

**DRAFT BASIC ASSESSMENT REPORT**  
18 June 2021

**THE PROPOSED ADDITION TO THE PROTEA SOLAR POWER  
PLANT NEAR VRYBURG, NORTH WEST PROVINCE**

## PROJECT DETAIL

<b>DFFE Reference No.</b>	:	To be confirmed
<b>Project Title</b>	:	The proposed addition to the Protea Solar Power Plant near Vryburg, North West Province.
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<b>Client</b>	:	Protea Solar Power Plant (RF) (Pty) Ltd
<b>Report Status</b>	:	Draft Basic Assessment Report
<b>Report date</b>	:	18 June 2021

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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 the Environment
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
REDZ	Renewable Energy Development Zone
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, fuelled by increasing economic growth and social development, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmentally responsible development, the impacts of climate change and the need for sustainable development. The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of the national Department of 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 (2019 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.

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

The Protea Solar Power Plant was issued with an Environmental Authorisation for the development of a 115 MW photovoltaic solar facility and associated infrastructure on 29 November 2016 (DEA Ref: 14/12/16/3/3/2/914). Protea Solar Power Plant (RF) (Pty) Ltd is now proposing the development of an additional 70 ha area to facilitate the generation of an additional 30 MW of electrical power on an identified site located on the Remaining Extent of the Farm Hartsboom No. 734, Registration Division IN, North West Province (refer to Figure 1 for the locality map). The affected property (i.e. Remaining Extent of the Farm Hartsboom No. 734) is the same property on which the 115MW Protea Solar Power Plant was authorised in 2016. Therefore, this Basic Assessment (BA) Report is undertaken to assess and obtain Environmental Authorisation (EA) for the proposed additional 30 MW (referred to as the Protea SPP). From a regional site selection perspective, this region is preferred for solar energy development due to its global horizontal irradiation value of around 2118 kwh/m<sup>2</sup>. The region (and full extent of the affected property) is also preferred for its inclusion within the Vryburg Renewable Energy Development Zone (REDZ) 6.

## EXECUTIVE SUMMARY

Like many other small and developing municipalities in the country, the Naledi Local Municipality, within which the Protea Solar Power Plant is proposed, faces a number of challenges in addressing the needs and improving the lives of the community. The Draft Integrated Development Plan (2020-2021) of the Dr Ruth S. Mompati District Municipality<sup>1</sup> states that it is the vision of the municipality to be a developmental district, where service delivery is prioritised and optimised in a sustainable manner. The municipality aims to achieve their key strategic goals, such as delivering quality basic services (i.e. electricity, water and sanitation) to their communities, stimulating local economic growth and to ensure sound financial management and viability within the municipality. The Naledi Local Municipality's Integrated Development Plan (2018-2019) vision is to provide sustainable, quality, and equitable services to their community through enhancing revenue, effective use of available resources, promoting infrastructure and socio-economic development. Naledi Local Municipality has conceptualised strategic objectives, such as to create an environment conducive for local economic development, to promote transparency, to foster good corporate culture and to accelerate the provision of basic services, in order to achieve their vision. The development of the Protea Solar Power Plant will contribute to the realisation of the vision and mission of the respective local and district municipalities that will be affected by the proposed development.

Protea Solar Power Plant (RF) (Pty) Ltd is proposing the development of an additional 70 ha area to facilitate the generation of an additional 30 MW of electrical power on the Remaining Extent of the Farm Hartsboom No. 734, which will form part of the authorised 115MW Protea Solar Power Plant. Therefore, this project is for the additional generation capacity of 30 MW. The town of Vryburg is located approximately 13 km northwest of the proposed development (refer to Figure 1 and Figure 2 for the locality and regional map). The total footprint of the project will be approximately 70 hectares (including supporting infrastructure).

The site<sup>2</sup> 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 into the national grid), 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). Further to the above, the desirability of the site for the development of a solar power plant is also supported by the fact that a larger solar power plant within the same affected property has been previously authorised, and for which the proposed solar power plant will provide an additional 30 MW of capacity.

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 additional footprint and generating capacity for the Protea Solar Power Plant. The

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<sup>1</sup> The Naledi Local Municipality falls within the Dr Ruth S. Mompati District Municipality.

<sup>2</sup> The site is defined as the portion being considered for the development located within the Remaining Extent of the Farm Hartsboom No. 734 (which is the affected property). The site has been assessed as part of this BA process for the development by the EAP and the independent specialists.

following listed activities have been identified with special reference to the proposed development and is listed in the EIA Regulations (as amended):

- Activity 14 (GN.R 327): *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."*
- 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."*

Activities required for the development of the solar facility which are listed under Listing Notice 1 and 2 (GNR 327 and 325) implies that the development could potentially have an impact on the environment that will require mitigation. The proposed addition to the Protea Solar Power Plant (SPP) is located within a Renewable Energy Development Zone (REDZ) and subsequently a Basic Assessment process is required (as per GNR 114) to be followed as described in Regulations 19 and 20 of the EIA Regulations (as amended). Environamics has been appointed as the independent Environmental Assessment Practitioner to undertake the Basic Assessment (BA) on behalf of Protea Solar Power Plant (RF) (Pty) Ltd.

Regulation 19 of the EIA Regulations (2017) requires that a Basic Assessment Report (BAR) must contain the information set out in Appendix 1 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 1 of GNR 326 requires that the environmental outcomes, impacts and residual risks of the proposed activity be set out in the BAR.

It has been determined through the BA 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 summarized below.

#### **Impacts during the construction phase:**

Construction of the solar power plant will potentially result in the following impacts: loss of indigenous faunal and floral species diversity, infestation of exotic or alien invasive plants, displacement of resident or priority avian species, impact on heritage objects, potential loss of productive farmland,

in-migration or influx of job seekers, presence of construction workers on the local communities, increased risk of veld fires and generation of waste - general waste, construction waste, sewage and grey water. Socio-economic impacts such as the creation of local employment and business opportunities, skills development and training and technical support to local farmers and municipalities will be positive impacts emanating from the construction phase.

#### **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 (including avifauna) and flora, soils and visual impacts. The provision of sustainable service delivery from the local municipality also needs to be confirmed for the operational phase of the project. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community. Additional electricity will also be generated from a clean renewable resource.

#### **Impacts during the decommissioning phase:**

The physical environment will benefit from the closure of the solar facility since the site will be rehabilitated to an acceptable level. The decommissioning phase will however potentially result in impact on soils, pressure on existing service infrastructure, heritage resources 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. 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 Energy Blog's database only one other solar PV plant has been granted preferred bidder status within close proximity to the proposed Protea Solar Power Plant, namely the Waterloo Solar Park with a capacity of 75MW, near Vryburg, North West Province. The Waterloo Solar Park is operational since November 2020. However, according to the Department of Forestry, Fisheries and the Environments (DFFE) database nineteen (19) other solar plants have been proposed in relative close proximity to the proposed activity.

The potential for cumulative impacts may therefore exist. The BAR includes a detailed assessment of the potential cumulative impacts associated with the proposed development. Potential cumulative impacts with a significance rating of negative medium during the construction phase relate to: loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats and large-scale in-migration of people. Cumulative impacts (negative medium) during the operational phase relate to: visual intrusion. The cumulative effect of the generation of waste was identified as potentially significant during the decommissioning phase.

In accordance with the EIA Regulations, this BAR evaluates and rates each identified potential impact, and identifies and recommends mitigation measures which will be required in order to ensure the reduction of the impact significance of negative impacts to acceptable levels and the avoidance of negative residual risks. The BAR also recommends enhancement measures for the enhancement of positive impacts. This BAR also contains information that is required by the competent authority to consider the Application for Environmental authorisation and to reach a decision contemplated in Regulation 20 of GNR 326. No fatal flaws were identified and the impacts from the proposed development are expected to be at an acceptable level with the implementation of mitigation

measures and therefore the project can be authorised (subject to the implementation of the recommended mitigation measures).

# 1 INTRODUCTION

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

**Appendix 1.** (3) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-  
(a) details of:

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

## 1.1 LEGAL MANDATE AND PURPOSE OF THE REPORT

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 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 14	<ul style="list-style-type: none"><li>“The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.”</li><li>Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a combined capacity of 80 cubic metres or more, but not exceeding 500 cubic metres.</li></ul>
GNR. 327 (as amended in 2017)	Activity 28(ii)	<ul style="list-style-type: none"><li>“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.”</li><li>Activity 28(ii) is triggered as the portions of the affected farm has been previously used for grazing and the property</li></ul>

		will be re-zoned to “special” use. The development footprint of the solar power plant will be 70 ha 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 30 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 Ghaap Plateau Vaalbosveld (SVk 7) which is described by Mucina and Rutherford (2006) as ‘least threatened’. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 70 ha.</li> </ul>

The activities triggered under Listing Notice 1 and 2 (Regulation 327 and 325) for the project implies that the development is considered as potentially having an impact on the environment. Based on the location of the entire extent of the project within the Vryburg REDZ, the process to be followed will be as per GNR 114, as gazetted on 16 February 2018. Therefore, the addition to the Protea Solar Power Plant is subject to a Basic Assessment process and not a full Environmental Impact Assessment process, as well as a shortened timeframe for the processing of the Application for Environmental authorisation by the DFFE. The Basic Assessment must be undertaken in line with the requirements stipulated under Regulations 19 – 20 of the EIA Regulations. According to Appendix 1 of GNR 326, the objective of the basic assessment process is to, through a consultative process:

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



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

This report is the Basic Assessment Report (BAR) that has been submitted to the Department of Forestry, Fisheries and the Environment (DFFE) for review and comment. According to GNR 326 all registered interested and affected parties (I&APs) and relevant State Departments (including Organs of State) must be allowed the opportunity to review and provide comment on the report. The BAR has been made available to registered I&APs and all relevant State Departments for a 30-day review and comment period from **19 June 2021 to 19 July 2021**. These stakeholders have been requested to provide written comment on the BAR within 30 days of receiving it. All issues identified and comments raised during this review period will be documented and compiled into a Comments and Responses Report to be submitted as part of the Final BAR to DFFE for decision-making on the Application for EA.

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

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

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Electronic Mail: [lisa@environamics.co.za](mailto:lisa@environamics.co.za)

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

### **1.3 DETAILS OF SPECIALISTS**

Table 1.2 provides information of the independent specialists that have been appointed as part of the Basic Assessment process. Regulation 13(1)(a) and (b) determines that independent and suitably qualified and experienced specialists should conduct the specialist studies. 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), which must comply with sub regulation 1. In terms of the independent status of the specialists, their declarations are attached as Appendix D to this report. The expertise of the specialists is also summarized in their respective curriculum vitae's which is included in the respective specialist 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 Potchefstroom 2522	Cell: 082 214 3738	adrian.haagner@agreencogroup.com
Ecological Fauna and Flora Habitat Survey	Anthene Ecological CC	Reinier Terblanche	P.O. Box 20488 Noordbrug Potchefstroom 2522	Cell: 082 614 6684	reinierf.terblanche@gmail.com
Heritage Impact Assessment	J van Schalkwyk Heritage Consultant	J van Schalkwyk	62 Coetzer Avenue Monument Park 0181	Cell: 076 790 6777	jvschalkwyk@mweb.co.za
Paleontological Study	NATURA VIVA CC	Dr. John Almond	PO Box 12410 Mill Street CAPE TOWN 8010	Cell: 021 462 3622	naturaviva@universe.co.za
Agricultural & Soils Compliance Statement	Johann Lanz Soil Scientist	Johann Lanz	P. O. Box 6209 Uniedal Stellenbosch 7612	Tel: 021 866 1518 Cell: 082 927 9018	johann@johannlanz.co.za
Visual Impact Assessment	Phala Environmental Consultants	Johan Botha	30 Fouche Street Steynsrus ,9515	Tel: 082 316 7749	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

#### 1.4 STATUS OF THE BA PROCESS

The BA process is being conducted strictly in accordance with the stipulations set out in Regulations 19 – 20 and Annexure 1 of GNR 326. Table 1.3 provides a summary of the BA 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.
- A newspaper advertisement was placed in the Stellalander, on 24 March 2021, informing the public of the BA process and for the public to register as I&APs.
- A site visit was conducted by the EAP on 25 March 2021.
- Site notices were erected on site on 25 March 2021 in order to inform the public of the commencement of the BA process.
- A revised public participation plan was submitted to the DFFE on 01 April 2021.
- The DFFE accepted the public participation plan in an email dated 01 April 2021.
- An application for the Environmental Authorisation Process and the draft BAR was submitted to DFFE on 18 June 2021.
- The Basic Assessment report has been made available for a 30-day review and comment period from 19 June 2021 to 19 July 2021.

It is envisaged that the BA process should be completed within approximately five months of submitting the Application for EA and the BAR, i.e. by Sept. 2021 – see Table 1.3.

**Table 1.3:** Project schedule

Activity	Prescribed timeframe	Timeframe
Appoint specialists	-	19 Feb. 2021
Submit pre-application meeting request and public participation plans	-	05 March 2021
Site visit	-	25 March 2021
Pre-application meeting & approval of PPP	-	01 April 2021
Public participation (BID) & newspaper advertisement	30 Days	25 March – 26 April 2021
Conduct specialist studies	2 Months	All reports due by mid-April 2021
Review of Specialist reports		April 2021
Submit application form and release the BAR for a 30-day review and comment period	-	18 June 2021

Public participation (DBAR) & Public meetings	30 Days	19 June 2021 – 19 July 2021
Submit Final BAR	90 Days	July 2021
Decision	57 Days	September 2021
Public participation (decision) & submission of appeals	20 Days	October 2021

## 1.5 STRUCTURE OF THE REPORT

This report is structured in accordance with the prescribed contents stipulated in Appendix 1 of GNR 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 BAR as specified in the Regulations		Section in report
<b>Appendix 1. (3) - A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-</b>		
(a)	details of - (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae.	1
(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;	2
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure.	
(e)	a description of the policy and legislative context within which the development is proposed including: (i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments	3

	that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) How the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks and instruments;	
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	4
(g)	A motivation for the preferred site, activity and technology alternative.	5
(h)	a full description of the process followed to reach the preferred alternative within the site including –	
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	6 & 7
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	
	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcomes of the site selection matrix;	
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including –	
	(i) a description of all environmental issues and risks that were identified during the EIA process; and	

	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures.	
(j)	an assessment of each identified potentially significant impact and risk, including- (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	6
(l)	an environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	8
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	
(n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	8
(o)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	8
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Not applicable
(r)	an undertaking under oath or affirmation by the EAP in relation to-	

	(i) the correctness of the information provided in the report;	Appendix A to the report
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties (I&APs);	
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
	(iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	Not applicable
(t)	any specific information that may be required by the CA; and	Not applicable
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Not applicable



## 2 ACTIVITY DESCRIPTION

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

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

(b) the location of the activity, including-

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

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

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

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

- (i) all listed and specified activities triggered and being applied for;
- (ii) a description of the associated structures and infrastructure related to the development.

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

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

The project entails the generation of an additional 30 MW electrical power through the operation of photovoltaic (PV) panels for the already authorised Protea Solar Power Plant. The total development footprint of the project will approximately be 70 hectares (including supporting infrastructure on site) – refer to Table 2.1 for general site information. The property on which the facility is to be constructed will be leased by Protea Solar Power Plant (RF) (Pty) Ltd from the property owner, Jacobus Johannes Nicolaus van Rooyen and Petronell Gertruida van Rooyen, for the lifespan of the project (minimum of 20 years).

**Table 2.1:** General site information

Description of affected farm portion	The Remaining Extent of the Farm Hartsboom No. 734, Registration Division IN, North West Province
21 Digit Surveyor General codes	TOHN00000000073400000
Type of technology	Photovoltaic solar facility
Structure Height	Panels ~6 m
Surface area to be covered (Development footprint)	Approximately 70ha
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 (EIA footprint)	Assessed 70 hectares for the development of the solar power plant
Generation capacity	Up to 30 MW
Expected production	70 -072 GWh per annum (expected production by 30MWdc modules) considering Bifacial and one-axis tracker

The site is located in a rural area and is bordered by farms where mainly agricultural activities are undertaken. The site survey revealed that the land use of the affected property currently consists of grazing cattle – refer to plates 1-9 for photographs of the site.

## 2.2 ACTIVITY DESCRIPTION

The proposed development will trigger the following activity:

**Table 2.2:** Listed activities

Relevant notice:	Activity No (s)	Description of each listed activity as per the project description:
GNR 327 (as amended in 2017)	Activity 14	<ul style="list-style-type: none"> <li>• <i>“The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.”</i></li> <li>• Activity 14 is triggered since the proposed development will need to develop infrastructure for the storage and handling of dangerous goods (diesel and oils) in containers with a combined capacity of 80 cubic metres or more, but not exceeding 500 cubic metres.</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 70 ha 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> </ul>

		<ul style="list-style-type: none"> <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 30 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 Ghaap Plateau Vaalbosveld (SVk 7) which is described by Mucina and Rutherford (2006) as ‘least threatened’. Activity 15 is triggered since portions of the site has not been lawfully disturbed during the preceding ten years; therefore, more than 20 hectares of indigenous vegetation will be removed. The development footprint of the solar power plant will be 70 ha.</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 will need to be cleared of vegetation and access to the site will need to be confirmed.
- 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 roads/paths – existing paths will be used where reasonably possible. A short access road will be constructed to link the site with the N18 National Road. Additionally, the turning circle for trucks will also be taken into consideration.
  - Trenching – all Direct Current (DC) and Alternating Current (AC) wiring within the PV plant will be buried underground. Trenches will have a river sand base, space for pipes, backfill of sifted soil and soft sand and concrete layering 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 30 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 or using one-axis tracker structures to follow the sun to increase the yield.
- 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.
- Roads –An internal site road network will be required, with a width of between 6 m and 12 m, to provide access to the solar field and associated infrastructure. The 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 8. The total surface area covered by the layout include the PV panel arrays (spaced to avoid shadowing), access and maintenance roads and associated infrastructure (buildings, power inverters, and perimeter fences). No environmental features of significance exist on site, therefore there were no sensitive features to avoid in the layout of the facility . A final layout plan is included in Appendix H under Layout Plans in the report. 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

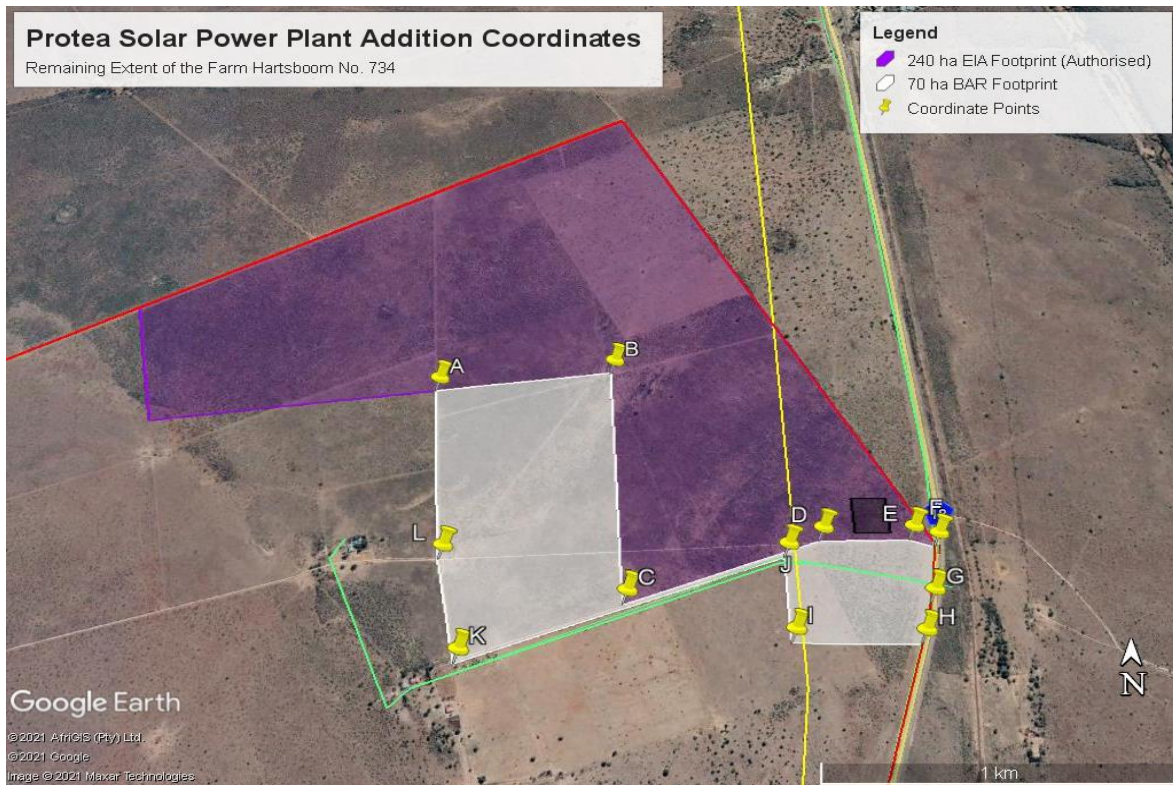
Component	Description / dimensions
Height of PV panels	6 meters
Area of PV Array	70 Hectares (development footprint)
Number of inverters required	Minimum 10
Area occupied by inverter / transformer stations	Central inverters+ LV/MV trafo: 20 m <sup>2</sup>
Area occupied by both permanent and construction laydown areas	Permanent Laydown Area: 70ha

<b>Length of internal roads</b>	Approximately 3 km
<b>Width of internal roads</b>	Between 6 & 12 meters
<b>Height of fencing</b>	Approximately 2.5 meters

Table 2.4 provide the coordinate points for the proposed project site.

**Table 2.4:** Coordinates

Coordinates			
<b>Project Site</b>	A	27° 4'32.36" S	24°44'23.88" E
	B	27° 4'29.89" S	24°44'44.77" E
	C	27° 4'58.71" S	24°44'45.64" E
	D	27° 4'51.45" S	24°45'7.72" E
	E	27° 4'51.27" S	24°45'17.91" E
	F	27° 4'52.08" S	24°45'20.57" E
	G	27° 4'58.61" S	24°45'19.16" E
	H	27° 5'3.13" S	24°45'17.58" E
	I	27° 5'3.01" S	24°45'3.59" E
	J	27° 4'53.36" S	24°45'3.68" E
	K	27° 5'5.18" S	24°44'27.68" E
	L	27° 4'53.58" S	24°44'25.42" E



**Figure 8:** Map indicating coordinate points of the proposed addition to the Protea Solar Power Plant.

## 2.5 SERVICES PROVISION

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

### 2.5.1 Water

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

The estimated maximum amount of water required during construction is 1333m<sup>3</sup> per month during the 15 months of construction. The estimated maximum amount of water required during the entire Protea SPP 20 years of production is 5000m<sup>3</sup> per annum. This addition to the Protea SPP will require approximately 2000m<sup>3</sup> per annum (out of the total 5000m<sup>3</sup>). 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 76048 panels will require 152 096 litres per wash. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quarterly cleaning (March, May, July, and September). This totals approximately 5000,000

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 5000m<sup>3</sup> of water required per annum for the entire Protea SPP. Drinking water supplied will comply with the SANS:241 quality requirements and it is noted that the Naledi Local Municipality remains the Water Service Authority in the area.

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.

### **2.5.2 Stormwater**

To avoid soil erosion, it is recommended that the clearing of vegetation be limited. Stormwater management and mitigation measures are included in the Environmental Management Programme (EMPr) – refer to Appendix F1.

### **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 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.
- 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 1. (3) A BAR (...) must include-**

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

#### 3.1 INTRODUCTION

Environmental decision making with regards to solar PV plants and associated infrastructure is based on numerous policy and legislative documents. These documents inform decisions on project level environmental authorisations issued by the National Department of Forestry, Fisheries and the Environment (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 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 Resource Plan (IRP) for South Africa (2010-2030)
- National Development Plan of 2030
- National Infrastructure Plan of South Africa
- New Growth Path Framework
- North West Provincial Spatial Development Framework (PSDF) (2012)

- Strategic Environmental Assessment (SEA) for wind and solar PV Energy in South Africa (2014)
- Dr Ruth s. Mompoti District Municipality Draft Integrated Development Plan (IDP) 2020-2021 (2020)
- Naledi Local Municipality Final Integrated Development Plan 2018-2019 (2019)
- Naledi Local Municipality Spatial Development Framework (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 Protea 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)	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 BA process undertaken for the Protea 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 Protea 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 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.</p>

The site falls within the C32 quaternary drainage region, this drainage region falls under Zone CNV, which refers to the amount of water that may be taken from the ground water resource, per hectare.

Also, should a water use license be required for the project, the National Water Act will be applicable in terms of obtaining the relevant license.

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

		and the Environment)			Atmospheric Emission License (AEL) is required for certain listed activities, which result in atmospheric emissions which have or may have a detrimental effect on the environment. The Regulation also sets out the minimum emission standards for the listed activities. It is not envisaged that an Atmospheric Emission License will be required for the proposed development.
<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 Protea 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 D5 to this BAR.</p>
<b>Conservation of Agricultural Resources Act</b>		National Provincial Government		and 1983	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.

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(Act No. 85 of 1983)

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.

A Soils and Agricultural Compliance statement has been undertaken for the Protea Solar Power Plant and is included as Appendix D4 of this BAR.

**The National Forests Act, 1998 (Act 84 of 1998)** Department of Environmental Affairs (now known as the Department of Forestry, Fisheries and the Environment) of 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.

An Ecological Impact Assessment has been undertaken for the Protea Solar Power Plant and is included in Appendix D1 of this BAR.



<b>North Nature Conservation Ordinance, 1983 (Act 12 of 1983)</b>	<b>West</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>An Ecological Fauna and Flora Habitat Survey has been undertaken for the Protea Solar Power Plant and is included in Appendix D1 of this BAR.</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 Protea 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).*

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

<b>Integrated Resource Plan (IRP) for South Africa</b>	Department of Mineral Resources and Energy	2010-2030	<p>The Integrated Resource Plan for Electricity for South Africa of 2010–2030 (further referred to as the IRP) is a “living plan” which is expected to be revised and updated continuously as necessary due to changing circumstances. According to the Summary of the plan the current IRP for South Africa, which was originally initiated by the Department of Energy (DoE) in June 2010 (the Department is now known as Department of Mineral Resources and Energy), led to the Revised Balanced Scenarios (RBS) for the period 2010–2030.</p> <p><i>“This scenario was derived based on the cost-optimal solution for new build options (considering the direct costs of new build power plants), which was then “balanced” in accordance with qualitative measures such as local job creation”. In addition to all existing and committed power plants, the RBS included 11,4 GW of renewables, which relates to the proposed Protea SPP. In 2010 several changes were made to the IRP model. The main changes in the IRP were the disaggregation of renewable energy technologies to explicitly display solar photovoltaic (PV), concentrated solar power (CSP), and wind options” (RSA, 2011a).</i></p> <p>The summary of the IRP further explains that traditional cost-optimal scenarios were developed based on the previously mentioned changes in the IRP. This resulted in the Policy-Adjusted IRP, which stated that:</p> <p><i>“The installation of renewables (solar PV, CSP and wind) have been brought forward in order to accelerate a local industry;</i></p> <p><i>To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW is included in the IRP;</i></p> <p><i>The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) is maintained; and</i></p> <p><i>Energy efficiency demand-side management (EEDSM) measures are maintained at the level of the RBS” (RSA, 2011a:6).</i></p> <p><i>“The Policy-Adjusted IRP includes the same amount of coal and nuclear new builds as the RBS, while reflecting recent developments with respect to prices for renewables. In addition to all existing and</i></p>
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*committed power plants (including 10 GW committed coal), the plan includes 9,6 GW of nuclear; 6,3 GW of coal; 17,8 GW of renewables; and 8,9 GW of other generation sources” (RSA, 2011a:6).*

The IRP highlights the commitments before the next IRP. The commitments pertaining to the purpose of the proposed project in renewable energy is:

*“Solar PV programme 2012-2015: In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary. Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment.”*

*“Solar PV 2016 to 2019: As with wind, grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location. To trigger the associated tasks in a timely manner, a firm commitment to these capacities is necessary in the next round of the IRP at the latest. By then, the assumed cost decreases for solar PV will be confirmed” (IRP, 2011a:17).*

In conclusion the IRP recommends that an accelerated roll-out in renewable energy options should be allowed with regards to the benefits of the localization in renewable energy technologies (RSA, 2011a). It is however important to take note that since the release of the IRP in 2011 there has been a number of developments in the energy sector of South Africa. Therefore, the IRP has been updated and were open for comments until March of 2017. The new IRP of 2019 was formally published in October 2019. The draft IRP of 2018 was open for comments until the end of October 2018. For the revision scenario, analysis were conducted and the results thereof are included in the draft IRP of 2018. The results revealed that for the period ending 2030 that: *“The committed Renewable Energy Independent Power Producers Programme, including the 27 signed projects and Eskom capacity rollout ending with the last unit of Kusile in 2022, will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to approximately 2025”; “Imposing annual build limits on renewable energy will not affect the total cumulative capacity and the energy mix for the period up to 2030”; and “the scenario without renewable energy annual build limits provides the least-cost option by 2030” (RSA, 2018:34).*

Lastly, the draft IRP of 2018 also included the scenario analysis for the period post 2030. Here it was observed that: *“Imposing annual build limits on renewable energy will restrict the cumulative renewable installed capacity and the energy mix for this period; adopting no annual build limits on renewables or imposing a more stringent strategy to reduce greenhouse gas emissions implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal-to-power are available; and the scenario without renewable energy annual build limits provides the least-cost option by 2050”* (RSA, 2018:34–35).

In the final IRP of 2019 key considerations were taken into account together with required actions to be taken for the IRP of 2019 to be credible. In terms of renewable energy technologies like solar and wind, the IRP stated that *“The application of renewable build limits ‘smoothes out’ the capacity allocations for wind and solar PV which provides a constant pipeline of projects to investment; this addresses investor confidence”*. The decision stated against this key consideration is to *“retain the current annual build limits on renewables (wind and PV) pending the finalization of a just transition plan”* (RSA, 2019:46). Hereby the IRP also recognises renewable technologies’ potential to diversify the electricity mix, create new industries and job opportunities and localize across the value chain (RSA, 2019:13).

The Protea 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.

**National  
Development  
Plan of 2030**

The Presidency:  
National  
Planning  
Commission

-

The National Development Plan aims to “eliminate poverty and reduce inequality by 2030” (RSA, undated). In order to eliminate or reduce inequality, the economy of South Africa 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 energy was identified as a key intervention strategy to address this challenge.

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

<b>National Infrastructure Plan of South Africa</b>	Presidential Infrastructure Coordinating Commission	2012	<p>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:</p> <ul style="list-style-type: none"> <li>- SIP 8: Green energy in support of the South African economy;</li> <li>- SIP 9: Electricity generation to support socio-economic development; and</li> <li>- SIP 10: Electricity transmission and distribution for all.</li> </ul> <p>SIP 8 according to the Plan “<i>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</i>”. The purpose of SIP 9 according to the Plan is to “<i>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</i>”. 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 “<i>expand the transmission and distribution</i></p>
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*network to address historical imbalances, provide access to electricity for all and support economic development” (RSA, 2012:20).*

The Protea 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	-	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).
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This framework sets out the markers for job creation and growth and also identify where there are viable changes in the character and structure of production, in order to create a more inclusive, greener economy on the long-term. It is stated in the framework that in order for this framework to reach its objectives, the Government is committed to:

- Identify the possible areas of employment creation; and
- Develop a policy to facilitate employment creation especially with regards to social equity, sustainable employment and growth in the creation of employment activities (RSA, 2011b).

This framework also identifies investments in five key areas, one of which is energy. This framework also states that the green economy is a priority area, which includes the construction 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.

Considering that the construction of and investment in renewable energy is a key area identified within the framework. The Protea Solar Power Plant is considered to be in-line with the framework.

<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 Environmental Affairs (DEA) has committed to contribute to the implementation of the National Development Plan and National Infrastructure Plan by undertaking Strategic Environmental Assessments (SEAs) to identify adaptive processes that integrate the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment. The wind and solar photovoltaic (PV) SEA was accordingly commissioned by DEA in support of SIP 8, which aims to facilitate the implementation of sustainable green energy initiatives.</p> <p>This SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms 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.</p> <p>Although it is intended for the SEA to facilitate proactive grid investment in REDZs, such investment should not be limited to these areas. Suitable wind and solar PV development should still be promoted across the country and any proposed development must be evaluated on its own merit. The proposed site falls within the Vryburg REDZ.</p>
<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>



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- Adopt a holistic approach to spatial development in order to minimise the long-term negative impacts of current land use or development decisions.
  - Ensure that spatial planning serves national, provincial and/or local interest.
  - Support the long-term adequacy or availability of physical, social and economic resources to support or carry development.
  - Protect existing natural, environmental, and cultural resources.
  - 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.
  - Support mining as a vital economic driver in the province without jeopardizing the biodiversity value of the environment.
  - Adopt a climate change strategy that will provide for responsible actions to curb the effect of global warming and climate change.

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 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.

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

<b>Dr Ruth S. Mompati District Municipality Draft Integrated Development Plan (IDP)</b>	<b>Dr Ruth S. Mompati District Municipality</b>	<b>2020 - 2021</b>	The long-term vision of the Dr Ruth S Mompati DM is: <i>“A Developmental district, where sustainable service delivery is optimised, prioritised and realised”</i> .
			The above stated vision defines what Dr Ruth S Mompati DM would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is that: <i>“We provide efficient, effective and sustainable municipal service to the communities of the Dr Ruth Mompati District Municipality”</i> .
			The SIPS provides an integrated framework for the delivery and implementation of social and economic infrastructure across the face of South Africa. Some of the SIPS’s 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:
			<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 envisaged in the Integrated Resource Plan (IRP 2010).</li> <li>• 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.</li> </ul> <p>Considering the plans for the alignment of the DM’s plans with SIP 8 and SIP 9 it is confirmed that the Protea Solar Power Plant is in line with the plan.</p>

<b>Naledi Municipality Final Integrated Development Plan (IDP)</b>	<b>Local Municipality</b>	Naledi Municipality	<b>Local Municipality</b>	<b>2018 - 2019</b>	<p>The vision of the Naledi LM is “To provide basic, quality, sustainable and equitable services through effective and efficient governance and financial management.”</p> <p>The Mission Statement is: “We will deliver adequate and sustainable services to our community by:</p> <ul style="list-style-type: none"> <li>- Enhancing revenue and effective utilisation of resources</li> <li>- Promoting radical socio economic and infrastructure development</li> <li>- Instil corporate culture</li> <li>- To have motivated and representative workforce with high ethical standards</li> <li>- To apply good and transparent municipal governance (King iii)</li> <li>- To render cost effective and sustainable services to all VTSD areas</li> <li>- Adhering to Batho Pele Principles”</li> </ul> <p>The vision and mission of the municipality have led to the conceptualisation of the following strategic objectives:</p> <ul style="list-style-type: none"> <li>- To Promote Sound Financial Management and revenue enhancement</li> <li>- To Promote transparency through good governance</li> <li>- To Foster Good Relationships with stakeholders through effective Public Participation</li> <li>- To Foster Good Corporate Culture</li> <li>- To Accelerate the Provision of Basic Services</li> <li>- To create an Environment conducive for Local Economic Development</li> </ul> <p>The development of the Protea 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>
<b>Naledi Municipality Spatial Development Framework</b>	<b>Local Municipality</b>	Naledi Municipality	<b>Local Municipality</b>	<b>2018</b>	<p>The Spatial Development Framework is an indicative plan showing the desired patterns of land use, direction of growth, special development areas and conservation-worthy areas. The SDF needs to be informed by the vision of the municipal area, the development objectives, as well as the strategies and outputs identified by the IDP.</p> <p>It is important that the SDF of Naledi Local Municipality is in line with the National Spatial Development Perspective, the Provincial Spatial Development Framework, and the District Spatial Development Framework in order to fully effect the aspirations of Spatial Planning within the Republic.</p>

The normative principles put forward in the National Spatial Development Plan (2006) forms the bases on which spatial proposals are formalised. It also recognised that rapid economic growth that is sustained and inclusive, is a prerequisite for the achievement of other policy objectives, among which poverty alleviation is key. Yet, government has a constitutional obligation to provide basic services to all citizens wherever they reside. It is therefore imperative that government spending on fixed investment should be focussed on localities of economic growth and/or economic activities in order to create sustainable employment opportunities.

Social inequalities should be addressed by focusing on 'people' and not 'places'. In areas where there are both high levels of poverty and demonstrated economic potential, this could include fixed capital investment beyond basic services to exploit the potential of those localities (such as Vryburg and Stella). In localities with low demonstrated economic potential, government should, beyond the provision of basic services, concentrate primarily on human capital development by providing education, training and social transfers to relief poverty.

The restructuring of regional spatial distortions needs a clear set of policy directives in order to direct people to migrate towards areas with higher level of services and opportunities. Future settlement and economic development opportunities should therefore be channelled into activity corridors and nodes. Naledi Local Municipality should further capitalize on its locality on the Western frontier SDI as well as its importance as a 1st order centre for Dr Ruth S. Mompati District Municipality, according to the PSDF.

The development of the Protea 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.

### 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 BA:

- The Equator principles III (2013)<sup>3</sup>
- 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 Basic Assessment 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, national guidelines, the World Bank EHS Guidelines, the IFC Performance Standards, and the Equator Principles.

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

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

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

The main findings of the review of the policy documents on all spheres of Government indicated that strong support was given towards renewable energy, specifically PV solar energy and therefore it is concluded that there is support for the development of the Protea 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 increase in energy supply, therefore the development of a solar energy facility is supported.

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 Protea 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 1.** (3) An BAR (...) must include-

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

### 4.1 THE NEED FOR THE PROPOSED ACTIVITY

The 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 this 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 primary rationale for the Protea Solar Power Plant (SPP) is to add new generation capacity from renewable energy to the national electricity mix and to aid in achieving the goal of 42% share of all new installed generating capacity being derived from renewable energy forms, as targeted by the Department of Mineral Resources and Energy (DMRE) (Integrated Resource Plan 2010-2030). The establishment of the photovoltaic solar facility will significantly contribute to achieving this objective and will also address some of the objectives identified by the Naledi Local Municipality's Integrated Development Plan such as creating an environment that is conducive for local economic development (IDP, 2018-2019).

### 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. Further to the above, the desirability of the development of an additional 70ha solar power plant is also supported by the fact that a larger solar power plant within the same affected property has been previously authorised to generate 115 MW, and this addition is expanding the generation capacity of the facility with 30 MW. Therefore, increasing the surety of supply.

- Local economic growth - The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the North West Province. The project will likely encounter widespread support from government, civil society and businesses, all of whom see potential opportunities for revenues, employment and business opportunities locally. The development of the photovoltaic solar facility will in turn lead to growth in tax revenues for local municipalities and sales of carbon credits, resulting in increased foreign direct investment.
- Lower costs of alternative energy - An increase in the number of solar facilities commissioned will eventually reduce the cost of the power generated through solar facilities. This will contribute to the country's objective of utilising more renewable energy and less fossil fuel based power sources. It will assist in achieving the goal to generate 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 utilisation 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 320 employment opportunities will be created during the construction and operational phases for this addition of the Protea SPP.
- 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 and soil limitations, the site is unsuitable for cultivated crops, and viable agricultural land use is limited to grazing only. The grazing capacity on AGIS is classified almost entirely across the site as 7ha per large stock unit. The proposed development in this specific area will generate alternative land use income through rental for the energy facility, which will have a positive impact on agriculture. It will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve the financial sustainability of the landowner.
- 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 1. (3) A BAR (...) must include-**

- (g) A motivation for the preferred site, activity and technology alternative;
- (h) a full description of the process followed to reach the proposed preferred alternative, within the site, including –
  - (i) details of all the alternatives considered;
  - (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
  - (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
  - (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
  - (viii) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;
  - (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and
  - (xi) a concluding statement indicating the preferred alternative development location within the approved site.

### 5.1 CONSIDERATION OF ALTERNATIVES

The DEA 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.

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

#### 5.1.1 No-go alternative

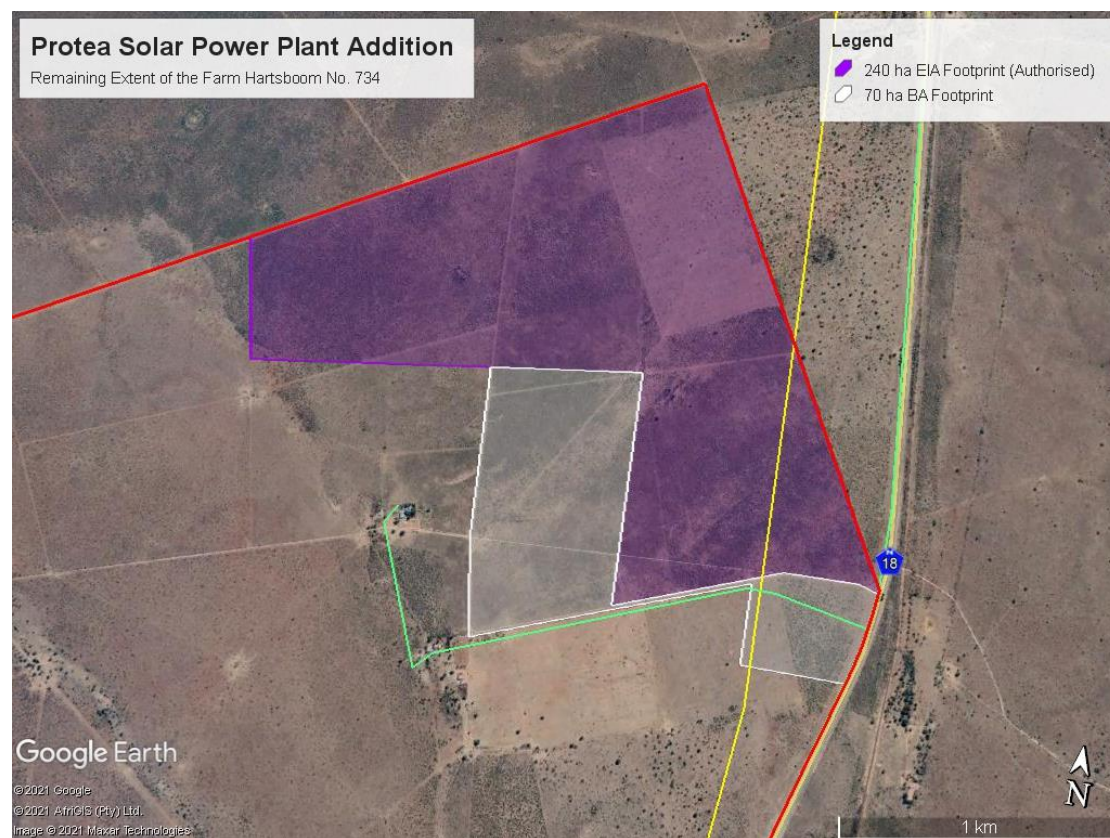
This alternative considers the option of ‘do nothing’ and maintaining the status quo. The description provided in section 5.3 of this report could be considered the baseline conditions (status quo) to persist should the no-go alternative be preferred. The site is currently zoned for agricultural land use. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for grazing cattle. 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 the 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 Protea Solar Power Plant (RF) (Pty) Ltd in the Vryburg area to potentially establish the project due to the development being proposed as an addition for adding capacity to the already authorised 115MW Protea Solar Power Plant. From a local perspective, the Remaining Extent of the Farm Hartsboom No. 734, is preferred due to its suitable climatic conditions, topography (i.e. in terms of gradient), environmental conditions (i.e. agricultural potential, ecological sensitivity), and 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 considered to have limited environmental sensitivity as a result. In 2017, the Department of Forestry, Fisheries and the Environment released a refined and updated land capability mapping which divides the land capability into 15 different categories where 1 is the lowest and 15 is the highest. The site land capability varies from very low (5) to low-moderate (7). Therefore, the agricultural potential is limited on site and the land use change is unlikely to result in significant impacts on agricultural production.

No alternative areas on the Remaining Extent of the Farm Hartsboom No. 734, have been considered as the development footprint will form part of the larger Protea Solar Power Plant that has been previously authorised. Therefore, a single preferred location alternative was assessed – refer to Figure 9.

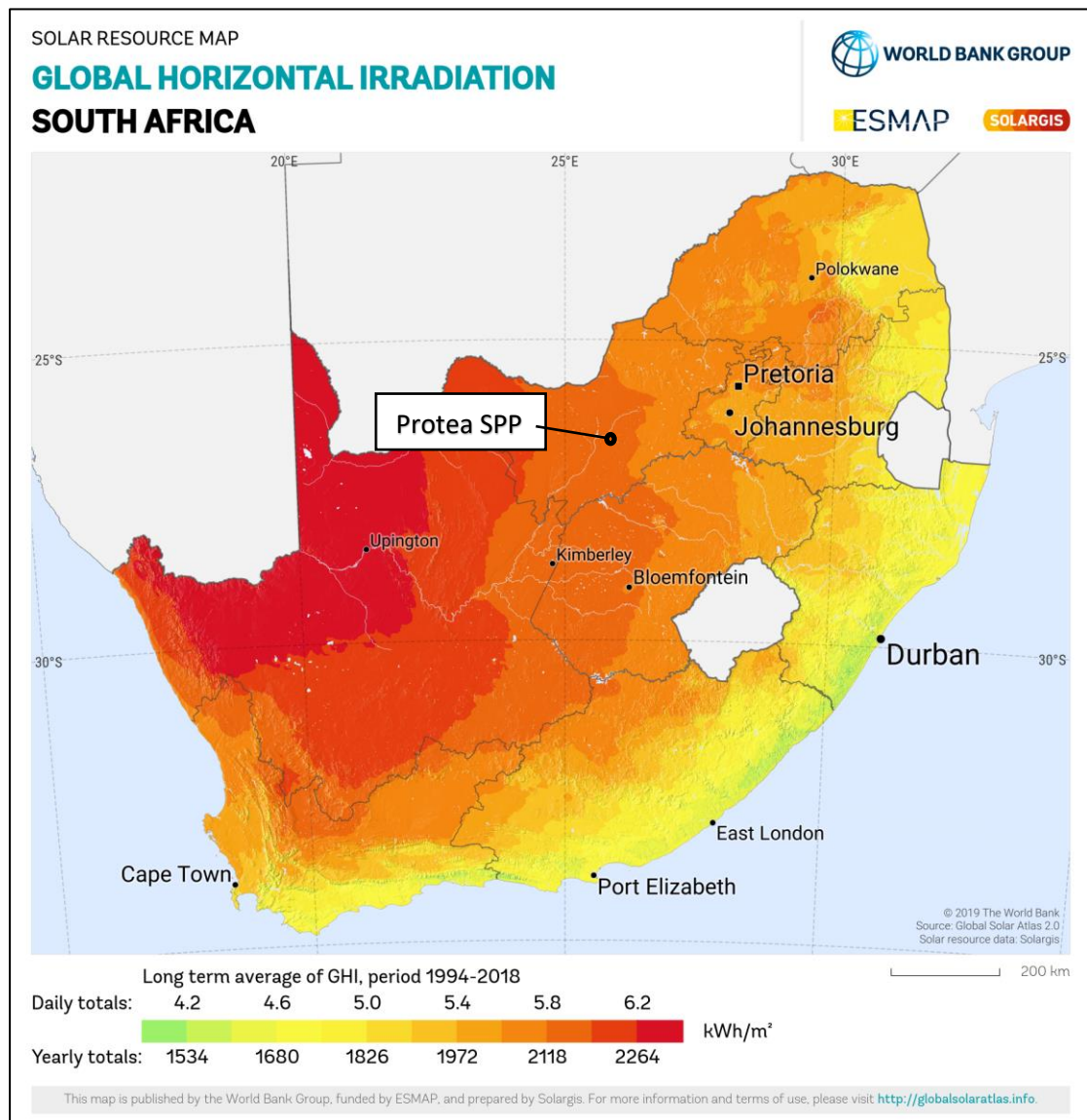


**Figure 9:** Location of the preferred alternative for the Protea Solar Power Plant on the Remaining Extent of the Farm Hartsboom No. 734.

### 5.1.3 Activity alternatives

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

- **Photovoltaic (PV) solar facility** – Protea Solar Power Plant (RF) (Pty) Ltd is part of a portfolio of solar PV projects throughout South Africa. Protea Solar Power Plant (RF) (Pty) Ltd is of the opinion that solar PV technology is perfectly suited to the site, given the high irradiation values of the Vryburg area – refer to Figure 10. 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 10:** 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 constrain 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 county. Therefore, this alternative will not be considered further in this report.

#### **5.1.4 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. The layout plan is included in Appendix H.

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 (power inverters 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.

#### **5.1.5 Technology alternatives**

Technology alternatives for the development of a solar PV facility needs to be considered during the BA process.

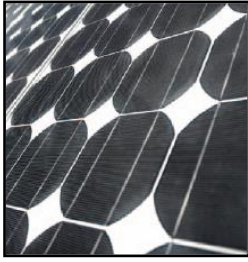
##### **5.1.5.1 Photovoltaic solar panels**

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, thin film or bifacial PV panels. 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)**

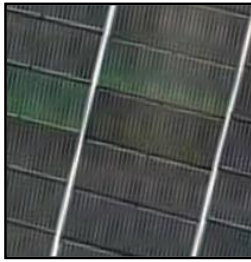
Thin film solar panels are made by placing thin layers of semiconductor material onto various surfaces, usually on glass. The term *thin film* refers to the amount of semiconductor material used. It is applied in a thin film to a surface structure, such as a sheet of glass. Contrary to popular belief,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

## **5.2 PUBLIC PARTICIPATION PROCESS**

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

### **5.2.1 General**

The public participation process was conducted strictly in accordance with Regulations 39 to 44. The following three categories of variables were taken into account when deciding the required level of public participation:

- The scale of anticipated impacts
- The sensitivity of the affected environment and the degree of controversy of the project
- The characteristics of the potentially affected parties

Since the scale of anticipated impacts is low, the low environmental sensitivity of the site and the fact that no conflict was foreseen between potentially affected parties, no additional public participation mechanisms were considered at this stage of the process.

The following actions have already been taken:

➤ Newspaper advertisement

Since the proposed development is unlikely to result in any impacts that extend beyond the municipal area where it is located, it was deemed sufficient to advertise in a local newspaper. An advertisement was placed in English in the local newspaper (Stellalander) on the 24 March 2021 (see Appendix C1) notifying the public of the BA 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 until 26 April 2021.

➤ Site notices

Site notices were placed on site in English on 25 March 2021 to inform surrounding communities and immediately adjacent landowners of the proposed development. I&APs were given the opportunity to raise comments by 26 April 2021. Photographic evidence of the site notices is included in Appendix C2.

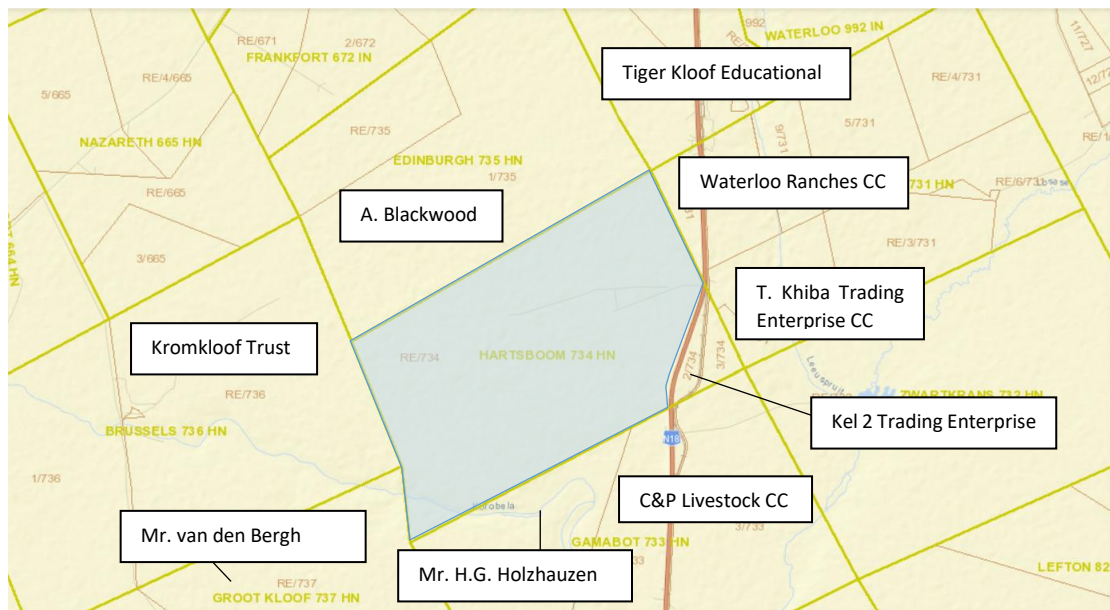
➤ Direct notification of identified I&APs

Identified and registered I&APs, including key stakeholders representing various sectors, has been directly informed of the Basic Assessment via registered post, telephone calls, WhatsApps and emails. For a complete list of I&APs with their contact details see Appendix C3 to this report.

➤ Direct notification of surrounding landowners and occupiers



Written notices were provided via WhatsApp or email to all surrounding landowners and occupiers – refer to Figure 11. The surrounding landowners were given the opportunity to raise comments within 30 days. For a list of surrounding landowners see Appendix C3.



**Figure 11: Surrounding Landowners**

#### ➤ Circulation of Draft Basic Assessment Report

As mentioned above, copies of the draft Basic Assessment report have been provided to all I&APs via Dropbox and/or email. Hard copies of the report will be made available on request. I&APs and organs of state have been requested to provide their comments on the report during the 30-day review and comment period from 19 June 2021 till 19 July 2021. All issues identified will be recorded and documented and compiled into a Comments and Responses Report to be included as part of the Final Basic Assessment Report. Hard copies of the report will be sanitized prior to it being posted or couriered, where requested.

### **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 and any other party as required by the competent authority should be given written notice of the activity. A complete list of all the consultees who received written notice as well as proof of correspondence is attached as Appendices C3 and C4.

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

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

*consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.”*

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

To date comments have been received from consultation bodies and is summarised in the Comments and Response Report included in Appendix C6. Any comments received during the circulation of the BAR will be summarized in the final BAR. The full wording and original correspondence will be included in Appendix C4.

### **5.3 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE PREFERRED ALTERNATIVE**

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

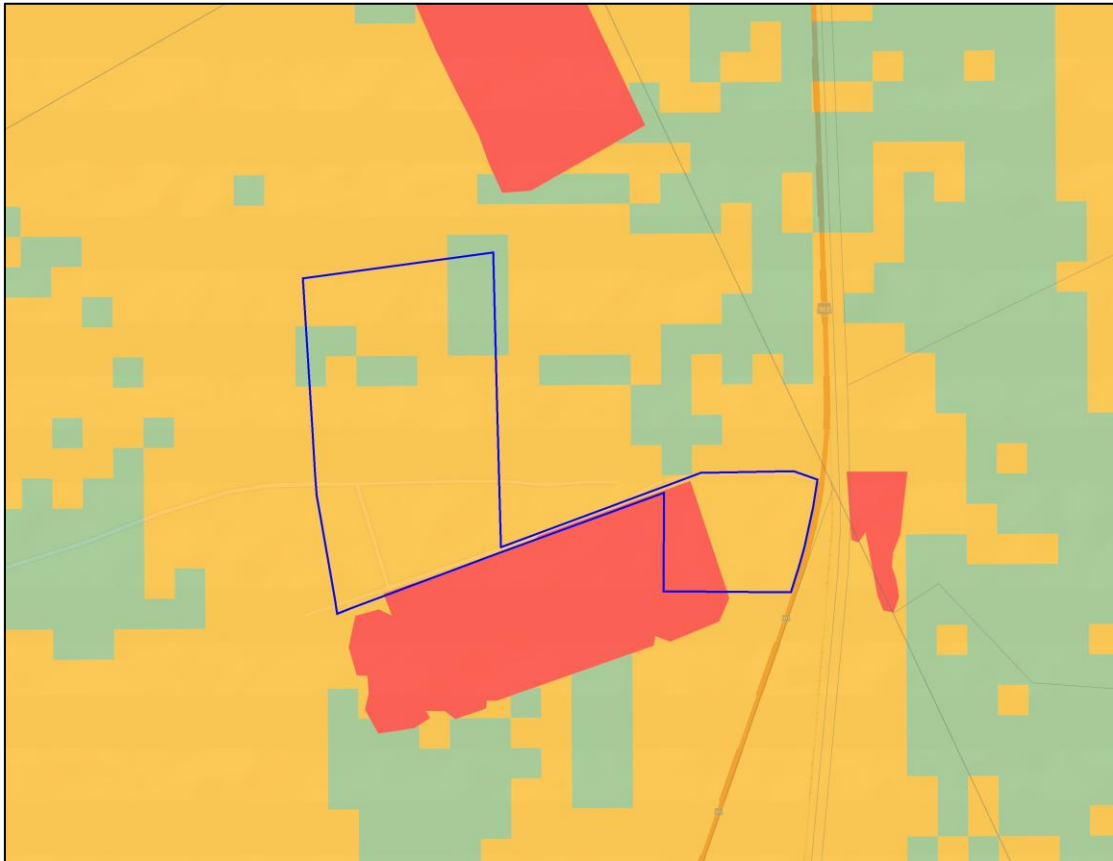
#### **5.3.1 Biophysical environment**

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 Soils and agricultural potential**

According to the Agriculture and Soils Compliance Statement (attached in Appendix D4) the low and medium agricultural sensitivity (as identified by the screening tool) is confirmed. The fairly low annual rainfall proves that the climate of the area is a limiting factor to the land capability. Shallow soils on underlying rock or hardpan carbonate, of the Coega, Gamoep and Mispah soil forms are the dominant soils across the site.

The screening tool identified some areas of high agricultural sensitivity (Figure 12) and resulting from the current cultivation status found on-ground, this is disputed by the Agriculture and Soils Compliance Statement. The motivation for disputing this sensitivity is that, according to historical imagery on Google Earth, in 2011 all cultivation on the land had ceased and has not been undertaken since. The field assessment confirmed that the historically cultivated piece of land has not been cultivated for an extended period (refer to Figure 13). The land capability of the site varies from 5 (low) to 6 -7 (low to moderate), which results in an agricultural sensitivity of low (5) and medium (6 & 7). The farm is not suitable for cultivation due to the soil and climatic limitations. Therefore, the agricultural potential of the site is low.



**Figure 12:** The proposed site (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high).



**Figure 13:** A current photograph of the historically cultivated land clearly showing that cultivation has not taken place for an extended period.

#### **5.3.1.2 Vegetation and landscape features**

The proposed site is located within the Savanna Biome and classified as the Ghaap Plateau Vaalbosveld (SVk 7) vegetation type. Mucina and Rutherford (2006) describes this vegetation type as being 'least threatened'. In South Africa the Ghaap Plateau Vaalbosveld is found in the Northern Cape and North-West Provinces: Flat plateau from around Campbell in the south, east of Danielskuil through Reivilo to around Vryburg in the north. Altitude at the Ghaap Plateau Vaalbosveld is approximately 1100 – 1500 m.

The site consists of an area where shrub-height layer of indigenous woody plant species, in particular *Tarchonanthus camphoratus* (Camphor Bush), is present. Dense covers of *Tarchonanthus camphoratus* which are observed at many places at the site can be described as bush encroachment. Vegetation at the site appears somewhat disturbed in some areas. Overall, a fairly natural vegetation with visible high cover of indigenous species, albeit widespread species, is present. Diggings, excavated areas, concrete farm dams, windpumps, fences and tracks, such as normally associated with cattle farming, are found at the site. Alien invasive plant species are conspicuous at disturbed areas.

Wetlands appear to be absent at the site. There are a number of diggings and excavations where ground walls may have formed, and water gather from time to time, but which do not ascribe to wetlands. Ecological sensitivity at most of the site is medium and in some parts, where much of the vegetation appears to have been cleared in the past, low. No areas or features of high sensitivity have been identified.



### Red Data, Protected and Endemic Plant Species

According to the Ecological Fauna & Flora Habitat Survey (refer to Appendix D1), the site contains the Protected Tree species *Vachellia erioloba* (Camel Thorn) (Figure 14) which occurs sparingly across the site. 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. The number of *Vachellia erioloba* (Camel Thorn) individuals at the site is relatively low, the tree occurs sparsely across the site. It is estimated that less than 10 individuals of *Vachellia erioloba* occur at the site.

Apart from *Vachellia erioloba* which is a Protected Tree species, none of the other plant species of particular conservation priority appear to occur at the site.



**Figure 14:** The *Vachellia erioloba* (Camel Thorn Tree) occurs sparingly at the site in savanna which is conspicuously dominated by the shrub-height tree *Tarchonanthus camphoratus*.

### Alien Invasive Species

According to the Ecological Fauna and Flora Habitat Survey (refer to Appendix D1) the declared alien invasive species, *Prosopis glandulosa* (Mesquite) is present in some places at the site. Other invasive plant species include the *Flaveria bidentis* (Smelter's Bush) and the alien invasive succulent *Opuntia ficus-indica* (Prickly-pear). Alien invasive weeds are not widespread on the site.

#### 5.3.1.3 Climate

According to Mucina and Rutherford (2006) climate is characterised by summer and autumn rainfall and very dry winters. Mean annual precipitation from about 300 mm in the southwest to about 500 mm in the northeast. Frost is frequent to very frequent in winter.

#### **5.3.1.4 Biodiversity**

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

##### **5.3.1.4.1 Avifauna**

According to the Avifaunal Assessment conducted in March 2021 (refer to Appendix D2), the proposed Protea SPP addition is situated in an area of moderate to low avifaunal diversity and low – moderate avifaunal sensitivity. There are non-perennial rivers, but they are not located near the site (>1 km), nor are there specific avifaunal habitat features that would attract large volumes of birds or act as a preferred flyway. The resident avifauna is represented by moderate to low species richness and abundance. The resident avifauna is represented by moderate to low species richness and abundance. A good baseline dataset was generated during the site surveys, supplemented by a relatively scant SABAP2 dataset and the results of the 2016 avifaunal specialist assessment for the larger 115MW Protea SPP. No Red Data species were recorded during the surveys, however suitable habitats exist for some of the Red Data species and they have a moderate likelihood of occasional occurrence on site. A small number of endemic or near-endemic species occur on site.

##### **5.3.1.4.2 Ecology**

Through a literature review the Ecological Fauna and Flora Habitat Survey (refer to Appendix D1) confirmed that no animals were restricted or endemic to the area. There are no rocky ridges at the site.

The focus of the Ecological Fauna and Flora Habitat Survey has been on signs and surveying habitat characteristics to note potential occurrences of mammals of particular conservation concern. Since the site falls outside of formal or informal reserves, threatened species such as the black rhinoceros (*Diceros bicornis*) and the African wild dog (*Lycaon pictus*) are obviously not present. No smaller mammals of particular high conservation significance are likely to be found on the site. Reptiles, amphibians and invertebrates were noted as sight records in the field and habitat characteristics are also surveyed to note potential occurrence. According to the survey there appears to be no threat to any reptile, amphibian nor invertebrate species of particular high conservation importance at the site. No Threatened or Near Threatened animal species appear to be resident at the site.

In terms of Critical Biodiversity Areas the site proposed for the SPP is situated at Other Natural Areas (ONAs). This means that the proposed photovoltaic footprint is located in fair ecological condition but is not part of a Critical Biodiversity Area (SANBI, 2017).

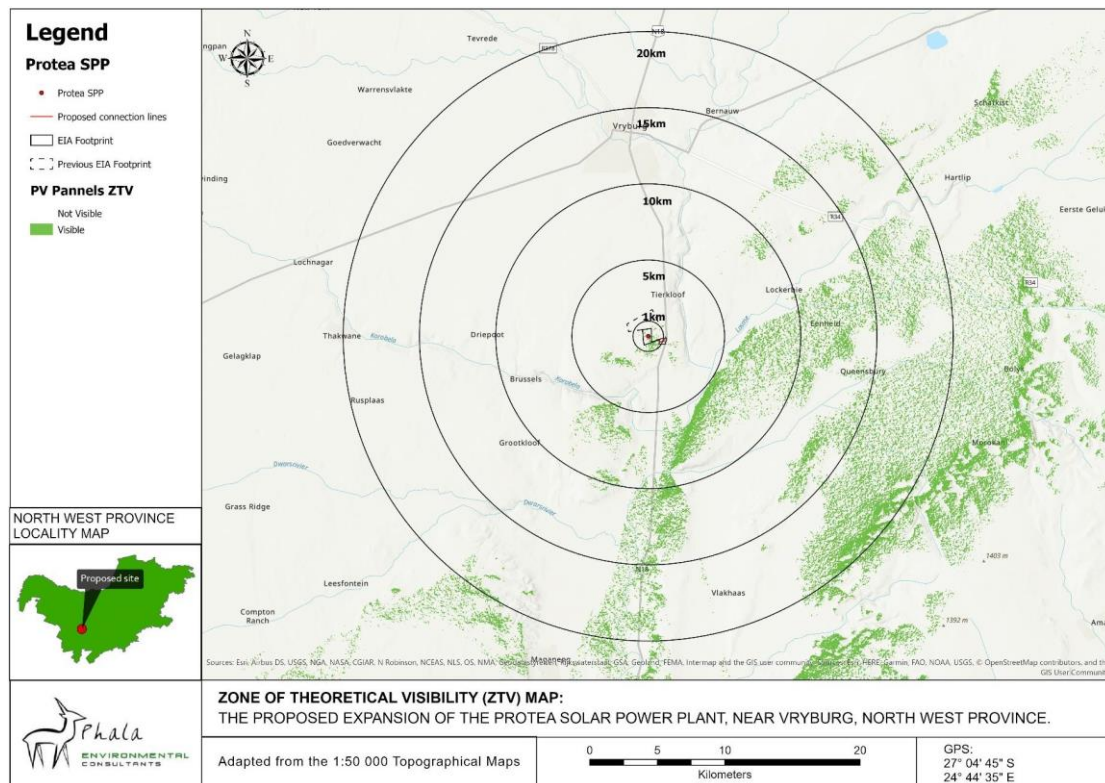
Ecological sensitivity at most of the site is medium and at some parts where much of the vegetation appears to have been cleared in the past, low. No areas of high sensitivity have been identified. There is little scope for the site to be part of a corridor of particular conservation importance.

### **5.3.1.5 Visual landscape**

The visual impact of a photovoltaic facility depends on the complex relationship between the visual environment (landscape), the development (object), and the observer/receptor (e.g. farmer). The establishment of a solar facility on the site is not expected to have a significant visual effect, given that the number of sensitive receptors is very low, electrical infrastructure such as power lines are already located in close proximity to the site and the technology considered for this development will be non-reflective.

The proposed development is not located in close proximity to any major rivers or dams. A non-perennial river, the Korobela, is located on the property but approximately 5km south west from the proposed development. The site drains to the south and to the west towards the Korobela River. The proposed development is located in an area with relatively low significance in elevation. The site is located at an above mean sea level (amsl) of approximately 1206m at the highest elevation and at an amsl of 1198m at the lowest elevation. The town of Vryburg's lowest elevation is approximately 1193m amsl and 1231m amsl at the highest elevation.

The landform and drainage described above is unlikely to limit visibility. Areas within 5km from the proposed development might have a clear view without taking existing screening into account. When taking the natural vegetation in the area into account, it is possible that the SPP won't be visible until a couple of 100m (see Figure 15). The proposed development is located in a close proximity of existing Eskom power infrastructure might have a cumulative impact on viewers. Other SPPs are also proposed in the area and the potential for cumulative impacts to occur as a result of the projects is therefore likely. On the other hand, the location of the SPPs within the Vryburg REDZ will contribute to the consolidation of SPP structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.



**Figure 15: Zone of Theoretical Visibility (ZTV) for the Protea Solar Power Plant addition**

### 5.3.1.6 Traffic consideration

The site for the Protea Solar Power Plant is located off the National Road N18, which will be utilised to access the Remaining Extent of the Farm Hartsboom No. 734. According to the Traffic Impact Study (Appendix D8) the photovoltaic components will be delivered to site from two (2) possible locations, either from the Port of Saldanha (1240 km) or from the Port of Durban (860 km).

The access point to the site is situated off National Road N18. The formalisation of this access point, to the standard, will in all probability be a requirement as part of the wayleave approval from SANRAL. Access to the site will be via an existing gravel track of approximately 1.5 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.

Cement will be sourced from local manufacturers within the town of Vryburg. All other civil construction materials, needed for concrete and wearing course, will be obtained on-site. These trips can be classified as local trips as vehicles will not be travelling over a very long distance. It is anticipated that construction personnel and labour would originate from towns such as Vryburg and Schweizer-Reneke. These trips can be classified as local trips as vehicles will not be travelling over a very long distance. The vehicles used to transport the photovoltaic (PV) equipment are standard container trucks and not abnormal load vehicles. No obstacles (e.g. low overhead services, cattle grids, narrow bridges, etc.) are expected, as these routes are travelled by the same type of vehicle throughout.



**Table 5.1:** Traffic impact on Saldanha route (delivery and construction trips)

Route Description (all traffic)	Est. Adt on Route (vpd)	Construction Trips (vpd)	Total trips (vpd)
N7	8899	36	8935
R27	862	36	898
N14	5412	36	5484

**Table 5.2:** Traffic impact on Durban route (delivery and construction trips)

Route Description (all traffic)	Est. Adt on Route (vpd)	Construction Trips (vpd)	Total trips (vpd)
N3	16939	36	16975
N5	7187	36	7259

It can be seen from the tables above 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 necessary.

**Table 5.3:** Traffic impact on Saldanha/Durban routes (commuter trips)

Route Description (all traffic)	Est. Adt on Route (vpd)	Construction Trips (vpd)	Total trips (vpd)
R34	2612	33	2645
N18	7620	164	7784

It can be concluded from the table above that the estimated additional traffic generated by the construction staff, when travelling to/ from the Protea SPP site, can be accommodated on the existing road network. Therefore, no mitigation measures will be necessary.

### 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 D7) the construction phase for an entire SPP will extend over a period of 12-18 months. The anticipated capital expenditure value of the proposed Protea SPP on completion will be approximately R1.5 Billion. The construction phase for the entire SPP 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 estimated that the addition to the Protea SPP will employ approximately 320 workers out of the overall 800 workers. It is anticipated that the operation of for the entire SPP is likely to create between 35-99 employment opportunities, comprising of low-skilled,

semi-skilled, and skilled opportunities. It is estimated that the addition to the Protea SPP will employ approximately 14-40 workers out of the overall 35-99 workers. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew.

The Dr Ruth Segomotsi Mompati DM (previously Bophirima District Municipality) is a Category C municipality located in the North West Province. It is bordered by Ngaka Modiri Molema and Dr Kenneth Kaunda DMs in the north, and John Taolo Gaetsewe DM in the south, which is a cross-boundary within the Northern Cape.

Dr Ruth S Mompati DM is the largest district in the province covering an area of 43 764km<sup>2</sup> and making up almost half of its geographical area. The district municipality comprises five local municipalities: Naledi, Greater Taung, Kagisano-Molopo, Mamusa and Lekwa-Teemane and is one of four districts in the province, with poor rural areas, formerly situated in the former Bophuthatswana homeland. With the population situated in more than 470 villages and towns dispersed in a 250km radius (approximately 50km north to south and 200km east to west).

The District municipality has a total population of 459 357 according to the 2016 Community Survey, living in 127 103 households of which 87% have access to electricity and 43% are female headed. The DM had an unemployment rate of 35,8% and a youth unemployment rate of 46% in 2011 which contributed to a Dependency ratio of 66.1 in 2016. The main economic sectors include: Community services (33.1%), agriculture (17.1%), finance (16.2%), trade (12.7%), transport (9%), manufacturing (4%), mining (3.2%), construction (3.2%).

The Naledi LM is a Category B municipality situated within the western part of the Dr Ruth Segomotsi Mompati District in the North West Province. It is bordered by the Ngaka Modiri Molema District in the north, Greater Taung in the south, Mamusa in the east, and Kagisano-Molopo in the west. It is the second largest of the five municipalities that make up the district, accounting for 16% of its geographical area at 7 030km<sup>2</sup>. It is known as the Texas of South Africa because of the cattle breeding and agricultural activities that take place there. The LM consists of two towns, including Stella and Vryburg.

The LM has a total population of 68 803 according to the 2016 Community Survey, living in 20 692 households of which 80% have access to electricity, 83% have access to piped water and 35,5% are female headed. The LM had an unemployment rate of 26,1%% and a youth unemployment rate of 35,5% in 2011 which contributed to a Dependency ratio of 52,1 in 2016, all of which are lower than that of the DM. The main economic sectors in the municipality are Agriculture and Hunting (27,8%). The majority of the population in this area also have no monthly income, therefore development initiatives should be directed towards them.

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

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

According to the Heritage Impact Assessment (attached as Appendix D5) the cultural landscape qualities of the region essentially consist of two components. The first is a rural area

in which the human occupation is made up of a pre-colonial (Stone Age) occupation and a much later colonial (farmer) component. The second component is an urban one consisting of a number of smaller towns, most of which developed during the last 150 years or less.

### ***Geology***

The lower strata of the Transvaal sequence comprise mostly of dolomite (with some chert and tillite interspersed in places) while the upper strata appear to be more varied in constituents. Dolomite consists largely of calcium carbonate and is hence vulnerable to solution, especially by the carbonic acid found in rainwater percolating downwards. The dissolution of dolomite can lead to the formation of underground caverns and horizontal chambers often filled with large volumes of groundwater.

Tillite is the result of sediment (till) that was deposited as a consequence of glacial actions and, due to subsequent burial, became solidified into solid rock.

Malmani Dolomite appears to be one of the main elements of the Transvaal sequence. It contains abundant algal stromatolites, evidence of an aquatic environment in ancient times. The algal stromatolites have a number of distinctive shapes such as domes, columns and spheres, their shape being governed by the environment in which they were formed. It is believed that the dolomites were laid down in shallow inter-tidal or sub-tidal zone of open water seas. Although these features are said to occur over a wide area, it is apparently only in a few places where they outcrop and are visible to the naked eye.

### ***Early history***

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

Late Stone Age (LSA) people had even more advanced technology than the MSA people and therefore succeeded in occupying even more diverse habitats. Some sites are known to occur in the region. These are mostly open sites located near river and pans. For the first time we also get evidence of people's activities derived from material other than stone tools. Ostrich eggshell beads, ground bone arrowheads, small bored stones and wood fragments with incised markings are traditionally linked with the LSA. The LSA people have also left us with a rich legacy of rock art, which is an expression of their complex social and spiritual beliefs. Some of the farms in the Vryburg region known to have rock engravings are Bernauw, Content, Gemsbok Laagte, Klipfontein, Kinderdam, Melalarg, Schatkist, Verdwaal Vlake and Wonderfontein, to mention but a few.

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

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

The earliest Iron Age settlers who moved into the North West Province region were Tswana-speakers such as the Tlhaping, Hurutshe, Fokeng, Kgatla and Rolong. In the region of the study area, it was mostly the booRapulana and booRatlou sections of the Rolong (Breutz 1959). Stone walled sites dating to the Late Iron Age and which can be linked to the Tswana occupation of the area, are found on a number of farms in the region, e.g. Waai Hoek and Brul Pan. However, the historic most important one, named Dithakong, is located some distance to the north-west. This site was first visited by early travellers such as Lichtenstein and John Campbell in the early part of the 19th century.

### ***Historic period***

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

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

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

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

### ***Vryburg***

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

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

The Tierkloof Institute, located to the south of Vryburg, on the farm Waterloo, was established in 1904 and served as centre for higher education for Tswana-speaking people, especially for children of the various royal families.

Cecil John Rhodes had the ambition to construct a railway line that would link Cape Town with Cairo. The section from Kimberley to Mafikeng via Vryburg was completed in 1890 (Weinthal 1922). However, it has been upgraded over the years - the roadbed improved and made higher, new tracks installed, as well as the bridges improved and made higher and strengthened due to the fact of carrying much heavier rolling stock than when it was originally constructed. Sections of this line has been surveyed and dates found on sections of the track goes back to 1936 and 1953 and 1955 – the latter ones also carried the name YSKOR, implying that it was locally made. Most of the stations are derelict and vandalised.

No sites, features or objects of cultural significance dating to the Stone Age, Iron Age nor the Historic Age were identified in the site.

### ***Palaeontology***

The fossil record of the Dwyka Group is generally poor, as expected for a glacial sedimentary succession. Sparse, low diversity trace fossil biotas from the Elandsvlei Formation mainly consist of delicate arthropod trackways (probably crustacean) and fish swimming trails associated with recessive-weathering dropstone laminites. Sporadic vascular plant remains (drifted wood and leaves of the *Glossopteris* Flora) are also recorded while palynomorphs (organic-walled microfossils) are likely to be present within finer-grained mudrock facies. Glacial diamictites (tillites or “boulder mudstones”) are normally un-fossiliferous but do occasionally contain fragmentary transported plant material as well as palynomorphs in the fine-grained matrix. There are biogeographically interesting records of limestone glacial erratics from tillites along the southern margins of the Great Karoo that contain Cambrian eodiscid trilobites as well as archaeocyathid sponges. Such derived fossils provide important data for reconstructing the movement of Gondwana ice sheets.

The Dwyka Group bedrocks within the small additional area for the Protea Solar Power Plant on the Remaining Extent of the Farm Hartsboom No. 734 is likely to be poorly exposed as well as dominated by unfossiliferous tillite facies. At most, erratic boulders within the Dwyka tillites might include occasional clasts of stromatolitic carbonate derived from Precambrian Transvaal Supergroup shelf sediments of the Ghaap Plateau. However, such occurrences are of low conservation significance.

The Neogene to Recent superficial deposits within the broader area - viz. sandy soils, downwasted surface gravels, alluvial gravels, calcrete pedocretes (including older pan sediments) - are likely to be of Low to Very Low palaeosensitivity for the most part. However, these younger sediments might occasionally contain important fossil biotas, notably the bones, teeth and horn cores of mammals. These may include ancient human remains of considerable palaeoanthropological significance. Other potential late Caenozoic fossil biotas from these superficial deposits include non-marine molluscs (bivalves, gastropods), ostrich egg shells, trace fossils (e.g. calcretised termitaria and other insect burrows or nests, coprolites, rhizoliths), and plant remains such as peats or palynomorphs (pollens) in fine-grained, organic-rich alluvial horizons. Quaternary alluvial sediments may contain reworked Stone Age artifacts that are useful for constraining their maximum age.

It is concluded that the paleo sensitivity of the additional area for the expansion of the Protea Solar Power Plant is Low to Very 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 and topography of the site. Further to the above, the desirability of the site for the development of a solar power plant is also supported by the fact that a larger solar power plant within the same affected property has been previously authorised, and for which the proposed solar power plant will provide an additional 30 MW of capacity. There is no grid associated with this project as it will utilise the grid authorised as part of the 115 MW facility. Studies of solar irradiation worldwide indicate that the North West Province has a huge potential for the generation of power from solar.

The receptiveness of the site to PV development includes the presence of optimal conditions for the sitting of a solar energy facility due to high irradiation values and optimum grid connection opportunities. The Remaining Extent of the Farm Hartsboom No. 734 where the project is proposed to be located is considered favourable 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 a high 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 2118 kwh/m<sup>2</sup> per year is relevant in the area.
- **Renewable Energy Development Zone (REDZ):** The site is also located in the Vryburg Renewable Energy Development Zone (REDZ). The solar PV assessment domain was based on the location of the majority of existing solar PV project applications at the commencement of the Strategic Environmental Assessment (SEA) and includes the five provinces of Northern Cape, Western Cape, Eastern Cape, Free State and North West.
- **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 BA process. Reluctant farm owners or farmers over capitalizing hamper efforts to find suitable farms. Access will be easily obtained via N18 National Road.
- **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 ecological features and the visual landscape – refer to Section 5.3.1 of this report. Nothing of note was identified from an ecological or conservation point of view on the site apart the presence of a limited amount of protected flora.

It is evident from the discussion above that the Remaining Extent of the Farm Hartsboom No. 734, may be considered favourable and suitable in terms of these site characteristics.

## **5.5 CONCLUDING STATEMENT ON ALTERNATIVES**

When considering the information provided by the specialists with regards to the site selection criteria and the comparison, the preferred site is identified as preferred due to the 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 and thereby avoiding impact on sensitive features.

Therefore, development of the 30 MW Protea Solar Power Plant addition on the Remaining Extent of the Farm Hartsboom No. 734, is the preferred option. The preferred layout on the Remaining Extent of the Farm Hartsboom No. 734 is included in the attached Appendix H. It is therefore concluded that no other alternatives are considered as part of the BA process.

## 6 DESCRIPTION OF THE IMPACTS AND RISKS

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

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

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

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

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated;

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

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

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

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

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

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

(i) cumulative impacts;

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

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

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

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

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

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

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



## 6.1 SCOPING METHODOLOGY

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

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

### 6.1.1 Checklist analysis

The independent consultant conducted a site visit on 25 March 2021. The site visit was conducted to ensure a proper analysis of the site-specific characteristics of the site and directly surrounding area. Table 6.1 provides a checklist, which is designed to stimulate thought regarding possible consequences of specific actions and so assist scoping of key issues. It consists of a list of structured questions related to the environmental parameters and specific human actions. They assist in ordering thinking, data collection, presentation and alert against the omission of possible impacts. The table highlights certain issues, which are further analysed in matrix format in section 6.2.

**Table 6.1:** Environmental checklist

QUESTION	YES	NO	Un-sure	Description
<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		None.
III. An area that is of cultural importance		X		None.
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		None.

XI. Red data species	×			<i>Vachellia erioloba</i> listed by Raimondo et al (2009) in the South African Red Data list as a Threatened species were recorded in the area.
XII. Tourist resort		×		None.
<b>2. Will the project potentially result in potential?</b>				
I. Removal of people		×		None.
II. Visual Impacts	×			The VIA (refer to Annexure D3) stated that the significance of the visual impact will be a "Negative Low Impact". The only receptors likely to be impacted by the proposed development are the nearby property owners and road users on nearby roads. The visual landscape is not degraded but has a large number of Eskom electricity infrastructure in the area and an operational SPP.
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 via the N18 National Road using an existing gravel road. Internal access roads will be constructed for the facility
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 and 99 employment opportunities during the operation phase of the entire SPP project. Of these, 320 employment opportunities will be created during the construction and 40 employment opportunities during the operation phase for this addition of the project.

VII. Utilisation of significant volumes of local raw materials such as water, wood etc.	×			The estimated maximum amount of water required during the entire SPP 20 years of production is approximately 5000 m <sup>3</sup> per annum. This addition to the Protea SPP will require approximately 2000m <sup>3</sup> per annum.
VIII. Job creation	×			Approximately 320 employment opportunities will be created during the construction and 14-40 employment opportunities during the operational phases for the SPP.
IX. Traffic generation	×			It is estimated that 72 trips per day will be generated over the 12-18 month construction period for the SPP.
X. Soil erosion	×			The site will need to be cleared or graded to a limited extent, which may potentially result in a degree of dust being created, increased runoff and potential 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	×			The Korobela river is located on the property approximately 5km south west of the development.
II. A conservation or open space area		×		None.
III. An area that is of cultural importance		×		None.
IV. A site of geological significance		×		None.
V. An area of outstanding natural beauty		×		None.
VI. Highly productive agricultural land		×		None.
VII. A tourist resort		×		None.
VIII. A formal or informal settlement	×			The Huhudi informal settlement is located approximately 8km north of the proposed site.

### 6.1.2 Matrix analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential

impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 6.2) for more in-depth assessment. An indication is provided of the specialist studies which were conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered 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.

**Table 6.2:** Matrix analysis

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

Low significance	Medium significance	High significance	Positive impact
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LISTED ACTIVITY (The Stressor)	ASPECTS OF THE DEVELOPMENT /ACTIVITY	POTENTIAL IMPACTS		SIGNIFICANCE AND MAGNITUDE OF POTENTIAL IMPACTS							MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Receptors	Impact description / consequence	Minor	Major	Extent	Duration	Probability	Reversibility	Irreplaceable loss of resources	Possible Mitigation	Possible mitigation measures	Level of residual risk		
CONSTRUCTION PHASE															
<p>Activity 14 (GN.R 327): “The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.”</p> <p>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.”</p> <p>Activity 24 (ii) (GN.R 327): “The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve</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> <p><u>Transportation and installation of PV panels into an Array</u></p>	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"><li>• Loss of habitat, loss of indigenous species.</li><li>• Loss of sensitive species (Threatened, Near Threatened, Rare, Declining or Protected species) during the construction phase.</li><li>• Fragmentation of the landscape and loss of connectivity.</li><li>• Contamination of soil</li><li>• Disturbance, trapping, hunting and killing of vertebrate animals during the construction phase .</li></ul>									<ul style="list-style-type: none"><li>- Limit development of new access roads.</li><li>- Maximise use of existing farm roads.</li><li>- Rehabilitation and monitoring of indigenous vegetation following clearance.</li><li>- Planting of indigenous <i>Vachellia erioloba</i> (Camel Thorn Trees) in areas near the footprint where these will not be affected.</li><li>- Leave/conservate areas with indigenous vegetation adjacent to proposed footprints.</li><li>- Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction, and must be managed properly to avoid any</li></ul>	L	Ecological Fauna and Flora Habitat Survey (Appendix D1)

<p>exists where the road is wider than 8 meters”</p> <p><u>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...”</u></p> <p><u>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.”</u></p> <p><u>Activity 15 (GN.R 325): “The clearance of an area of 20 hectares or more of indigenous vegetation.”</u></p>	<p>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>											littering or spillage. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during the construction phase.		
		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	- Limit construction footprint and retain indigenous vegetation wherever possible, limit access to remainder of area, avoid breeding season (summer), lay-down areas to be located only on disturbed zones, construct in shortest timeframe, control noise to minimum	L	Avifaunal Assessment (Appendix D2)
		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 transport sand and building materials are fitted with tarpaulins or covers.	L	-
		Soil	<ul style="list-style-type: none"><li>Loss of agricultural potential by occupation of land</li></ul>		-	S	S	Pr	PR	ML	Yes	- Design and implement an	L	Agricultural and Soils

				<ul style="list-style-type: none"><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>									<p>effective system of stormwater 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.</p> <ul style="list-style-type: none"><li>- Maintain, where possible, all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li><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>		Compliance Statement (Appendix D4)
			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</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</li></ul>	L	-

				<p>surface it may present problems when driving solar panel columns.</p> <ul style="list-style-type: none"> <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>									<p>areas also getting compacted.</p> <ul style="list-style-type: none"> <li>- If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation.</li> <li>- Retention of vegetation where possible to avoid soil erosion.</li> </ul>		
			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 the storage and handling of dangerous goods.</li> </ul>	-		S	S	Pr	CR	ML	Yes	<ul style="list-style-type: none"> <li>- A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. Full construction details of monitoring boreholes must be recorded when they are drilled (e.g. screen and casing lengths,</li> </ul>	L	-



													diameters, total depth, etc). - Sampling of monitoring boreholes should be done according to recognised standards.		
			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	- Where reasonable and practical, the SPP service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low- skilled job categories	L	Social Impact Assessment (Appendix D7)
		SOCIAL/ECONOMIC ENVIRONMENT	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> </ul>		-	L	S	D	CR	NL	Yes	- Ensure that vegetation is not unnecessarily removed during the construction phase. - 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. - Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. - 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. - Reduce and control dust during construction by	M	Visual Impact Assessment (Appendix D3)

													utilising dust suppression measures. - Construction activities should be limited to between the hours of 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting. - Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping.		
			Traffic volumes	<ul style="list-style-type: none"> <li>Increase in construction vehicles.</li> </ul>	-		L	S	Pr	CR	NL	Yes	- 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 no mitigation measures will be necessary.	L	Traffic Impact Assessment (Appendix D8)
			Health & Safety	<ul style="list-style-type: none"> <li>Air/dust pollution.</li> <li>Road safety.</li> <li>Impacts associated with the presence of construction workers on site and in the area.</li> <li>Influx of job seekers to the area.</li> <li>Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site.</li> <li>Increased risk of veld fires.</li> </ul>	-		L	L	Pr	PR	ML	Yes	- Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. - Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. - Provide transportation for workers (from	M	Social Impact Assessment (Appendix D7)

												Vryburg) to ensure workers can easily access their place of employment and do not need to move closer to the site. Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.		
												- Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.		
												- Prevent the recruitment of workers at the site.		
												- 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 (i.e. grievance mechanism).		
												- Establish clear rules and regulations for access to the proposed site.		
												- Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours.		
												- A firebreak should be implemented before the construction		

													phase. The firebreak should be controlled and constructed around the perimeters of the development footprint.		
													- Adequate fire-fighting equipment should be provided and be readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment.		
			Noise levels	<ul style="list-style-type: none"> <li>The generation of noise as a result of construction vehicles, the use of machinery such as drills and people working on the site.</li> </ul>	-		L	S	D	CR	NL	Yes	- During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers.	L	Social Impact Assessment (Appendix D7)
			Tourism industry	<ul style="list-style-type: none"> <li>Since there are no tourism facilities in close proximity to the site, the proposed activities will not have an impact on tourism in the area.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Social Impact Assessment (Appendix D7)
			Heritage resources	<ul style="list-style-type: none"> <li>As no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.</li> </ul>	-		S	S	U	PR	ML	Yes	- Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a	L	Heritage Impact Assessment (Appendix D5)

													permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites of significance are to be destroyed or altered.		
			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 D6)
OPERATIONAL PHASE															
<u>Activity 14 (GN.R 327): “The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.”</u>  <u>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.”</u>	The key components of the proposed project are described below: <ul style="list-style-type: none"><li><u>PV Panel Array</u> - To produce 30 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</li></ul>	BIOPHYSICAL ENVIRONMENT	Fauna & Flora	<ul style="list-style-type: none"><li>Continued loss of indigenous vegetation to poor recovery of vegetation at the proposed solar plant.</li><li>Increased infestation of exotic or alien invasive plant species owing to disturbance.</li></ul>		-	L	L	Po	PR	ML	Yes	<ul style="list-style-type: none"><li>Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as <i>Prosopis glandulosa</i> (Honey Mesquite) that should not be allowed to establish.</li><li>A monitoring and rehabilitation plan for vegetation at the site is to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.</li></ul>	L	Ecological Fauna and Flora Habitat Survey (Appendix D1)
			Avifauna	<ul style="list-style-type: none"><li>Displacement of priority avian species from important habitats</li></ul>		-	S	L	Pr	PR	ML	Yes	<ul style="list-style-type: none"><li>Limit ongoing human activity to the minimum required for ongoing operation, control noise</li></ul>	M	Avifaunal Impact Assessment (Appendix D2)

	<p>alternating current (AC) electricity at grid frequency.</p> <ul style="list-style-type: none"><li>• <u>Roads</u> – Access will be gained via N18. An internal site road network will also be required to provide access to the solar field and associated infrastructure. All site roads will require a width of approximately 6m – 12m.</li><li>• <u>Fencing</u> - For health, safety and security reasons, the facility will be required to be fenced off from the surrounding properties.</li></ul>		<ul style="list-style-type: none"><li>• Displacement of resident avifauna through increased disturbance</li><li>• Collisions with PV panels leading to injury or loss of avian life</li></ul>									to minimum, rehabilitate with indigenous vegetation, limit roadways and vehicle speeds. - Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.			
		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
		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	<ul style="list-style-type: none"><li>- Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring.</li><li>- Facilitate re-vegetation of denuded areas throughout the site.</li></ul>	L	Agricultural and Soil Compliance Statement (Appendix D4)	
		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.</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	-
		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 and sense of place impacts associated with the operation phase of Protea SPP.</li> </ul>	-		L	L	D	PR	ML	Yes	<p><i>Planning</i></p> <ul style="list-style-type: none"> <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> </ul> <p><i>Operations</i></p> <ul style="list-style-type: none"> <li>Maintain the general appearance of the facility as a whole. Screening should be implemented by means of vegetation in conjunction with security fencing.</li> <li>Shield the source of light by physical barriers (walls, vegetation etc.)</li> <li>Limit mounting heights of lighting fixtures, or alternatively use</li> </ul>	L	Visual Impact Assessment (Appendix D3)

													footlights or bollard level lights. - Make use of minimum lumen or wattage in fixtures. - Make use of down-lighters, or shield fixtures. - Make use of low-pressure sodium lighting or other types of low impact lighting. - 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.		
			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 D8)
			Health & Safety	<ul style="list-style-type: none"> <li>The proposed development will not result in any health and safety impacts during the operational phase.</li> </ul>	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	N/A	Social Impact Assessment (Appendix D7)
			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
			Heritage resources	<ul style="list-style-type: none"> <li>It is not foreseen that the proposed activity will impact on heritage resources or vice versa.</li> </ul>	-		S	S	U	PR	ML	Yes	- Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be	L	Heritage Impact Assessment (Appendix D5)



													obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.		
			Electricity supply	<ul style="list-style-type: none"> <li>Generation of additional electricity.</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	-
DECOMMISSIONING PHASE															
-	<p><u>Dismantlement of infrastructure</u> During the decommissioning phase the Solar Power Plant 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	<ul style="list-style-type: none"> <li>Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species, such as <i>Prosopis glandulosa</i> (Honey Mesquite), that should not be allowed to establish.</li> <li>A monitoring and rehabilitation plan for vegetation at the site is to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.</li> <li>Rubble or waste that could accompany the decommission effort should be removed</li> </ul>	L	Ecological Fauna and Flora Habitat Survey (Appendix D1)

													during and after decommissioning. - Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during decommissioning phase.		
			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	<ul style="list-style-type: none"> <li>Regular maintenance of equipment to ensure reduced exhaust emissions.</li> <li>Implementation of appropriate dust suppression measures.</li> </ul>	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 construction (decommissioning) vehicles (hydrocarbon spills).</li> </ul>		-	S	S	Pr	PR	M	Yes	<ul style="list-style-type: none"> <li>Implement an effective system of stormwater 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> <li>If an activity will mechanically disturb</li> </ul>	L	Agriculture and Soils Compliance Statement (Appendix D4)

													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.		
			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
			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 (decommissioning) vehicles.</li> </ul>	-		L	S	D	I	NL	Yes	-	L	-
			Groundwater	<ul style="list-style-type: none"> <li>Pollution due to construction (decommissioning) vehicles.</li> <li>Pollution due to the storage and handling of dangerous goods.</li> </ul>	-		S	S	Pr	CR	ML	Yes	-	L	-
			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</li> </ul>	-		L	S	D	CR	NL	Yes	- Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas.	L	Visual Impact Assessment (Appendix D3)

				project. However, in the case of Protea SPP it is 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	<ul style="list-style-type: none"><li>Movement of heavy construction (decommissioning) 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.</li></ul>	L	Traffic Impact Assessment (Appendix D8)
			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 (decommissioning) 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	<ul style="list-style-type: none"><li>Demarcated routes to be established for construction (decommissioning) vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes.</li><li>Where dust is generated by trucks passing on gravel roads, dust mitigation / suppressants must be enforced.</li><li>Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not</li></ul>	L	Social Impact Assessment (Appendix D7)

													pose any danger to the community. - Components that are dismantled must be recycled / reduced as far as possible.		
			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	- The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.	L	Social Impact Assessment (Appendix D7)
			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	Social Impact Assessment (Appendix D7)
			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	- Any discovered artifacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.	L	Heritage Impact Assessment (Appendix D5)

<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	-

An Environmental Awareness and Fire Management Plan is included in Appendix F as part of the EMPr (Appendix F1 of the BAR).

## 6.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which were addressed in more detail in the BA report – refer to the significance assessment attached as Appendix G2 to the report.

### 6.2.1 Impacts during the construction phase

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

- Activity 14 (GN.R 327): *“The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.”*
- 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.”*

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
Ecological Fauna and Flora Habitat Survey	Loss of habitat owing to the removal of vegetation at the proposed solar plant for site access roads.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Limit development of new access roads. Maximise use of existing farm roads.</li> </ul>
	Loss of habitat owing to the removal of vegetation at the proposed solar plant for installation of PV units and infrastructure	Negative Medium	Negative Medium	<ul style="list-style-type: none"> <li>Rehabilitation and monitoring of indigenous vegetation following clearance.</li> </ul>
	Loss of sensitive species (Threatened, Near Threatened, Rare, Declining or Protected species)	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Planting of indigenous <i>Vachellia erioloba</i> (Camel Thorn Trees) in areas near the footprint where these will not be affected.</li> </ul>
	Loss of corridors of particular conservation concern	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Leave/conservate areas with indigenous vegetation adjacent to proposed footprints</li> </ul>
	Contamination of soil during construction in particular by hydrocarbon spills	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Rubble or waste that could accompany the construction effort, should be removed during and after construction. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase.</li> </ul>
	Possible disturbance, trapping, hunting and	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Contractors must ensure that no animal species are disturbed, trapped, hunted or killed during the construction phase.</li> </ul>



	killing of vertebrates during construction phase			
Avifauna Impact Assessment	Displacement of priority avian species from important habitats	Negative Medium	Negative Low	<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 Low	<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 Low	Negative Low	<p>Planning</p> <ul style="list-style-type: none"> <li>Retain and maintain natural vegetation immediately adjacent to the development footprint.</li> </ul> <p>Construction</p> <ul style="list-style-type: none"> <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> </ul>

				<ul style="list-style-type: none"> <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 suppression measures.</li> <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>• Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Erosion can be reduced by implementing erosion control measures.</li> <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 stormwater 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</li> </ul>

				<p>any run-off water from all accumulation points, and it must prevent any potential down slope erosion.</p> <ul style="list-style-type: none"> <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-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</li> </ul>
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>• No sites, features or objects of cultural significance were identified, no mitigation measures are proposed.</li> <li>• The contractors and workers should be notified that archaeological sites might be exposed during the construction activities;</li> <li>• Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible;</li> <li>• All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken;</li> <li>• Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and</li> <li>• Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1). A person or entity, e.g. the ECO, should be tasked to take responsibility for the heritage sites and held accountable for any damage.</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 Low	Negative Low	<ul style="list-style-type: none"> <li>Monitoring of all major site clearance and excavation work for fossil remains by ECO.</li> <li>Substantial well-preserved fossils (stromatolites, vertebrate bones, teeth) to be safeguarded, preferably <i>in situ</i>, and reported by ECO to SAHRA.</li> <li>Recording and sampling of significant new fossil finds by professional palaeontologist</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 Mompati 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 Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies,</li> </ul>

				<p>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 Protea 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 needs 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 Vryburg) 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 relevant authorities.</li> <li>Compile and implement a grievance mechanism.</li> </ul>

				<ul style="list-style-type: none"> <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 Community Liaison Officer (CLO) should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local</li> </ul>

			<p>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>
Temporary increase in traffic disruptions 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 N18 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 for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.</li> <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> </ul>

				<ul style="list-style-type: none"> <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 impacts (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> <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</li> </ul>



Traffic Impact Assessment				construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.
	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 study area.</li> </ul>
	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 necessary.</li> </ul>
	Increase in traffic for commuter trips	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>• The estimated additional traffic generated by the construction staff, when travelling to/ from Protea 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 14 (GN.R 327): *“The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic 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.”*

Table 6.4 summarised the negative impacts are generally associated with the Solar Power Plant, which include impacts on the fauna and flora, soils, geology, the pressure on existing services infrastructure, and visual impacts. The provision of sustainable services delivery also needs to be confirmed. The operational phase will have a direct positive impact through the provision of employment opportunities for its duration, and the generation of income to the local community.

**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
Ecological Fauna and Flora Habitat Survey	An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species such as <i>Prosopis glandulosa</i> (Honey Mesquite) that should not be allowed to establish.</li> </ul>
	Continued loss of indigenous vegetation owing to poor recovery of vegetation at the proposed solar plant.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>A monitoring and rehabilitation plan for vegetation at the site is to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where 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>
Visual Impact Assessment	Visual impact on observers travelling along the roads and residents at homesteads	Negative Medium	Negative Low	Planning <ul style="list-style-type: none"> <li>Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.</li> </ul>

	within a 5km radius of the SPP.			<ul style="list-style-type: none"> <li>Where insufficient natural vegetation exists next to the property, a 'screen' can be planted using endemic, fast growers that are water efficient.</li> </ul> <p>Operations</p> <ul style="list-style-type: none"> <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	<p>Planning</p> <ul style="list-style-type: none"> <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> </ul> <p>Operations</p> <ul style="list-style-type: none"> <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 impact and impacts on sense of place	Negative Low	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> <li>Implement good housekeeping measures.</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 stormwater 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-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</li> </ul>

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>• No sites, features or objects of cultural significance were identified, no mitigation measures are proposed.</li> <li>• The contractors and workers should be notified that archaeological sites might be exposed during the construction activities;</li> <li>• Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer (ECO) shall be notified as soon as possible;</li> <li>• All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken;</li> <li>• Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and</li> <li>• Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1). A person or entity, e.g. the ECO, should be tasked to take responsibility for the heritage sites and held accountable for any damage.</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 be implemented.</li> </ul>
	Contribution to LED and social upliftment	Positive Medium	Positive High	<ul style="list-style-type: none"> <li>A Community Needs Analysis (CNA) must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.</li> <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>
	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 Protea SPP, it is suggested that the recommendations made in the Visual Impact Assessment (specialist study) 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 and the loss of permanent employment. Skilled staff will be eminently employable, and a number of temporary jobs will also be created in the process. Decommissioning of a PV facility will leave a positive impact on the habitat and biodiversity in the area as the area will be rehabilitated to its natural state.



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

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Ecological Fauna and Flora Habitat Survey	An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>Continued monitoring and eradication of alien invasive plant species are imperative. It is in particular declared alien invasive species, such as <i>Prosopis glandulosa</i> (Honey Mesquite), that should not be allowed to establish.</li> </ul>
	Continued loss of indigenous vegetation owing to poor recovery of vegetation.	Negative Medium	Negative Low	<ul style="list-style-type: none"> <li>A monitoring and rehabilitation plan for vegetation at the site is to be implemented to make sure that indigenous vegetation recover at hitherto cleared areas where possible.</li> </ul>
	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	<ul style="list-style-type: none"> <li>Rubble or waste that could accompany the construction effort, should be removed during and after decommissioning. Measures should be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil. Proper waste management should be undertaken.</li> </ul>
	Displacement of priority avian species	Negative Low	Negative Low	<ul style="list-style-type: none"> <li>None required due to low significance</li> </ul>

Avifauna Assessment	Impact from important habitats			
	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 stormwater 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	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> <li>Should decommissioning take place, the loss of employment must be undertaken in line with the relevant labour laws.</li> </ul>

### 6.3 SUMMARY OF RECOMMENDATIONS FROM SPECIALIST STUDIES

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

- Ecological Fauna and Flora Habitat Survey – Anthene Ecological CC (see Appendix D1)
- Avifaunal Impact Assessment – Agreenco Environmental Projects (see Appendix D2)
- Visual Impact Assessment – Phala Environmental Consultants (see Appendix D3)
- Agricultural and Soils compliance statement – Johann Lanz (see Appendix D4)
- Heritage Impact Assessment – JA van Schalkwyk (see Appendix D5)
- Palaeontological Impact Assessment – Natura Viva CC (see Appendix D6)
- Social Impact Assessment – Phala Environmental Consultants (see Appendix D7)
- Traffic Impact Assessment – Bvi Consulting Engineers (see Appendix D8)

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

#### 6.3.1 Issue 1: Geotechnical suitability

The geotechnical suitability for the SPP site was determined in 2021. The main question had to be addressed was:

*“Are the geotechnical conditions favourable for the development of a PV solar plant?”*

The following conclusions are made from the investigations and assessment of the results of the Agricultural and Soils compliance statement (Appendix D4):

Large parts of the site are covered by shallow hardpan carbonate, which is likely to be approximately 1 meter thick, and likely to be underlain by dolomite. The loamy, unconsolidated soil cover overlying the hardpan varies between 0 and 60 cm. In places the Mispah soil form occur, there is no hardpan carbonate and the loamy soil is underlain directly by dolomite at a depth of 20-40cm.

The foundations for mounting structures will therefore need to be erected in unconsolidated, loamy material at the surface with underlying hardpan or rock at between 0 and 70 cm below surface.

None of the following occur on the site:

- Shallow water table (less than 1.5m deep)
- Sinkhole or doline areas. But the underlying geology is dolomite.
- Seasonally wet soils (often close to water bodies)
- Unstable rocky slopes or steep slopes with loose soil
- Dispersive soils (soils that dissolve in water)
- Soils with high clay content (clay fraction more than 40%)

- Any other unstable soil or geological feature
- An area sensitive to erosion

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

### **6.3.2 Issue 2: Heritage and archaeological impacts**

South Africa's heritage resources comprise a wide range of sites, features, objects and beliefs. According to Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA), refer to Appendix D5, to determine if any sites, features or objects of cultural heritage significance occur within the proposed site. The main question which needs to be addressed is:

*“Will the proposed development impact on any heritage or archaeological artefacts?”*

The cultural landscape qualities of the region are made up of a pre-colonial element consisting of very limited Stone Age and Iron Age occupation, as well as a much later colonial (farmer) component, which also gave rise to an urban component. The geology of the region is made up of shale and dolomite belonging to the Schmidtsdrif Subgroup of the Ghaap Group of the Transvaal Supergroup.

During the site visit, the high and dense vegetation that covered the project area limited ground visibility very much, even to the point of making the determination of buffer zones around identified sites impossible. During the survey no sites, features or objects of cultural significance were identified. Impact analysis of cultural heritage resources under threat of the proposed development, is based on the present understanding of the development. For the current study, as no sites, features or objects of cultural significance were identified, no mitigation measures are proposed.

From a heritage point of view, it is recommended that the Protea SPP be allowed to continue on implementation of the mitigation measures recommended and the conditions proposed.

### **6.3.3 Issue 3: Ecological Impacts**

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

*“How will the proposed development impact on the ecology?”*

According to the Ecological Fauna and Flora Habitat Survey (Appendix D1) the ecological sensitivity at the site is medium and low. No areas of features of high ecological sensitivity have been identified.

No Threatened or Near Threatened plant or animal species appear to be resident at the site, apart from *Vachellia erioloba* which is a Protected Tree species (note *Vachellia erioloba* is a widespread species that is not Threatened). The site contains the Protected Tree species *Vachellia erioloba* (Camel Thorn) which occurs sparingly at the site. 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. There is little scope for the site to be part of a corridor of particular conservation importance.

Establishment of exotic weeds should be monitored, during construction, if the development is approved, and exotic weeds at the site should be eradicated. *Prosopis glandulosa* (Honey Mesquite) is found at the site but not in any large numbers at present. However, *Prosopis* has become the second most widespread invasive alien plant taxon in the country. These invasions have detrimental effects on biodiversity, ecosystem services and human livelihoods. In South Africa it was found that native woody species density, basal area, richness and diversity all decreased significantly as the basal area of *Prosopis* stands increased. Therefore, a declared invader such as the mesquite tree (*Prosopis* species), should not be planted or allowed to establish.

The footprint at the site proposed for the photovoltaic facility is situated in Other Natural Areas (ONAs). This means that the proposed photovoltaic footprint fair ecological condition but are not part of a Critical Biodiversity Area (SANBI, 2017). It is unlikely that the proposed development will have a significant impact on any extant Critical Biodiversity Areas.

Following the mitigations which will be upheld and the planned footprint for development all the impact risks listed above are moderate or low. The layout of the proposed footprint appears to be well-chosen and acceptable.

#### **6.3.4 Issue 4: Avifaunal Impacts**

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

*“How will the proposed development impact on the avifauna?”*

The Avifaunal Assessment (Appendix D2) stated that the proposed Protea SPP addition is situated in an area of moderate avifaunal diversity and with low-moderate avifaunal sensitivity (according to DFFE). The resident avifauna is represented by relatively low species richness and abundance, and the habitats present on site are well represented over a very large area. There are individual impacts that are relatively high, however most can be effectively mitigated through the controls prescribed in this report. The overall mitigated impacts can result in the project having an overall low-negative impact rating on avifauna.

The final layout does not have any bearing on the risk ratings presented and is considered acceptable, from an avifaunal perspective. Despite some residual impacts, there is no objection, from an avifaunal perspective to the development of the proposed SPP development. The overall impact of the project on avifauna can be effectively mitigated, should the controls prescribed in this report be adequately followed, with sufficient monitoring of mitigation effectiveness.

#### **6.3.5 Issue 5: Visual Impacts**

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

*“To what extent will the proposed development be visible to observers and will the landscape provide any significant visual absorption capacity?”*

According to the Visual Impact Assessment (Appendix D3) the majority of visual impacts associated with the project are anticipated to occur during the operational phase of development. Impacts during the construction phase of the SPP are typical of the type of visual impacts generally associated with construction activities. Impacts associated with the design and construction phase of a project are

usually of a short duration and temporary in nature but could have long-term effects on the surrounding visual environment if not planned or managed appropriately. It is therefore necessary that the design phase be conducted in such a manner so as not to result in permanent impacts associated with the ill placement of project components or associated infrastructure.

Protea SPP is anticipated to operate for a minimum of 20 years. The facility will operate continuously, 7 days a week, during daylight hours. While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. Key elements of the Operation and Management (O&M) Plan include monitoring and reporting the performance of the solar facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security.

These lighting impacts relate to the effects of glare and sky glow. The source of glare light is unshielded luminaries which emit light in all directions, and which are visible over long distances. Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the number of light sources. It is possible that the SPP may contribute to the effect of sky glow within the already developed area. Potential visual impacts of glint and glare as a visual distraction and possible air travel hazard. Glint and glare occur when the sun reflects off surfaces with specular (mirror-like) properties. Examples of these include glass windows, waterbodies and potentially some solar energy generation technologies. Glint is generally of shorter duration and is described as “a momentary flash of bright light”, whilst glare is the reflection of bright light for a longer duration.

The visual impact of glint and glare relates to the potential it has to negatively affect sensitive visual receptors in relatively close proximity to the source (e.g., residents of neighbouring properties), or aviation safety risks for pilots. Photovoltaic panels are designed to generate electricity by absorbing the rays of the sun and are therefore constructed of dark materials and are covered by an anti-reflective coating. Indications are that as little as 2% of the incoming sunlight is reflected from the surface of modern PV panels. The proposed Protea SPP is not located within 5km of an airfield.

An area's sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture, and heritage. An area's sense of place is however subjective and largely dependent on the demographics of the population residing within the area and their perceptions regarding trade-offs. For example, while some individuals may prefer not to see any form of infrastructure development, others may have an interest in large-scale infrastructure, or engineering projects, and the operation of such facilities, and consider the impact to be less significant. Such a scenario may especially be true given that the project comprises a Renewable Energy project and could therefore be seen as benefitting the local environment, when compared to non-renewable energy generation projects.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The Visual impacts associated with the impact on sense of place relate to the change in the landscape character and visual impact of Protea SPP. The area surrounding the project site is characterised by farmland, and electricity infrastructure. Considering this, it can be anticipated that the visual and sense of place impacts associated with the operation of the facility will be of low significance.

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

Taking into account all positive factors of such a development including economic factors, social factors and sustainability factors, especially in an arid country, the visual impact of this proposed development will be insignificant and is suggested that the development commence, from a visual impact point of view. It is therefore the specialist's recommendation that the project be approved.

#### **6.3.6 Issue 6: Impact on Agriculture and Soils**

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

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

An Agricultural Compliance Statement (Appendix D4) is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site. It must provide a substantiated statement on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development.

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

- The proposed development will occupy land that is of limited land capability and is not suitable for the production of cultivated crops. There is not a scarcity of such agricultural land in South Africa and its conservation for agriculture is therefore not a priority.
- The amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with low agricultural production potential.
- The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and easily managed by mitigation management actions. In addition, the degradation risk is only to land of low agricultural value, and the significance of the impact is therefore low.
- The proposed development offers some positive impact on agriculture by way of improved financial security for the landowner, as well as wider, societal benefits.

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

#### **6.3.7 Issue 7: Socio-economic impacts**

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

*“How will the proposed development impact on the socio-economic environment?”*

There are some vulnerable communities within the area that may be affected by the development of Protea SPP and its associated infrastructure. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

Based on the social impact assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion, and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting renewable energy which, when compared to energy generated through the burning polluting fossil fuels, represents a positive social benefit for society.
- It should be noted that the perceived benefits associated with the project, which include renewable energy generation and local economic and social development, outweigh the perceived impacts associated with the project.

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

### **6.3.8 Issue 8: Paleontological Impacts**

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

*“How will the proposed development impact on the Palaeontological resources?”*



According to the Palaeontological Impact Assessment (Appendix D6), the Protea Solar Power Plant site is located in a region that is underlain by potentially fossiliferous sedimentary rocks of Precambrian, Palaeozoic and younger, Neogene to Holocene age. Existing impacts to palaeontological heritage within the site are likely to be minimal, largely comprising occasional damage to fossils exposed at the ground surface through agricultural activities. These on-going impacts are offset by the slow exposure of fresh fossil material through bedrock weathering.

The construction phase of the proposed solar energy facility will entail substantial excavations into the superficial sediment cover and perhaps locally into the underlying bedrock as well. These include, for example, surface clearance and excavations for the PV panel footings, laydown areas, internal and access roads, underground cables, and other associated ancillary infrastructure. All these activities may adversely affect potential legally-protected fossil heritage within the project footprint as a result of excavations and surface disturbance (e.g. surface clearing and vehicle activity) during the construction phase by destroying, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

The impact significance of the proposed development in terms of palaeontological heritage is assessed as negative low without mitigation. Should the recommended mitigation measures for the construction phase of the solar facility development be consistently followed-through, the impact significance would remain negative low but would entail both positive and negative impacts. Residual negative impacts from inevitable loss of *some* valuable fossil heritage would be partially offset by an improved palaeontological database for the study region as a direct result of appropriate mitigation. The latter is a positive outcome because any new, well-recorded and suitably-curated fossil material would constitute a useful addition to our scientific understanding of the fossil heritage of the Ghaap Plateau region of North West Province. The No-Go option would probably have a neutral impact significance; protection of local fossils from damage or destruction would be partially offset by natural surface weathering processes as well as lost opportunities to improve the palaeontological database through professional mitigation of chance fossil finds.

There are no fatal flaws associated with the proposed solar PV project from a palaeontological heritage viewpoint and no objections to authorisation of the development, provided that the recommended mitigation measures are fully implemented.

#### **6.3.9 Issue 9: Traffic Impacts**

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

*“How will the proposed development impact on the traffic on main delivery routes to the site?”*

The following conclusions can be drawn from the Traffic Impact Study:

- The existing traffic volumes on the transportation routes were sourced from permanent count stations only, as this is the most reliable and accurate data that was available.
- The impact of the construction trip generation, on the predicted 2023 traffic volumes near the town of Vryburg and along the transportation routes, are expected to be low. No mitigation measures (upgrading of existing intersections) will be necessary.

- The photovoltaic (PV) components will be delivered to site from two possible ports, either from Saldanha (1240 km) or from Durban (860 km).
- All construction materials and PV components will be transported by truck, i.e. no abnormal loads will be transported to site.
- The access point to the site is situated off an unknown gravel road. The formalisation of this access point, to standard, will in all probability be a requirement as part of the wayleave approval of Naledi Local Municipality.
- Adequate traffic accommodation signage must be erected and maintained on either side of the access point, on the gravel road, throughout the construction period of the project.

It is expected that the communities of Vryburg and Schweizer-Reneke will participate in the construction phase of the additional section to the Protea Solar Power Plant. The development of this solar farm and other similar facilities create an opportunity for temporary employment and economic upliftment of the surrounding communities. From a traffic point of view, it was found that the total daily construction traffic will be low and will not significantly influence the surrounding communities. The development of the Protea Solar Power Plant on the Remaining Extent of the Farm Hartsboom No. 734, in the North West Province, can be supported from a traffic perspective.

## 6.4 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 6.6.

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

### 6.4.1 Impact Rating System

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

- planning
- construction
- operation
- decommissioning

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

**Table 6.6:** The impact rating system

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		

This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
<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>		
<p>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.</p> <p>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.</p>		
Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

## 7 CUMULATIVE EFFECTS ASSESSMENT

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

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

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

### 7.1 INTRODUCTION

The EIA Regulations (as amended in 2017) determine that cumulative impacts, *“in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.”* Cumulative impacts can be incremental, interactive, sequential or synergistic. BA’s have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

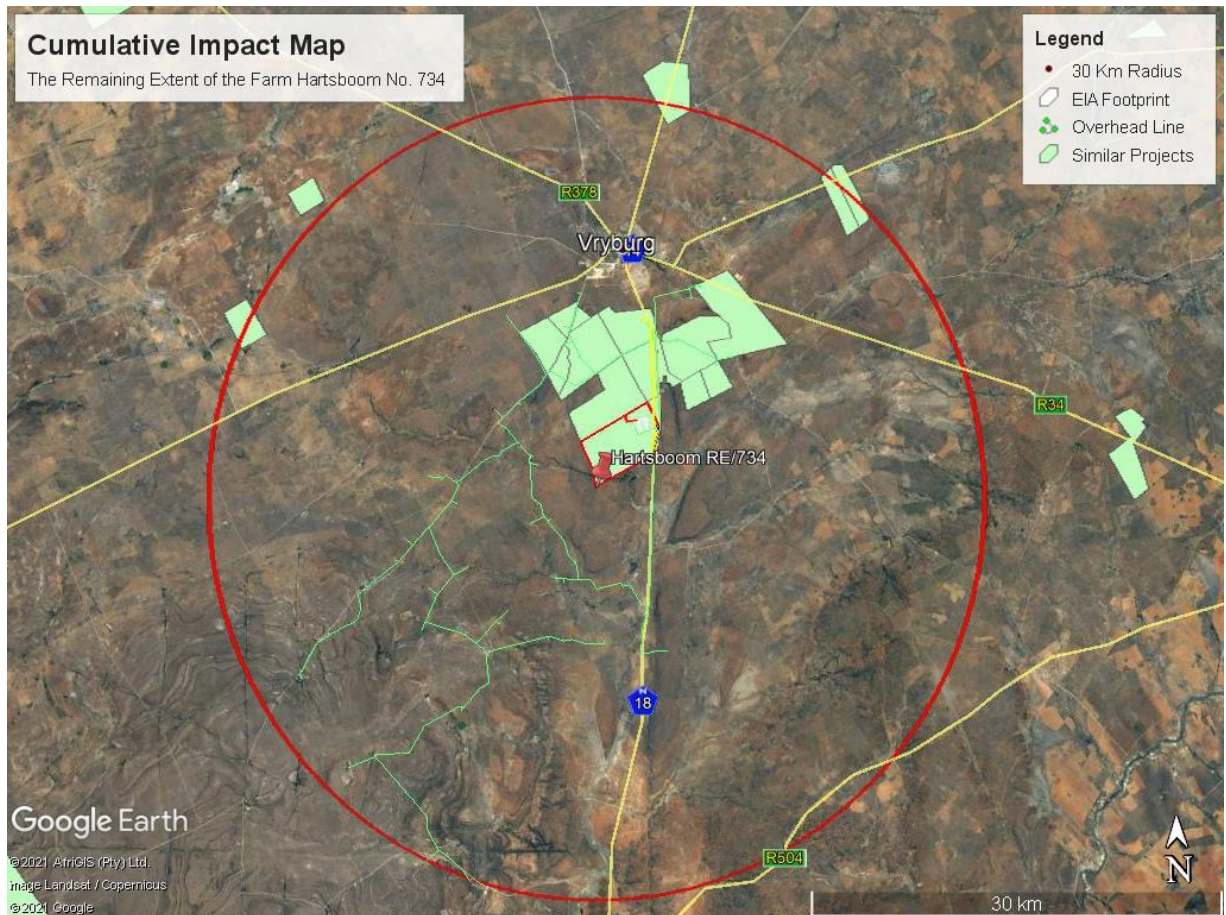
- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities;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

Despite these challenges, cumulative impacts have been afforded increased attention in this Basic Assessment Report and for each impact a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact – refer to Appendix E. 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 Protea 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 30 km radius surrounding the proposed development – refer to Figure 16 below.



**Figure 16:** Geographic area of evaluation with utility-scale renewable energy generation sites and power lines within a 30 km radius of the proposed Protea Sola Power Plant

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 Province. A larger geographic area may be used to analyse cumulative impacts based on the specific temporal or spatial impacts of a resource. For example, the socio-economic 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 nineteen (19) 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 study area.

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Waterloo	4.4 km	75 MW	14/12/16/3/3/2/308	Scoping and EIA	Operational
Protea	0km	115MW	14/12/16/3/3/2/914	Scoping and EIA	Approved
Tiger Kloof	1.4 km	75 MW	14/12/16/3/3/2/535	Scoping and EIA	Approved
Naledi	5.7 km	75 MW	14/12/16/3/3/2/390	Scoping and EIA	Approved
Carocraft	23 km	75 MW	14/12/16/3/3/2/374	Scoping and EIA	Approved
Elda	25.6 km	75 MW	14/12/16/3/3/2/750	Scoping and EIA	Approved
Khubu SPP	9.2km	115MW	14/12/16/3/3/2/912	Scoping and EIA	Approved
Gamma SPP	10.3km	115MW	14/12/16/3/3/2/917	Scoping and EIA	Approved
Sonbesie SPP	200m	115MW	14/12/16/3/3/2/915	Scoping and EIA	Approved
Woodhouse PV 1	10.7km	100MW	14/12/16/3/3/2/863	Scoping and EIA	Approved
Woodhouse PV 2	10.7km	100MW	14/12/16/3/3/2/865	Scoping and EIA	Approved
Vryburg PV 1	500m	115MW	14/12/16/3/3/1/1939	Scoping and EIA	Approved
Vryburg PV 2	500m	115MW	14/12/16/3/3/1/1940	Scoping and EIA	Approved
Vryburg PV 3	500m	115MW	14/12/16/3/3/1/1941	Scoping and EIA	Approved
Sendawo 1	4.2km	75MW	14/12/16/3/2/893	Scoping and EIA	Approved
Sendawo 2	4.2km	75MW	14/12/16/3/2/893	Scoping and EIA	Approved
Sendawo 3	4.2km	75MW	14/12/16/3/2/893	Scoping and EIA	Approved

Moeding Solar	6km	115MW	14/12/16/3/3/1/1987	Scoping and EIA	Approved
Alpha SPP	23km	115MW	14/12/16/3/3/2/916	Scoping and EIA	Approved
Meerkat SPP	21km	115MW	14/12/16/3/3/2/913	Scoping and EIA	Approved

It is unclear whether other projects not related to renewable energy is or has been or will be constructed in this area. In general, development activity in the area is focused on industrial development and agriculture. Agriculture in the area is primarily associated with cattle grazing. The next section of this report will aim to evaluate the potential for solar projects for this area in the foreseeable future.

#### **7.4.2 Projects in the foreseeable future**

As part of the SEA for Wind and Solar Energy in South Africa, the CSIR and the DFFE mapped the location of all BA and EIA applications submitted within South Africa. According to this database approximately 19 applications have been submitted for renewable energy projects within the geographical area of investigation. The majority of these projects are located in close proximity to Vryburg.

### **7.5 SPECIALIST INFORMATION ON CUMULATIVE EFFECTS**

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

#### **7.5.1 Soil, Land Capability and Agricultural Potential**

In quantifying the cumulative impact, the area of land taken out of grazing as a result of these twenty projects plus this one (total generation capacity of 2,065 MW) will amount to a total of approximately 5,163 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 Environmental Affairs (DEA) 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 1.83% 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**

Corridors and linkages of areas with similar habitat are present in the local district where a number of solar power plants are planned. Watercourses and wetlands are not present at the site and avoided by the proposed footprint so that stepping stone corridors (pans) and a network of linked corridors (active channels with riparian zones) remain in the larger area. 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 study area. Overall because most of the Vryburg area is part of extensive vegetation types or ecosystem types with large distributions and generally in avoidance of very sensitive restricted habitats (compared to for example the pristine wetlands or highly sensitive habitat pockets of threatened species in mountain grassland areas or fynbos areas of South Africa) the development of a number of solar plants appears 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. The cumulative impacts, from an ecological perspective, is considered to be acceptable.

### **7.5.3 Avifaunal**

The proposed Protea SPP expansion is situated in an area of moderate to low avifaunal diversity. There are non-perennial rivers present but they are not located near the site (>1 km), nor are there specific avifaunal habitat features that would attract large volumes of birds or act as a preferred flyway. The resident avifauna is represented by moderate to low species richness and abundance. A good baseline dataset was generated during the site surveys, supplemented by a relatively scant SABAP2 dataset and the results of the 2016 avifaunal specialist assessment for the larger 115MW Protea SPP. No Red Data species were recorded during the surveys, however suitable habitats exist for some of the Red Data species and they have a moderate likelihood of occasional occurrence on site. A small number of endemic or near-endemic species occur on site.

The cumulative displacement of resident avifauna and cumulative loss of important avifaunal habitats 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 therefore a lasting anticipated impact of the development of this project. Considering the size of the project and the paucity of effective controls, the impact is considered acceptable.

### **7.5.4 Social Impact Assessment**

Protea 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 the Protea 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. The impacts are considered to be acceptable from a Socio-economic perspective.

#### **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, there is however an existing SPP (Waterloo) and Eskom electrical infrastructure, therefore, 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. On the other hand, the location of the SPPs within the Vryburg REDZ will contribute to the consolidation of SPP structures to this locality and avoid a potentially scattered proliferation of solar energy infrastructure throughout the region.

#### **7.5.6 Heritage**

The cumulative impact of the proposed Protea Solar Power Plant is assessed by adding impacts from this proposed development to existing and other proposed developments with similar impacts within a 30 km radius. It was determined that the 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 stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded.

Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to the heritage are expected to be of low significance.

### 7.5.7 Paleontology

Based on the SAHRIS website, palaeontological heritage assessments (PIAs) are available for the majority, if not all, of the projects listed (Almond 2013a-c, Almond 2016a-i, Butler 2016, 2018, Groenewald 2016, Rubidge 2012, Durand 2018). It is noted that (1) of the available PIA reports several are only desktop studies with no field-based ground truthing and (2) a low palaeontological impact significance is inferred for most, but not all, of the projects concerned. This applies most notably to those projects featuring similar Late Caenozoic sedimentary rock units to those mapped in the present Protea SPP site where surface exposure of stromatolitic bedrocks is low to non-existent. Higher palaeo-sensitivities and levels of impact significance are understandably inferred for projects that involve surface exposure of Precambrian stromatolites (fossil microbial mounds) which are almost certainly *not* represented at surface in the Protea Solar Power Plant site (cf Almond 2013a, 2016e, Groenewald 2016). In the author's opinion:

- Palaeontological impact significances inferred for renewable energy projects, where these are assessed at all, may well to some extent 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* Late Caenozoic alluvial and calcrete sediments 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 Late Caenozoic superficial deposits in the region as well as (2) the generally low palaeo-sensitivity of these younger deposits and (3) the probable (albeit *unconfirmed*) rarity of *scientifically valuable* occurrences of well-preserved stromatolites within flat-lying terrain preferred for solar energy projects, the anticipated cumulative impact of the proposed or authorised solar power plant developments in the Vryburg region - including the proposed Protea Solar Power Plant - is assessed as negative medium (without mitigation), potentially falling to negative low (with full mitigation). There are therefore no objections on palaeontological grounds to the authorisation of this project.

### 7.5.8 Traffic

There is a total of 19 (nineteen) renewable energy projects within a 30 km radius of the proposed project. The construction of these plants will not only have an impact on transportation routes but will also affect the local traffic and surrounding communities. Transportation (long distance) trips generated by the delivery of equipment and components to site are insignificant when compared to the Average Daily Traffic (ADT) of the immediate road network. The additional trips do not affect the Levels of Service (LOS) in any substantial way. Local traffic on the N18 near the PV solar power plants have an abundance of spare capacity and will be able to accommodate the estimated traffic generated by delivery vehicles, construction vehicles and on-site staff. The construction of these solar power plants will have a positive impact on the surrounding communities, as it creates more job opportunities. It is unlikely that the other solar power plants will be constructed within the exact same period as the

Protea SPP, but overlapping of construction periods is a possibility. 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 are low, as they are only temporary and extend over a short time period.

## 7.6 CUMULATIVE 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>		
<b>Ecological Fauna and Flora Habitat Survey</b>	Habitat loss owing to clearing of vegetation	Clearing of vegetation at the proposed solar power plant footprint. This will entail the partial destruction of habitat of low or medium sensitivity.	- Medium
	Removal of sensitive species	Cumulative impacts could have an amplified effect on the loss of sensitive species. Sensitive species: Presence of Threatened or Near Threatened mammals, reptiles, amphibians and invertebrates at the site appear to be unlikely. This means by avoidance highly sensitive species are not impacted by the proposed development and therefore do not contribute to the cumulative impacts on highly sensitive species such as threatened species.	- Low

		Protected tree species at the site, <i>Vachellia erioloba</i> (Camel Thorn). Note that <i>Vachellia erioloba</i> is not Threatened and is a widespread protected species. <i>Vachellia erioloba</i> occurs in relatively low numbers at the site. Camel Thorn forests containing particularly large <i>Vachellia erioloba</i> individuals are absent at the site (Reference sites for such special Camel Thorn tree forests are Witsand Nature Reserve and Kathu Camel Thorn Forest visited/ researched in the past by the specialist). When considering cumulative impacts in the Vryburg area possibly posed by solar plant facilities the planting of <i>Vachellia erioloba</i> trees are essential. This could be undertaken nearby the site.	
	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.	- Low
Avifaunal Impact Assessment	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 developments in a 30 km radius.	- Low

Agricultural and Soils Impact Assessment	Loss of agricultural land	<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>	- Low
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	<p>The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded.</p> <p>Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to heritage are expected to be of low significance.</p>	- Low



Palaeontological Impact Assessment	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)	Given (1) the comparatively small combined footprint of the renewable energy projects under consideration compared with the very extensive outcrop areas of Late Caenozoic superficial deposits in the region as well as (2) the generally low palaeo-sensitivity of these younger deposits and (3) the probable (albeit unconfirmed) rarity of scientifically valuable occurrences of well-preserved stromatolites within flat-lying terrain preferred for solar energy projects, the anticipated cumulative impact of the proposed or authorised solar power plant developments in the Vryburg region - including the proposed Protea Solar Power Plant - is assessed as negative medium (without mitigation), potentially falling to negative low (with full mitigation). There are therefore no objections on palaeontological grounds to authorisation of this project	- Low
Social Impact Assessment	Impacts of employment opportunities, business opportunities and skills development	Protea 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 Protea SPP alone.	+ Medium
	Impact with large-scale in-migration of people	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	- Medium

		to the area in search of better employment opportunities and higher standards of living.	
<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
	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 steppingstone corridors of particular conservation importance at the site.	- Low

Visual Impact Assessment	Visual impacts related to the SPP	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, there is however an existing SPP (Waterloo) and Eskom electrical infrastructure, therefore, construction and operation of the SPP in the area is likely to have a negative impact.	- Medium
Heritage Impact Assessment	Loss or damage to sites, features or objects of cultural heritage significance	<p>The cultural heritage profile of the larger region is very limited. Most frequently found are stone artefacts, mostly dating to the Middle Stone Age. Sites containing such material are usually located along the margins of water features (pans, drainage lines), small hills and rocky outcrops. Such surface scatters or 'background scatter' is usually viewed to be of limited significance. The colonial period manifests largely as individual farmsteads, in all its complexity, burial sites and infrastructure features such as roads, railways and power lines. For the purpose of this review, heritage sites located in urban areas have been excluded.</p> <p>Because of the low likelihood of finding further significant heritage resources in the relevant area proposed for development and the generally low density of sites in the wider landscape the cumulative impacts to heritage are expected to be of low significance.</p>	- Low
<b>Decommissioning Phase</b>			
Visual Impact Assessment	Visual Intrusion	The decommissioning of the PV plant may increase the cumulative visual impact together with farming activities and people using the existing gravel roads adjacent to the site increasing the amount of dust generated. Dust control and housekeeping will be the main factors to consider.	- 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 Basic Assessment Report (BAR) addressed the cumulative environmental effects of the construction, operation and decommissioning project phases. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area.

The potential most significant cumulative impacts relate to:

- Cumulative effects during construction phase:
  - Habitat loss owing to clearing of vegetation (- 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 solar panels (- Medium)
  - Visual impacts related to the Protea SPP (- 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 ENVIRONMENTAL IMPACT STATEMENT

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

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

- (l) an environmental impact statement which contains-
  - (i) a summary of the key findings of the environmental impact assessment;
  - (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and
  - (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;
- (m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMP;
- (n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
- (o) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;
- (q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;

### 8.1 SUMMARY OF KEY FINDINGS AND ASSESSMENT RESULTS

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

➤ **Impacts during construction phase:**

- Loss of habitat owing to the removal of vegetation at the proposed solar plant for installation of PV units and infrastructure. (- 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:**

- Displacement of priority avian species from important habitats. (- Medium)
- Collision with solar panels. (-Low)

- 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:**

- An increased infestation of exotic or alien invasive plant species owing to clearance or disturbance where the footprint took place. (- Low)
- Continued loss of indigenous vegetation owing to poor recovery of vegetation. (- Low)
- Contamination of soil by leaving rubble/ waste or spilling petroleum fuels or any pollutants on soil which could infiltrate the soil during rehabilitation. (- Low)
- Displacement of priority avian species from important habitats. (- Low)
- Displacement of resident avifauna through increased disturbance. (- Low)
- Loss of employment opportunities. (- Low)

Cumulative biophysical impacts resulting from similar developments in close proximity to the proposed activity will be of negative medium to low significance.

## **8.2 RECOMMENDATION OF EAP**

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

- All key consultees have been consulted as required by Chapter 6 of the EIA Regulations (as amended in 2017)
- The Basic Assessment process has been conducted as required by the EIA Regulations (as amended in 2017), Regulations 19 and Appendix 1.
- The EMPr was compiled for the Protea Solar Power Plant as per Appendix 4 of the EIA Regulations (GN.R. 326) ,published in Government Gazette 40772 on 07 April 2017.
- The proposed mitigation measures will be sufficient to mitigate the identified impacts to an acceptable level.
- No additional specialist studies are proposed on any environmental issue raised and therefore, no terms of reference are provided for such studies.

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

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

**The final recommendation of the EAP is that:**

It is the opinion of the independent EAP that the proposed development will have a net positive impact for the area and will subsequently ensure the optimal utilisation of resources. The project will add an additional 30 MW of capacity to an already authorised and larger facility. All negative environmental impacts can further be effectively mitigated through the proposed mitigation measures. Based on the contents of the report it is proposed that an environmental authorisation be issued, which states (amongst other general conditions) that the Protea Solar Power Plant and associated infrastructure on the Remaining Extent of the Farm Hartsboom No.734, Registration Division I.N., North West Province be approved subject to the following conditions:

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

We trust that the Department finds the report in order and eagerly await your comment in this regard.

**Christia van Dyk**

Environamics - Environmental Consultants



**ENVIRONAMICS**

## 9 REFERENCES

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ACTS see SOUTH AFRICA

ALMOND, J.E. 2021. Palaeontological Heritage Report: Desktop Assessment Proposed Protea Solar Power Plant on the Remaining Extent of the Farm Hartsboom No. 734, Naledi Local Municipality, North West Province.

ANON. nd. Guidelines for Environmental Impact Assessments. <http://redlist.sanbi.org/eiaguidelines.php>

BODEN, T.A., G. MARLAND, and R.J. ANDRES. 2011. Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A.

BOTHA, M. 2021. Visual Impact Assessment - The Proposed Addition to the Protea Solar Power Plant near Vryburg, North West Province

BOTHA, M. 2021. Social Impact Assessment - The Proposed Addition to the Protea Solar Power Plant near Vryburg, North West Province

CONSTITUTION see SOUTH AFRICA. 1996.

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

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

DIVYA, K.C. AND ØSTERGAARD, J., 2009. Battery energy storage technology for power systems—An overview. *Electric power systems research*, 79(4), pp.511-520.

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

FIRST SOLAR. 2011. PV Technology comparison.

HAAGNER, A.S.H. 2021. Proposed Addition to the Protea Solar Power Plant Specialist Avifaunal Assessment.

LANZ, J. 2021. Site sensitivity verification and agricultural compliance statement for proposed Addition to the Protea solar power plant near Vryburg in the North West province.

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



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

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

SANBI. 2016. Guidelines for Environmental Impact Assessments. [Web:] <http://redlist.sanbi.org/eiaguidelines.php>. Date of access: 26 April 2016.

SOLARGIS. 2021. Global Horizontal Irradiation (GHI). [Web:] <https://globalsolaratlas.info/download/south-africa> [Date of access: 04 May 2021].

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

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

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

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

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

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

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

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

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

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

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

TERBLANCHE, R.F. 2021. Ecological Fauna and Flora Habitat Survey for the proposed Addition to the Protea Solar Power Plant.

THE MESOTHELIOMA CENTRE. 2016. Mesothelioma in South Africa. [Web:] <http://www.asbestos.com/mesothelioma/south-africa/>. [Date of access: 27 June 2016].

VAN SCHALKWYK, J. 2021. Cultural Heritage Impact Assessment: The Proposed Addition to the Protea Solar Power Plant Near Vryburg, North West Province.

VAN ZYL, L. 2021. Traffic Impact Study For The Transportation Of Solar Energy Equipment To The Addition to the Protea Solar Power Plant Near Vryburg, North West Province.

WORLD BANK GROUP. 2006. The Equator Principles.