vocational training programs should be established to promote the development of skills.</li> </ul>
	Development of non-polluting, renewable energy infrastructure	Positive Medium	Positive Medium	<ul style="list-style-type: none"> <li>• No mitigation measures are proposed</li> </ul>
	Loss of agricultural land and overall productivity	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>• The proposed mitigation measures for the construction phase should have been implemented at this stage.</li> <li>• Mitigation measures from the Agricultural and Soil Compliance Statement, should also be implemented.</li> </ul>
	Contribution to Local	Positive	Positive High	<ul style="list-style-type: none"> <li>• A Community Needs Analysis (CNA) must be conducted to</li> </ul>

	Economic Development (LED) and social upliftment	Medium		<p>ensure that the LED and social upliftment programmes proposed by the project are meaningful.</p> <ul style="list-style-type: none"> <li>• Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused.</li> <li>• The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).</li> </ul>
	Potential impacts related to the impact on tourism.	Low Positive / Negative	Low Positive / Negative	<ul style="list-style-type: none"> <li>• Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a “Green Energy” awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa’s movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be implemented by constructing a visitor’s centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists.</li> </ul>
	Visual impact and impacts on sense of place	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Boitumelo SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard.</li> </ul>

### **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
Terrestrial biodiversity impact assessment	Habitat destruction caused by clearance of vegetation.	Negative High	Negative Medium	<ul style="list-style-type: none"> <li>The same mitigation measures applicable during the construction phase will apply.</li> </ul>
	Habitat fragmentation caused by clearance of vegetation	Negative Low	Negative Low	
	Increased Soil Erosion and Sedimentation	Negative Medium	Negative Low	
	Soil, Water and air Pollution	Negative Low	Negative Low	
	Spread and establishment of alien invasive species	Negative Medium	Negative Low	
	Negative effect of human activities on fauna and road mortalities	Negative Low	Negative Low	
	Continued loss of indigenous vegetation owing to poor	Negative Medium	Negative Low	

	recovery of vegetation.			
	Contamination of soil by leaving rubble/waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation	Negative Medium	Negative Low	
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• None required due to low significance</li> </ul>
	Displacement of resident avifauna through increased disturbance	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• None required due to low significance</li> </ul>
Agricultural and Soils Compliance Statement	Erosion	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.</li> <li>• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li> </ul>



		Top Soil	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</li> </ul>
Social Assessment	Impact	Loss of employment opportunities	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>It is not expected that the facility will be decommissioned.</li> </ul>
Heritage Assessment	Impact	Loss or damage to sites, features or objects of cultural heritage significance	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>The same mitigation measures applicable during the construction phase will apply.</li> </ul>

## 7 CUMULATIVE EFFECTS ASSESSMENT

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

### 7.1 Introduction

The EIA Regulations (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.

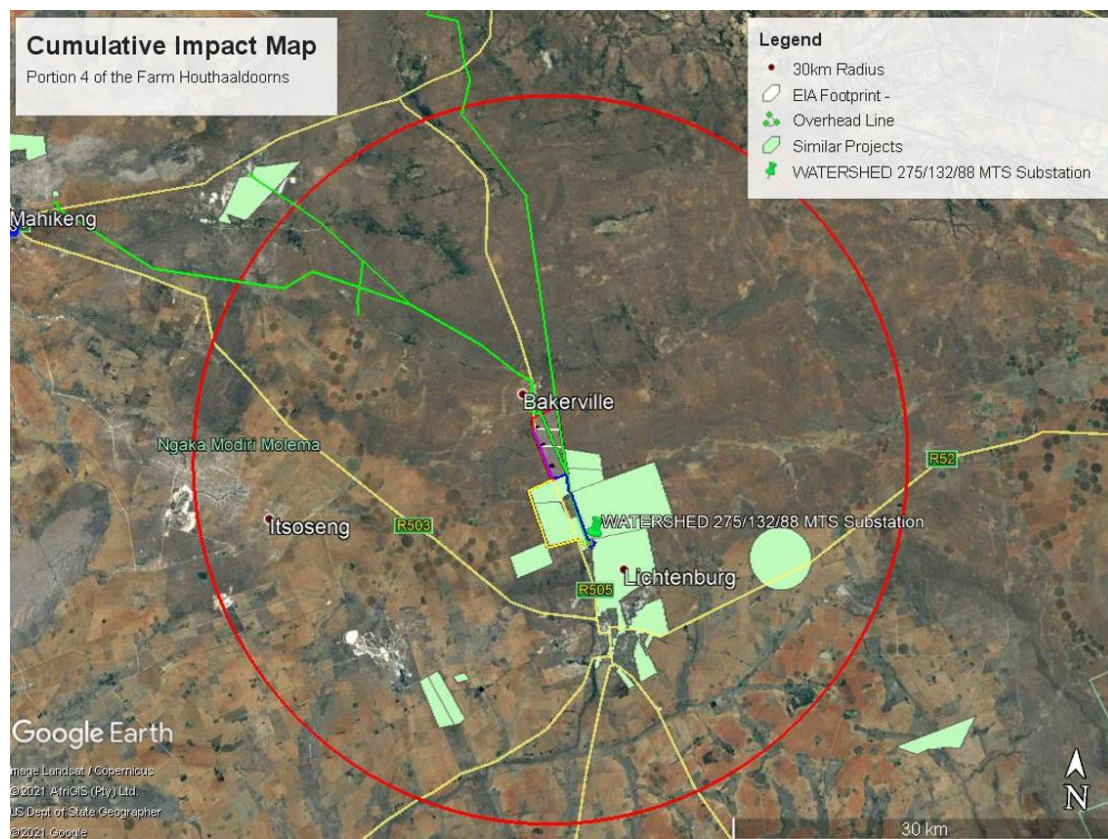
Despite these challenges, cumulative impacts have been afforded increased attention in this Scoping Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. 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 SPP site 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 7.1 below.



**Figure 7.1:** 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 North West and North West Provinces. 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 projects being proposed in the geographical area of evaluation.

### 7.4.1 Existing projects in the area

According to the DFFE's database nine PV solar plant applications have been submitted to the Department within the geographic area of investigation – refer to table 7.1.

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

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Hibernia solar Energy Facility	23.3 km	-	14/12/16/3/3/2/1062	Scoping and EIA	Approved
ACSA PV	20.3 km	3 MW	12/12/20/2149	BAR	Approved
Lichtenburg 1 solar PV energy	1.6 km	100 MW	14/12/16/3/3/2/1091	Scoping and EIA	Approved
Lichtenburg 2 solar PV energy	1.7 km	100 MW	14/12/16/3/3/2/1092	Scoping and EIA	Approved
Lichtenburg 3 solar PV energy	2 km	100 MW	14/12/16/3/3/2/1093	Scoping and EIA	Approved
Lichtenburg Solar Park	10 km	70 MW	14/12/16/3/3/2/270	Scoping and EIA	Approved
Tlitseng PV1 SEF	8 km	75 MW	14/12/16/3/3/2/974	Scoping and EIA	Approved
Tlitseng PV2 SEF	8.5 km	75 MW	14/12/16/3/3/2/975	Scoping and EIA	Approved
Watershed Solar Energy Facility	11 km	75 MW	14/12/16/3/3/2/557	Scoping and EIA	Approved

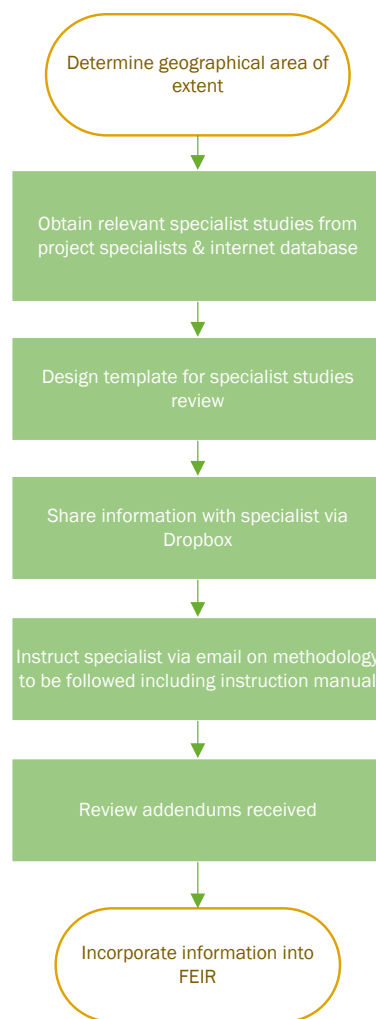
Environamics is also in the process of applying for Environmental Authorisation for two (2) additional PV solar power projects on Portion 4 of the farm Houthaaldoors 2, namely:

- The proposed 150MW Lerato Solar Power Project; and
- The proposed 150MW Kutlwano Solar Power Project.

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.

## 7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS

In line with the Terms of Reference (ToR) provided as part of the scoping report, specialists were asked to, where possible, take into consideration the cumulative effects associated with the proposed development and other projects which are either developed or in the process of being developed in the local area – refer to Figure 7.2 for process flow. The following sections present their findings.



**Figure 7.2:** Process flow diagram for determining cumulative effects

### 7.5.1 Soil, Land Capability and Agricultural Potential

In quantifying the cumulative impact, the area of land taken out of grazing as a result of the above nine projects plus this one (total generation capacity of ~750 MW) will amount to a

total of approximately 1875 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Fisheries, Forestry and the Environment (DFFE) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to 1.80% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land that is only suitable for grazing, of which there is no scarcity in the country. This is particularly so when considered within the context of the following point:

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential.

Furthermore, there are no significant other land uses, apart from renewable energy, that are competing for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses is not significantly higher than what has been considered above. Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it is approved.

### **7.5.2 Ecology**

The Terrestrial and Biodiversity Survey (refer to Appendix E3) states that corridors and linkages of areas with similar habitat are present in the local district where a number of solar power plants are planned. No particular habitats of threatened species that could easily be isolated (for example beetles with flightless females) are known to be impacted locally in the larger site. Overall because most of the area appears to be ideal to avoid very sensitive habitats such as larger pristine wetlands and also avoid highly sensitive habitat pockets of Threatened species, the development of a number of solar plants appear to be more ideal on a national scale than at many other areas. Therefore, an important mitigation measure is to leave corridors with indigenous vegetation in between solar plants and their associated infrastructure.

Overall, because of the restricted nature of solar plants and few or no emissions and pollutants into air when operational, soil and water cumulative impacts to the environment are limited (if compared for example to emissions from fossil fuel burning). Ultimately power plants could relieve the pressures to use fossil fuels that are associated with numerous cumulative impacts and habitat losses.

### **7.5.3 Avifauna**

The area is not within an IBA, however it has been identified as 'High Avian Sensitivity' by DFFE's screening tool. The resident avifaunal community is diverse, with moderate-low species richness and abundances. Some priority and endemic species are expected to be recorded on the site. The panels are reported to either be built with fixed inclinations or to

be built with variable inclination so as to track the sun movement. At times, these panels will be horizontal, potentially attracting birds through the 'lake effect'. At other times, the panels may be horizontal, and, during the day, they may create a mirror effect and result in bird collisions, or, at night, may result in collisions with migrating birds. The displacement of priority or resident avifauna through increased disturbance. Loss of avian habitat and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.

The proposed 132 kV power line section is expected to be short (between 8 and 24 km) but quite high (32m) and some species that are sensitive to power line collisions either occur on site or have been recorded during SABAP2 assessments or have a reasonable chance of occurring on site. Electrocutions when perched on power line infrastructure and collisions with power line infrastructure leading to injury or loss of avian life are considered to be cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.

Rated High-Negative to Medium-Negative but cumulative displacement of resident avifauna can be reduced to Low-Negative with effective implementation and ongoing monitoring of required mitigations as specified. However, cumulative displacement of priority avifauna remains Medium-Negative even after reasonable mitigation controls can be implemented and are thus a lasting anticipated impact of the development of this project.

#### **7.5.4 Social Impact Assessment**

Boitumelo SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Boitumelo SPP alone.

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.

It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

#### **7.5.5 Visual Impact Assessment**

The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where

currently there is only a precedent predominantly for agricultural. Due to the abundance of natural vegetation in the area, the scenic quality of the region is high, further construction and operation of the SPP in the area is likely to have a negative impact. The potential for cumulative impacts to occur as a result of the projects is therefore likely.

#### **7.5.6 Heritage**

It was determined that the Boitumelo project is located in an area with a very low presence of heritage sites and features. The cultural heritage profile of the larger region is very limited. Most frequently found are farmsteads, formal and informal burial sites and site relating to diamond mining activities. For this review, heritage sites located in urban areas have been excluded.

Heritage resources are sparsely distributed on the wider landscape with highly significant (Grade 1) sites being rare. Because of the low likelihood of finding further significant heritage resources in the area of the proposed for development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.

#### **7.5.7 Paleontology**

Based on the SAHRIS website, palaeontological heritage assessments (PIAs) for this review by (Almond 2013), Rubidge (2012), Groenewald (2015, 2016, 2017a, 2017b) and Bamford (2019) are available. Combined desktop and field-based studies have been conducted for the adjoining proposed Boitumelo, Lerato and Kutlwano SPPs on Portion 4 of the Farm Houthaaldoors 2 (Almond in prep., 2021). It is noted that (1) several of the available PIA reports are desktop studies with no field-based ground truthing and (2) a LOW palaeontological impact significance is inferred for all the projects concerned, including those involving Precambrian stromatolitic bedrocks comparable to those mapped in the present project area except where there is reasonable potential for Caenozoic karstic bone breccias (See Groenewald 2017a, 2017b). In the author's opinion:

- Palaeontological impact significances inferred for renewable energy projects, where these are assessed at all, may well reflect different assessment approaches rather than contrasting palaeontological sensitivities and impact levels;
- Meaningful cumulative impact assessments require comprehensive data on all major developments within a region, not just those involving renewable energy, as well as an understanding of the extent to which recommended mitigation measures are followed through;
- Trying to assess cumulative impacts on different fossil assemblages from different stratigraphic units (for example, Precambrian stromatolites from 2.6 billion years ago versus Pleistocene alluvial deposits less than 2.5 million years old) has limited value.

Given (1) the comparatively small combined footprint of the renewable energy projects under consideration compared with the very extensive outcrop areas of Malmani Group stromatolitic carbonate bedrocks as well as (2) the probable (albeit unconfirmed) rarity of scientifically valuable, unique or unusual occurrences of well-preserved stromatolites within



flat-lying terrain preferred for solar energy projects, the cumulative impact of the proposed or authorized Solar Power Plant developments in the Lichtenburg region – including the three adjoining SPPs (namely, Boitumelo, Lerato and Kutlwano) proposed on Portion 4 of the Farm Houthaaldoors 2 - is assessed as Medium (negative) without mitigation, potentially falling to Low (negative) with full mitigation. There are therefore no objections on palaeontological grounds to authorization of this project.

### 7.5.8 Traffic

The construction of the Solar Power Plants proposed within the 30 km radius will not only have an impact on transportation routes but will also affect the local traffic and surrounding communities. The Traffic Impact Study summarised the expected trips generated by the development of the above-mentioned solar PV plants, along with the background traffic on each of the major roadways. It was found that the cumulative additional trips will not greatly influence the immediate or wider road network. On both transportation routes, the maximum ADT of the major roadways are not exceeded and the cumulative additional trips will not initiate a change in the LOS. It must be noted, however, that on the Durban route the LOS of the N5 (near Bethlehem) is likely to change from LOS B to LOS C. However, the roadway will still continue to operate at an acceptable level of service and therefore no mitigation measures are required due to the short period of impact.

## 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
<b>Construction Phase</b>			
trial Biodiversity	Habitat loss owing to clearing of vegetation	Clearing of vegetation at the proposed Solar Plant footprint. This will entail the partial destruction of habitat of low or medium	- Medium

		sensitivity.	
	Fragmentation of corridors of particular conservation concern	Owing to the possibility of a number of solar plants to be developed in the local area the possible impact to fragmentation of the landscape and loss of corridors are real. Otherwise, there are no indications of any particular linked or stepping stone corridors of particular conservation importance at the site.	- Negligible
<b>Avifaunal Impact Assessment</b>	Displacement of priority avian species	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Medium
	Displacement of resident avifauna	The displacement of resident avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Low
	Loss of important avian habitats	The displacement of priority avifauna through increased disturbance and possible collisions with PV panels leading to injury or loss of avian life are considered as a cumulative impact due to the large number of planned solar development in a 30 km radius.	- Medium

<p style="text-align: center;"><b>Agricultural and Soils Impact Assessment</b></p>	<p>Loss of agricultural land</p>	<p>It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has very little cultivation potential, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country. The limits of acceptable agricultural land loss are far higher in this region than in regions with higher agricultural potential.</p> <p>Furthermore, there are no significant other land uses, apart from renewable energy, that are competing for agricultural land in the area, and so the total cumulative loss of agricultural land from all competing land uses is not significantly higher than what has been considered above.</p>	<p style="text-align: center;">- Low</p>
<p style="text-align: center;"><b>Heritage Impact Assessment</b></p>	<p>Loss or damage to sites, features or objects of cultural heritage significance</p>	<p>It was determined that the Boitumelo project is located in an area with a very low presence of heritage sites and features. Because of the low likelihood of finding further significant heritage resources in the area of the proposed for development and the generally low density of sites in the wider landscape the overall impacts to heritage are expected to be of generally low significance before mitigation.</p>	<p style="text-align: center;">- Low</p>
<p style="text-align: center;"><b>Palaeontological Impact Assessment</b></p>	<p>Disturbance, damage or destruction of legally-protected fossil heritage within the development footprints during the construction phase (impacts on well-preserved and / or rare fossils of scientific and conservation value)</p>	<p>The cumulative impact of the proposed or authorized solar power plant developments in the Lichtenburg region – including the three adjoining SPPs proposed on Portion 4 of the Farm Houthaaldoorns 2 - is assessed as Medium (negative) without mitigation, potentially falling to Low (negative) with full mitigation.</p>	<p style="text-align: center;">- Low</p>
<p style="text-align: center;"><b>Social Impact Assessment</b></p>	<p>Impacts of employment opportunities, business opportunities and skills development</p>	<p>Boitumelo SPP and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The cumulative benefits to the local, regional, and national economy through employment and</p>	<p style="text-align: center;">+ Medium</p>

		procurement of services are more considerable than that of Boitumelo SPP alone.	
	Impact with large-scale in-migration of people	The development of several projects may have a cumulative impact on the in-migration and movement of people. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.	- Medium
<b>Traffic Impact Study</b>	Increase in construction vehicles	The construction of the solar power plants will have a minimal impact on the current traffic volumes for long distance transportation routes. The chances of local traffic being adversely affected by the construction traffic is considered extremely low. The construction of the solar power plants will have a definite positive impact on communities of the surrounding towns. As the construction of the solar power plants is of short-term duration, the impacts on the surrounding area will only be temporary. All of the impacts are completely reversible, as the project is of short duration. The significance of the above-mentioned impacts is low, as they are only temporary and extend over a short time period.	- Low
<b>Operational Phase</b>			
<b>Ecological Fauna and Flora Habitat Survey</b>	Emissions and pollutants into air, water and soil	Overall emissions and pollutants from solar plants are limited when operational. During the operational phase cumulative impacts to the pollution of soils could happen. Rubble or waste could lead to infiltration of unwanted pollutants into the soil. Spilling of petroleum fuels and unwanted chemicals onto the soils that infiltrate these soils could lead to pollution of soils and if this happens at a number of solar plants in an area, the cumulative effect could be detrimental to the local environment.	- Low
<b>Avifaunal Impact Assessment</b>	Collisions when flying into power line infrastructure	Collisions with power line infrastructure leading to injury or loss of avian life are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium

	Electrocutions when perched on power line infrastructure	Electrocutions when perched on power line infrastructure are cumulative impacts due to the large number of planned solar developments and power lines in a 30 km radius.	- Medium
Visual Impact Assessment	Visual impacts related to the SPP and power line	The anticipated cumulative visual impact of the proposed SPP is expected to include the change in sense of place, as well as the precedent being set for SPP in the area where currently there is only a precedent predominantly for agricultural. Due to the abundance of natural vegetation in the area, the scenic quality of the region is high, further construction and operation of the SPP in the area is likely to have a negative impact.	- Medium
<b>Decommissioning Phase</b>			
Visual Impact Assessment	Visual Intrusion	The decommissioning of the PV plant and 132kV power line may increase the cumulative visual impact together with farming activities and people using the existing gravel roads Boitumelo PV adjacent to site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to take into account.	- Low
Other	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 DSR 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:
  - Habitat loss owing to clearing of vegetation (- Medium)
  - Displacement of resident avifauna (- Medium)
  - Loss of important avian habitats (- Medium)
  - Impacts of employment opportunities, business opportunities and skills development (+ Medium)
  - Impact with large-scale in-migration of people (- Medium)

- Cumulative effects during the operational phase:
  - Collisions when flying into power line infrastructure (- Medium)
  - Electrocutions when perched on power line infrastructure (- Medium)
  - Visual impacts related to the Boitumelo SPP and power line (- Medium)
  
- Cumulative effects during the decommissioning phase:
  - Generation of waste (- Medium)

The cumulative impacts for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in section 7 of this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. Photovoltaic solar energy technology is a clean technology which contributes toward a better-quality environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. 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.

## 8 PLAN OF STUDY FOR EIA

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

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

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

### 8.1 INTRODUCTION

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

### 8.2 ANTICIPATED OUTCOMES OF THE IMPACT ASSESSMENT PHASE

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

- Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

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

### **8.3 TASKS TO BE UNDERTAKEN**

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

#### **8.3.1 Project Description**

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

#### **8.3.2 Consideration of alternatives**

The following project alternatives will be investigated in the EIR:



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

### 8.3.3 Compilation of Environmental Impact Report

A Draft EIR will be compiled to meet the content requirements as per Appendix 3 of GNR326 of the EIA Regulations (as amended in 2017) and will also include a draft Environmental Management Programme containing the aspects contemplated in Appendix 4 of GNR326.

### 8.3.4 Public participation

All registered I&APs and relevant State Departments will be given the opportunity to review the Draft Environmental Impact Report in accordance with Regulation R326. A minimum of 30 days commenting period will be allowed and all stakeholders and I&APs will be given an opportunity to forward their written comments within that period. All issues identified during this public review period will be documented and compiled into a Comments and Response Report to be included as part of the Final EIR to be submitted to the DFFE.

## 8.4 ASPECTS ASSESSED

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

**Table 8.1:** Aspects assessed

Aspects	Potential impacts	Specialist studies / technical information
Construction of the PV Solar facility and associated infrastructure	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment & Avifauna Study
	Visual Impact	Visual Impact Assessment
	Impacts on agricultural potential (soils)	Soil and Agricultural Compliance statement
	Impacts associated with the geology of the site	Geotechnical Report
	Impacts on existing services infrastructure	Confirmation from the Local Municipality
	Temporary employment, impacts on health and safety	Social Impact Assessment
	Impacts on heritage resources	Heritage Impact Assessment & Palaeontological Impact Assessment
Operation of the PV Solar facility and associated infrastructure	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment & Avifauna study
	Impacts on agricultural potential (soils)	Soil Agricultural Compliance Statement

	Impacts associated with the geology of the site	Geotechnical Report
	Increased consumption of water	EAP assessment
	Pressure on existing services infrastructure	Confirmation from the Local Municipality
	Visual Impact	Visual Impact Assessment
	Provision of employment & generation of income for the local community	Social Impact Assessment
Decommissioning of the PV Solar facility	Impacts on the fauna and flora	Terrestrial biodiversity impact assessment
	Socio-economic impacts (loss of employment)	Social Impact Assessment
Cumulative Impacts	Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity.	EAP assessment

#### 8.4.1 Specialist studies

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

- Geotechnical report: To determine whether the geotechnical conditions at the site are favorable for the development and construction of a solar PV plant.
- Heritage report: To determine whether the proposed activity will impact on any heritage or archeological artifacts.
- Terrestrial biodiversity impact assessment: To determine what the impact of the proposed activity will be on the ecology (fauna and flora) in the area.
- Avifaunal Study: To determine what the impacts of the proposed activity will have on the bird (Avifauna) in the area.
- Visual Impact Assessment: To determine to what extent the proposed activity will be visually intrusive to the surrounding communities or other receptors.
- Soil and Agricultural Compliance Statement: To determine how the proposed activity will impact on soil and agricultural resources.

- Social Impact Assessment: To determine how the proposed activity will impact on the socio-economic environment.
- Palaeontological Impact Assessment: To determine the impacts on palaeontological resources.

#### **8.4.2 Terms of reference for specialist studies**

Specialists in their field of expertise will consider baseline data and identify and assess impacts according to predefined rating scales – refer to attached method of assessment. Specialists will also suggest optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists will, where possible, take into consideration the cumulative effects associated with this and other projects which are either developed or in the process of being developed in the local area. The specialist is reminded to follow the latest DFFE protocols.

The results of these specialist studies have been integrated into the Draft Scoping Report (DSR). The general requirements proposed for the inputs are presented below and specialists are encouraged to comment and provide input on these. The Terms of Reference (ToR) for each specialist study are include as Appendix E to the report.

##### **8.4.2.1 General Requirements**

Specialists' reports must comply with Appendix 6 of GNR326 published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included:

- The details of-
  - o the specialist who prepared the report; and
  - o the expertise of that specialist to compile a specialist report including a curriculum vitae;
- A declaration that the specialist is independent in a form as may be specified by the competent authority;
- An indication of the scope of, and the purpose for which, the report was prepared;
  - o An indication of the quality and age of base data used for the specialist report;
  - o A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
- The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

- Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
- An identification of any areas to be avoided, including buffers;
- A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
- A description of any assumptions made and any uncertainties or gaps in knowledge;
- A description of the findings and potential implications of such findings on the impact of the proposed activity, or activities;
- Any mitigation measures for inclusion in the EMPr;
- Any conditions for inclusion in the environmental authorisation;
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation;
- A reasoned opinion-
  - whether the proposed activity, activities or portions thereof should be authorised;
    - regarding the acceptability of the proposed activity or activities; and
  - if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
- A description of any consultation process that was undertaken during the course of preparing the specialist report;
- A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

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

- Include an executive summary to the report.

## 8.5 METHOD OF ENVIRONMENTAL ASSESSMENT

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

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

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

### 8.5.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

**Table 8.2:** The rating system

<b>NATURE</b>
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.
<b>GEOGRAPHICAL EXTENT</b>

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.
<b>PROBABILITY</b>		
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).
<b>DURATION</b>		
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.
<b>INTENSITY/ MAGNITUDE</b>		
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.
<b>REVERSIBILITY</b>		
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.
<b>IRREPLACEABLE LOSS OF RESOURCES</b>		
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.
<b>CUMULATIVE EFFECT</b>		
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
<b>SIGNIFICANCE</b>		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.		



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

## 8.6 CONSULTATION WITH THE COMPETENT AUTHORITY

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

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

## 9 CONCLUSION

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

- The scoping phase complied with the specifications set out in Regulations 21 and Appendix 2 of GNR326.
- All key consultees have been consulted as required by the Regulations 39 to 44.

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

- **Impacts during construction phase:**
  - Habitat destruction caused by clearance of vegetation (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Displacement of resident avifauna through increased disturbance (- Medium)
  - Creation of direct and indirect employment opportunities (+ Medium)
  - Economic multiplier effects from the use of local goods and services (+ Medium)
  - Temporary increase in traffic disruptions and movement patterns (- Medium)
- **Impacts during the operational phase:**
  - Habitat destruction caused by clearance of vegetation (- Medium)
  - Displacement of priority avian species from important habitats (- Medium)
  - Collision when flying into power line infrastructure (- Medium)
  - Electrocution when perched on power line infrastructure (- Medium)
  - Visual impact of sensitive visual receptors located within a 500m radius of the proposed power line. (- Medium)
  - Creation of employment opportunities and skills development. (+ Medium)
  - Development of non-polluting, renewable energy infrastructure. (+ Medium)
  - Contribution to LED and social upliftment (+ High)
- **Impacts during the decommissioning phase:**
  - Habitat destruction caused by clearance of vegetation (- Medium)

Cumulative biophysical impacts resulting from similar development in close proximity to the proposed activity is Negative Medium to Low.

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

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

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

**Mrs. Carli van Niekerk**

Environamics Environmental Consultants

## 10 REFERENCES

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ACTS *see* SOUTH AFRICA

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