

Environmental
Management Group
(Pty) Ltd.



**PROPOSED 60 MW PV
SOLAR FACILITY FOR
PRIESKA POWER
RESERVE, WONDERPAN
SOLAR 1, NORTHERN CAPE
PROVINCE**

**Prieska Power Reserve (Pty) Ltd. ~
Prieska, Northern Cape Province**

Report details

DAEARDLR reference number:	NC/EIA/06/PIX/SIY/PRI3/2022
Document purpose	<p>This Draft Environmental Impact Assessment (Draft EIA) Report forms part of a series of reports and information sources that are being provided during the EIA Process for the proposed 60MW Wonderpan PV Plant in Prieska, Northern Cape. In accordance with the 2014 NEMA EIA Regulations (as amended), the purpose of the EIA Report is to:</p> <ul style="list-style-type: none"> • Present the details of and need for the proposed project; • Describe the affected environment, including the planning context, at a sufficient level of detail to facilitate informed decision making; • Provide an overview of the EIA Process being followed, including public consultation; • Assess the predicted positive and negative impacts of the project on the environment; • Provide recommendations to avoid or mitigate negative impacts and to enhance the positive benefits of the project; • Provide an Environmental Management Programme (EMPr) for the design, construction and operational phases of the project. <p>The Draft EIA Report is being made available to all stakeholders for a 30-day review period. All comments on the Draft EIA Report (submitted within the 30-day review period) will be considered in the preparation of the finalised EIA Report. This finalised EIA Report will then be submitted to the Northern Cape Department: Agriculture, Environmental Affairs, Rural Development and Land Reform in accordance with Regulation 23 (1) of the 2014 NEMA EIA Regulations, for decision-making in terms of Regulation 24 of the 2014 NEMA EIA Regulations (as amended).</p>

Project title	Proposed 60 MW PV solar facility for Prieska Power Reserve, Wonderpan Solar 1, Northern Cape Province
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Development type	Photovoltaic solar facility
Associated infrastructure	13 km transmission line (33kV)
Broad scale locality	Prieska, Northern Cape Province
Fine scale locality	Farm Karabee 50/2 (<i>transmission line</i>) Farm Karabee 50/4 (<i>solar site + transmission line</i>) Farm Karabee 50/8 (<i>transmission line</i>)
Site area	137 ha / 1 330 000 m ²
PV panel laydown area	104.3 ha
Generation capacity	60 MW

Executive summary

1.1. Background:

Prieska Power Reserve (Pty) Ltd has undertaken feasibility investigations for the flexible production of green hydrogen and ammonia from variable solar and wind energy. Prieska and its surrounding areas prove to have extremely good solar and wind load factors. Prieska Power Reserve (Pty) Ltd developed a model to utilise these load factors to produce green ammonia of which the hydrogen content is derived from the renewable energy sources, solar and wind (energy production).

Planned industries for the power reserve hub proposal in the Prieska area is anticipated to be developed in the following phases.

-  **Phase 1:** Development and construction of several solar photovoltaic (PV) plants and their associated infrastructure with a total combined capacity to produce at least 770MW AC.;
-  **Phase 2:** Development and construction of a wind generation plant with associated infrastructure; and
-  **Phase 3:** Development and construction of an industrial park for green hydrogen and ammonia production.

This report deals with the **Wonderpan PV solar facility** as part of **Phase 1**.

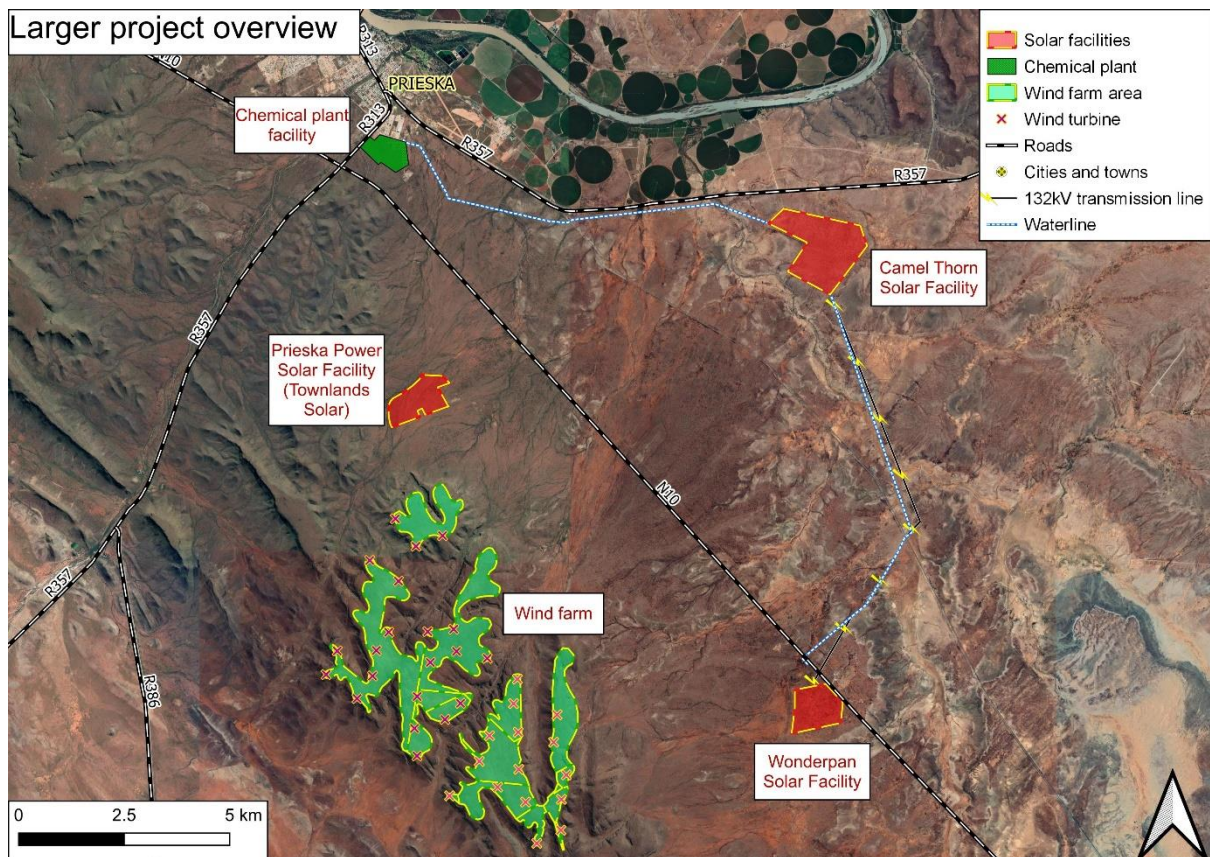


Figure 1 Map indicating a portion of the larger Prieska Power Reserve Hub. Note this project only deals with the Wonderpan Solar facility which form part of phase 1.

1.2. Project description:






The proposed Wonderpan solar facility's footprint will take up 137 ha of the 1526 ha available on farm Karabee 50/4 situated south of the N10. Installed hardware will have the potential to generate 60 MW by PV technology. Renewable energy production will be facilitated through eight (8) blocks of fixed tilt (30° north facing) solar arrays. A small on-site substation and its associated hardware will convert the solar output to AC through eight (8) 7.5MW inverters, whereby the green energy will be relayed via the proposed 132kV transmission line to the Camel Thorn solar facility. The following infrastructure will be developed:

Solar field:

- 💧 Eight (8) blocks of fixed-tilt panel arrays;
- 💧 Steel support structure and tracker system on concrete foundations;
- 💧 Inverter stations as part of the PV field (8 total 7.5MW inverters);
- 💧 Transformer, switchgear, and related equipment as part of the substations;
- 💧 Fencing around the site perimeter (2.5m high);
- 💧 Internal roads.

Associated infrastructure:

- 💧 Substation complex (33/132kV) including control rooms and grid control yard;

-  Transmission lines and transmission towers (towards the Camelthorn Solar PV Plant - 13km in length);
-  Battery energy storage system;
-  Operations and maintenance buildings;
-  Access and internal roads;
-  Perimeter fencing and access control point (gate and security building);

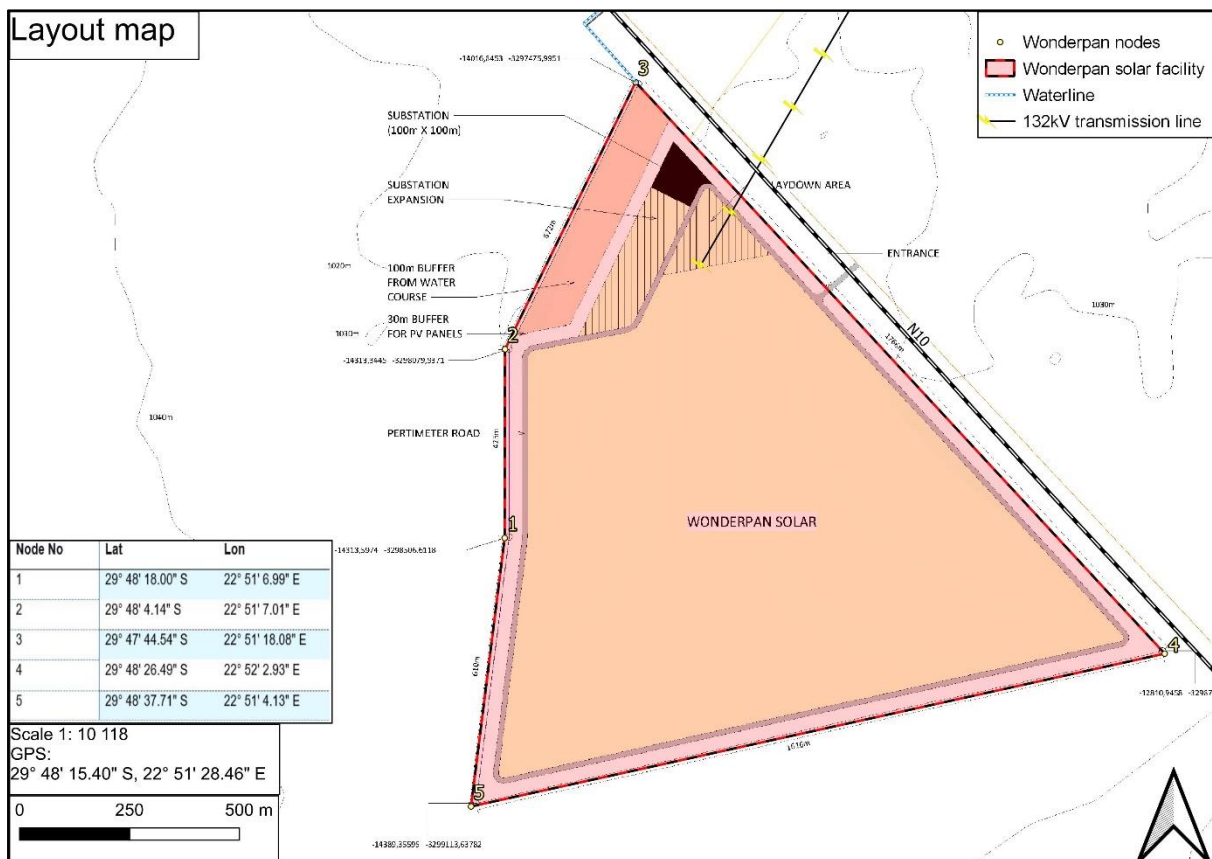


Figure 2 Layout map indicating the proposed Wonderpan Solar facility’s site boundary and associated infrastructure.

Table 1 Technical development specifications.





Item / component	Specification
One (1) block	
Generation capacity	7.5 MW DC
Total area required	0.8 ha / MW
PV array information	
Total blocks (full 60 MW)	8 blocks (fixed tilt)
Module output	Canadian solar CS7N-660MS 1500v / 660wat

Average panel height	3 meters
Fixed panel tilt	30° north
Total panels required (full 60MW generation)	± 105 000 units
Inverters	(8) x 7.5 MW inverters
Total PV array area (physical clearance)	104.3 ha
Total Wonderpan solar farm area (site)	137 ha

1.3. Specialist investigations:

The compilation of this document required niche-specific expertise, specifically in the fields of terrestrial and aquatic ecology, palaeontology, anthropology, and ornithology. Experts in these fields were appointed for the compilation of specialist reports which reported on the *in situ* condition of the receiving environment and the anticipated impacts associated with the proposed development.

The following specialist investigations were commissioned:

-  Avifaunal assessment
-  Terrestrial ecological assessment
-  Phase 1 HIA (Archaeological and Palaeontological assessment)
-  Aquatic ecological assessment (Wetland study)

A full breakdown of each specialist's findings is provided in Chapter 8. Through the commissioning of the mentioned specialists, no fatal flaws were identified; however, based on expert opinion, several mitigation measures were indicated.

1.4. Impact Assessment Summary:

The impacts derived from the planning, construction and operational phases associated with this development were adequately assessed. Through this report, it was argued that due to the planning phases' dependence on computer intensive screening and brief site visits, its impacts are negligible. The primary impact causing phases are anticipated to be concentrated in the construction and operational phases. See below a summary of the anticipated impacts.

Table 2 Summary of the anticipated impacts. See the full impact assessment for more details (**Appendix F**).

Impact type	Phase	Status	Significance pre mitigation	Significance post mitigation
Aspect: Ecological impacts				

Habitat loss <i>Loss of habitat and species diversity as a result of construction and the removal natural elements.</i>	Construction	Negative	Medium-high (20)	Medium (12)
	Operation	N/A	N/A	N/A
Invasive plant species <i>Proliferation of exotic plant species due to environmental disturbance.</i>	Construction	Negative	Low-medium (6)	Low (2)
	Operation	Negative	Low-medium (6)	Low (2)
Loss of floral and faunal SCC <i>The loss of floral and faunal species of conservation concern as a result of the proposed development.</i>	Construction	Negative	Medium-high (16)	Low-medium (9)
	Operation	Negative	Medium (12)	Low-medium (6)
Loss of ecological support areas (ESA) <i>The loss of ESA areas due to the proposed development.</i>	Construction	Negative	Medium (12)	Low-medium (8)
	Operation	N/A	N/A	N/A
Loss of avifaunal priority species <i>The displacement or loss of priority avifaunal species due to the proposed development</i>	Construction	Negative	Medium (12)	Low-medium (6)
	Operation	Negative	Low-medium (9)	Low (4)
Cumulative impacts <i>The cumulative impact on the receiving environment's ecology regarding the proposed development total footprint assessed in conjunction with other renewable developments in a 30 km radius.</i>	Construction	Negative	Low-medium (10)	Low-medium (8)
	Operation	N/A	N/A	N/A
Aspect: Heritage impacts				
The loss of artefacts and fossils <i>Destruction of any archaeological artefacts or fossils.</i>	Construction	Negative	Low (4)	Low (1)
	Operation	Negative	Low (4)	Low (1)

Aspect: Water resource impacts				
Surface and ground water quality	Construction	Negative	Medium (12)	Low-medium (6)
<i>The pollution of surface and groundwater resources due to the proposed development.</i>	Operation	Negative	Low-medium (6)	Low(4)
Aspect: Aesthetics				
Construction of infrastructure	Construction	Negative	Low-medium (8)	Low-medium (6)
<i>The alteration of landscape appreciation, visual deterioration and visual impacts from the solar array.</i>	Operation	Negative	Medium (12)	Low-medium (9)
Aspect: Air quality and noise				
Air quality	Construction	Negative	Low-medium (9)	Low (4)
<i>Additional air pollution introduced due to the mobilisation of vehicles and land clearance.</i>	Operation	Positive	Medium (15)	N/A
Noise and vibrations	Construction	Negative	Low-medium (9)	Low (4)
<i>Sound pollution through the operations of vehicles and equipment.</i>	Operation	N/A	N/A	N/A
Aspect: Socio-economic impacts				
Job creation and the influx of job seekers	Construction	Positive	Medium (15)	N/A
<i>Impacts associated with the need for locally appointed construction/ operation workers.</i>	Operation	Positive	Medium (12)	NA
Aspect: Waste impacts				
General solid waste	Construction	Negative	Low-medium (9)	Low (4)
<i>General solid waste pollution.</i>	Operation	Negative	Low-medium (9)	Low (4)

The **no-go alternative** assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed development. This alternative would result

in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives were compared. The following implications will occur if the “no go” alternative is implemented:

- 💧 No benefits will be derived from the implementation of an additional land-use.
- 💧 The chemical plant, which’s already authorised by the DAERL will opt to receive its electricity from ESKOM’s grid.
- 💧 This will further enforce more strain on the already outdated electrical grid.
- 💧 Considering the national grid is largely supplied by non-renewable energy production facilities (90% coal based), the no go option will indirectly result in more carbon dioxide emissions.
- 💧 The authorisation refusal of this solar plant will indirectly create a precedence which will deter future renewable energy developments in the area.
- 💧 Socio-economic benefits such as job creation, skills development, and local economic growth will be lost.
- 💧 Local economic benefits arising through the REIPPP will not be realised.

Besides the above mentioned, the following benefits might occur if the no go alternative is implemented:



- 💧 No vegetation will be removed and or disturbed.
- 💧 The ecology will remain largely intact.
- 💧 No change/ alteration to the existing landscape.
- 💧 No additional waste will end up in landfill sites.

While the no go alternative will not generate any negative environmental impacts, it will surely remove any socio-economic benefit the local community will receive. The no go alternative will also not aid the government in addressing climate change, reaching its greenhouse gas emission targets, and will further place more strain on the existing electrical grid. Therefore, the **no go alternative is not considered the preferred alternative.**

1.5. EAP’s recommendation and conclusion:

The Wonderpan Solar Facility's construction and operation present several notable benefits to the local community and the larger area around Prieksa. These benefits include:

- 💧 Green development incentives such as the proposed project sustain a positive momentum for future renewable developments and investments to take precedence.
- 💧 The construction and operational phases of this facility present ample job opportunities and significant potential for economic growth.
- 💧 Regional economic growth through utilising the REIPP enterprise and socio-economic development contributions.

-  Indirect contribution¹ towards relieving additional usage stress off the ESKOM grid.
-  Indirect contribution towards aiding the country to meet its carbon emission targets.






Besides the apparent benefits arising from the Wonderpan Solar facility's operation, several adverse environmental impacts were also identified. The assessed environmental themes' impacts range from insignificant to moderately high, all of which can, with adequate mitigation, be lowered. Refer to the summary of impacts in the previous chapter for reference.

Additional consideration:

During the decision-making phase, the EAP encourages the competent authority to weigh in the following information as part of the larger scope of works associated with the Prieska Power Reserve Hub:

As indicated in the project background, the Wonderpan Solar facility forms part of two other solar PV developments, a wind farm, and the chemical plant. These renewable energy developments each play a vital role in realising the larger overarching project. The DAERL and DFFE, respectively, have already authorised both the townlands and camel thorn solar facilities. The Prieska Power Reserve's chemical plant was already authorised by the DAERL.

To conclude, the EAP recommends the competent authority to favourably consider the proposed development based on the provided information and subject to the following conditions, which ensure the underlying principles of Integrated Environmental Management be upheld:

-  Implementation of the proposed mitigation measures set out in the EMPr.
-  Implementation of the proposed mitigation measures set out in the specialist studies.
-  The proposed solar facility must comply with all relevant national environmental laws and regulations.
-  All actions and tasks indicated in the EMPr may not be neglected and a copy of the EMPr should be made available onsite at all times.
-  Applicant/ appointed environmental representative to liaise with the DFFE and the DAERL regarding the acquisition for the issuing of Forest Act License and Biodiversity Permit.

¹ The alleviation of potential electrical strain from the ESKOM grid is derived from the Chemical plant's renewable energy supply feed. Considering that the chemical plant is already authorised by the DAERL (Reff NC/BA/09/PIX/SIY/PRI1/2022) if the proposed renewable energy plants do not receive the same favourable outcome, the chemical plant would have to receive its electrical supply from the ESKOM grid. Provided the existing outdated electrical infrastructure of the country, this energy supply alternative is not nearly comparable in terms of the benefits arising from the plant's power supply when derived from renewable sources.

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Glossary of terms and acronyms







Term	Explanation
BAR	Basic Assessment Report
CEA	Cumulative Effects Assessment
DEFF	Department of Environment, Forestry and Fisheries
DM	District Municipality
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly, or partially resulting from a development and or the operation thereof.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
kV	Kilo Volt
Mitigate	Activities designed to lessen/compensate for unavoidable environmental impacts.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework

SPP	Solar Power Plant
VU	Vegetation Unit
LM	Local Municipality

1. Introduction

1.1. Document purpose:

This Draft Environmental Impact Assessment (Draft EIA) Report forms part of a series of reports and information sources provided during the EIA Process for the proposed 60MW Wonderpan PV Plant in Prieska, Northern Cape. In accordance with the 2014 NEMA EIA Regulations (as amended), the purpose of the EIA Report is to:

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1.2. The Environmental Assessment Practitioner:

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include “(a) details of—

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

Environmental Management Group (PTY) Ltd. (EMG) is an active company working in conjunction with other private companies, government departments, municipalities and parastatals to promote sustainable development and sound environmental management principles. EMG was appointed by the applicant to facilitate the environmental authorisation process for the proposed solar development. The lead environmental assessment practitioner (EAP) for the proposed development is Mr. CW Vermeulen.

A detailed *curriculum vitae* (CV) of the lead EAP is presented in **Appendix I**. Refer to the bellow summary for a brief overview of qualifications, registrations and associations held by the lead EAP.










Table 3 Summary of associations, registrations and qualifications held by the lead EAP.









Lead EAP name	Mr. CW Vermeulen
Contact information	☎ +27 51 412 6350 ✉ cwv@envmgrp.com
Company	Environmental Management Group (Pty) Ltd.
Role(s)	Director, Avifauna Specialist and Senior Environmental Assessment Practitioner
Qualifications	BSc Environmental and Biological Sciences
Professional registrations	Environmental Assessment Practitioners Association of South Africa (EAPASA): Registration No. 2019/1521

1.3. The team of experts:

The compilation of this EIA required the expertise and knowledge of various specialists in the fields of terrestrial and aquatic ecology, palaeontology, anthropology, and ornithology. Experts in these fields were appointed for the compilation of specialist reports which reported on the *in situ* condition of the receiving environment and the anticipated impacts associated with the proposed development. The various specialists, their fields of expertise, relevant qualifications, and registrations are presented in **Table 4** below.

Table 4 Summary of relevant qualifications and registrations held by the team of experts.

Specialist member	Field of expertise	Qualifications and registrations
Darius van Rensburg	Ecological and wetland specialist	 BSc Botany and Zoology  BSc (Hons) Botany  MSc Vegetation Ecology  SACNASP Pr Eco Sci
Ricus Nel	Terrestrial ecological specialist	 BSc Botany and Zoology  BSc (Hons) Vegetation ecology  SACNASP Cand Eco Sci
Lloyd Rossouw	Archaeology and Cultural Anthropology Specialist	 B.A. (Hons.) Archaeology  M.Sc. Quaternary Vertebrate Palaeontology (cum laude)

		 Ph.D Plant Sciences, Dept. of Plant Science  Member of Association for South African Professional Archaeologists (ASAPA)  Member of Palaeontological Society of Southern Africa (PSSA)
Chris van Rooyen consulting	Avifaunal specialist	 Work experience 17+ years in ornithology
Albert Froneman	Collaboration with Avifaunal specialist	 SACNASP Reg Zoo Sci  MSc majoring in Zoology
Megan Loftie-Eaton	Collaboration with Avifaunal specialist	 PhD Zoology  SACNASP Pr Nat Sci

2. Project introduction

2.1. Project background:

Prieska Power Reserve (Pty) Ltd has undertaken feasibility investigations for the flexible production of green hydrogen and ammonia from variable solar and wind energy. Prieska and its surrounding areas prove to have extremely good solar and wind load factors. Prieska Power Reserve (Pty) Ltd developed a model to utilise these load factors to produce green ammonia of which the hydrogen content is derived from the renewable energy sources, solar and wind (energy production).

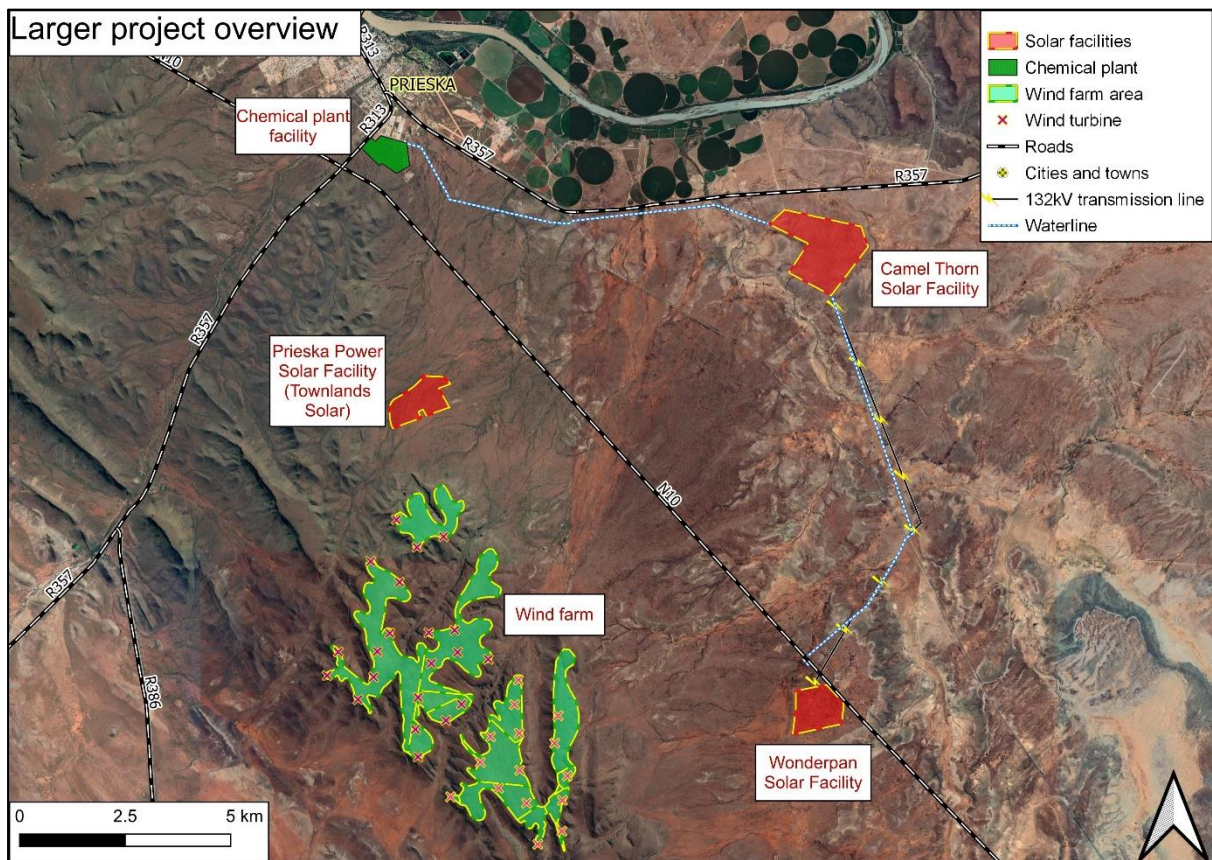





Figure 3 Map illustrating the three solar developments included in phase 1. The 13 km long transmission line connecting the Wonderpan and Camel Thorn solar facilities are also indicated. Note: the waterline runs adjacent to the proposed 132kV power line.

Planned industries for the power reserve hub proposal in the Prieska area is anticipated to be developed in the following phases.

-  **Phase 1:** Development and construction of several solar photovoltaic (PV) plants and their associated infrastructure with a total combined capacity to produce at least 770MW AC.;
-  **Phase 2:** Development and construction of a wind generation plant with associated infrastructure; and
-  **Phase 3:** Development and construction of an industrial park for green hydrogen and ammonia production.

This report deals with the **Wonderpan PV solar facility** as part of **Phase 1**. The proposed development constitutes listed activities in terms of the 2014 EIA Regulations (as amended in 2017) as promulgated under the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended). As such, the proposed development requires an Environmental Authorisation (EA) prior to the commencement of construction and operation. Environmental Management Group (Pty)Ltd. has been appointed by the applicant to facilitate the EA application process. The nature of the proposed development requires a Scoping and Environmental Impact Report (S&EIR) as part of the EA application process.

2.2. Project locality:

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include “(b) *the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, 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.”*

The Wonderpan PV solar facility will be situated on Portion 4 of the Farm Karabee 50, located approximately 18 SE of Prieska, which falls within the jurisdictional control of the Siyathemba Local Municipality. The Wonderpan site is accessed via the N10, south of Prieska.

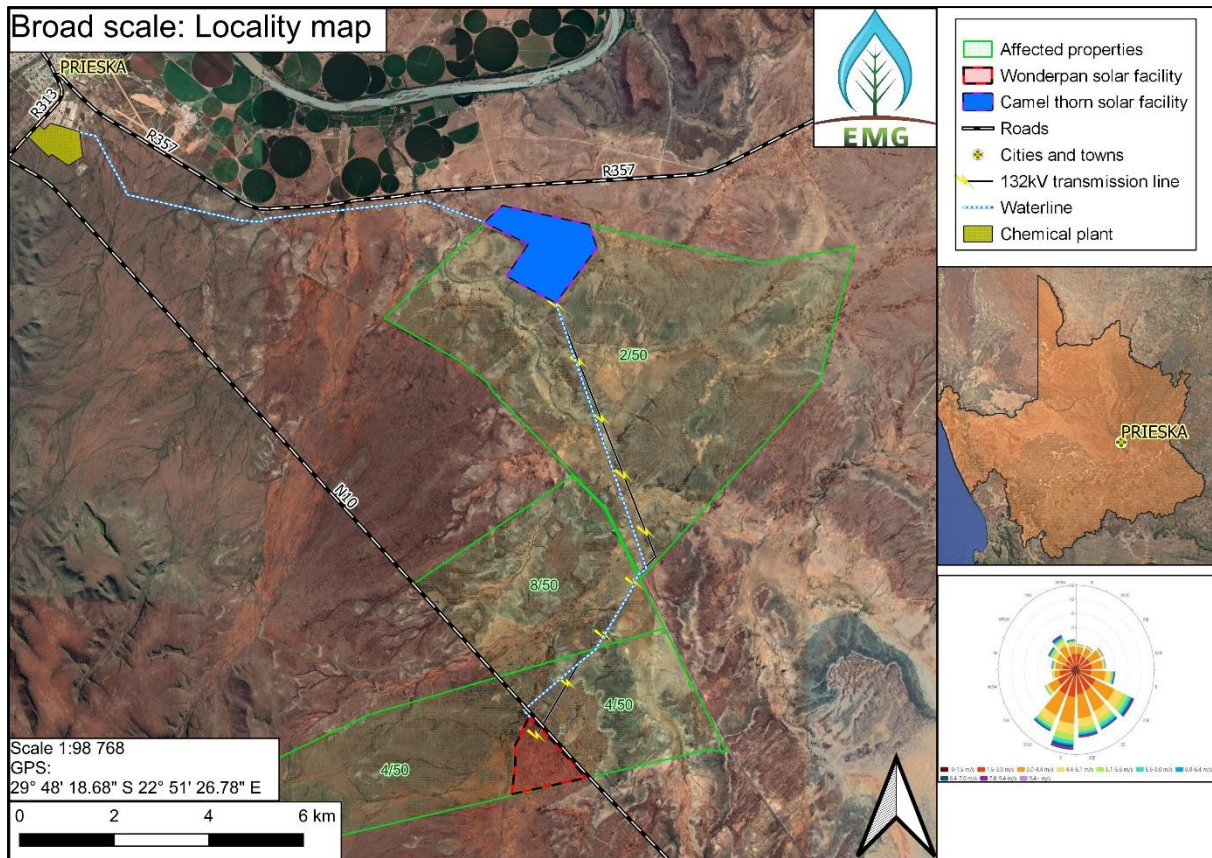


Figure 4 Locality map indicating the proposed development site and its associated infrastructure. **Note this project only deals with the Wonderpan solar site and its associated infrastructure (132kV line and the water supply line).**

Associated infrastructure forming part of the Wonderpan development includes a 132kV transmission line. The mentioned 132kV transmission line traverses through Portions 4, 2, and 8 of Farm Karabee 50 and will ultimately connect the Wonderpan and Camel Thorn solar facilities. An environmental authorisation (EA) for the Camel Thorn solar facility has already been approved by the National Department of Environment, Forestry and Fisheries (DFFE), in December 2021 (**Appendix L**).

Table 5 Properties affected by the proposed development. Refer to **Figure 4** above.

Proposed infrastructure	Properties	Surveyor General 21 Digit code
132kV transmission line	Portion 2 of the Farm Karabee 50, Prieska Road	C06000000000005000002
Wonderpan PV solar site + 132kV transmission line	Site 1 (Preferred alternative): Portion 4 of the Farm Karabee 50, Prieska Road	C06000000000005000004
132kV transmission line	The Remaining Extent of Portion 8, Prieska Road	C06000000000005000008

Table 6 Node coordinates of the Wonderpan solar site and the proposed 132kV transmission line. Refer to **Figure 4** for a visual representation of the site and transmission line's overall layout.

Wonderpan PV solar site		
Node No	Lat	Lon
1	29° 48' 18.00" S	22° 51' 6.99" E
2	29° 48' 4.14" S	22° 51' 7.01" E
3	29° 47' 44.54" S	22° 51' 18.08" E
4	29° 48' 26.49" S	22° 52' 2.93" E
5	29° 48' 37.71" S	22° 51' 4.13" E
132kV transmission line		
Node	Lat	Lon
1	29° 42' 21.32" S	22° 51' 17.20" E
2	29° 42' 43.48" S	22° 51' 0.24" E
3	29° 43' 1.53" S	22° 51' 38.38" E
4	29° 46' 3.65" S	22° 52' 50.13" E
5	29° 46' 7.49" S	22° 52' 43.61" E
6	29° 46' 18.57" S	22° 52' 37.98" E
7	29° 46' 58.69" S	22° 52' 9.40" E
8	29° 47' 8.26" S	22° 51' 57.06" E
9	29° 47' 52.56" S	22° 51' 26.64" E
10	29° 42' 6.91" S	22° 50' 43.64" E
11	29° 41' 51.03" S	22° 49' 55.87" E

2.3. Project description:

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include:

“(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;*
- (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.”

The proposed Wonderpan solar facility's footprint will take up 137 ha of the 1526 ha available on farm Karabee 50/4 situated south of the N10. Installed hardware will have the potential to generate 60 MW by PV technology. Renewable energy production will be facilitated through eight (8) blocks of fixed tilt (30° north facing) solar arrays. A small on-site substation and its associated hardware will convert the solar output to AC through eight (8) 7.5MW inverters, whereby the green energy will be relayed via the proposed 132kV transmission line to the Camel Thorn solar facility. The following infrastructure will be developed:

Solar field:

- 💧 Eight (8) blocks of fixed-tilt panel arrays;
- 💧 Steel support structure and tracker system on concrete foundations;
- 💧 Inverter stations as part of the PV field (8 total 7.5MW inverters);
- 💧 Transformer, switchgear, and related equipment as part of the substations;
- 💧 Fencing around the site perimeter (2.5m high);
- 💧 Internal roads.

Associated infrastructure:

- 💧 Substation complex (33/132kV) including control rooms and grid control yard;
- 💧 Transmission lines and transmission towers (towards the Camelthorn Solar PV Plant - 13km in length);
- 💧 Battery energy storage system;
- 💧 Operations and maintenance buildings;
- 💧 Access and internal roads;
- 💧 Perimeter fencing and access control point (gate and security building);

Table 7 Technical development specifications.

Item / component	Specification
One (1) block	
Generation capacity	7.5 MW DC
Total area required	0.8 ha / MW
PV array information	
Total blocks (full 60 MW)	8 blocks (fixed tilt)
Module output	Canadian solar CS7N-660MS 1500v / 660wat
Average panel height	3 meters

Fixed panel tilt	30° north
Total panels required (full 60MW generation)	± 105 000 units
Inverters	(8) x 7.5 MW inverters
Total PV array area (physical clearance)	104.3 ha
Total Wonderpan solar farm area (site)	137 ha

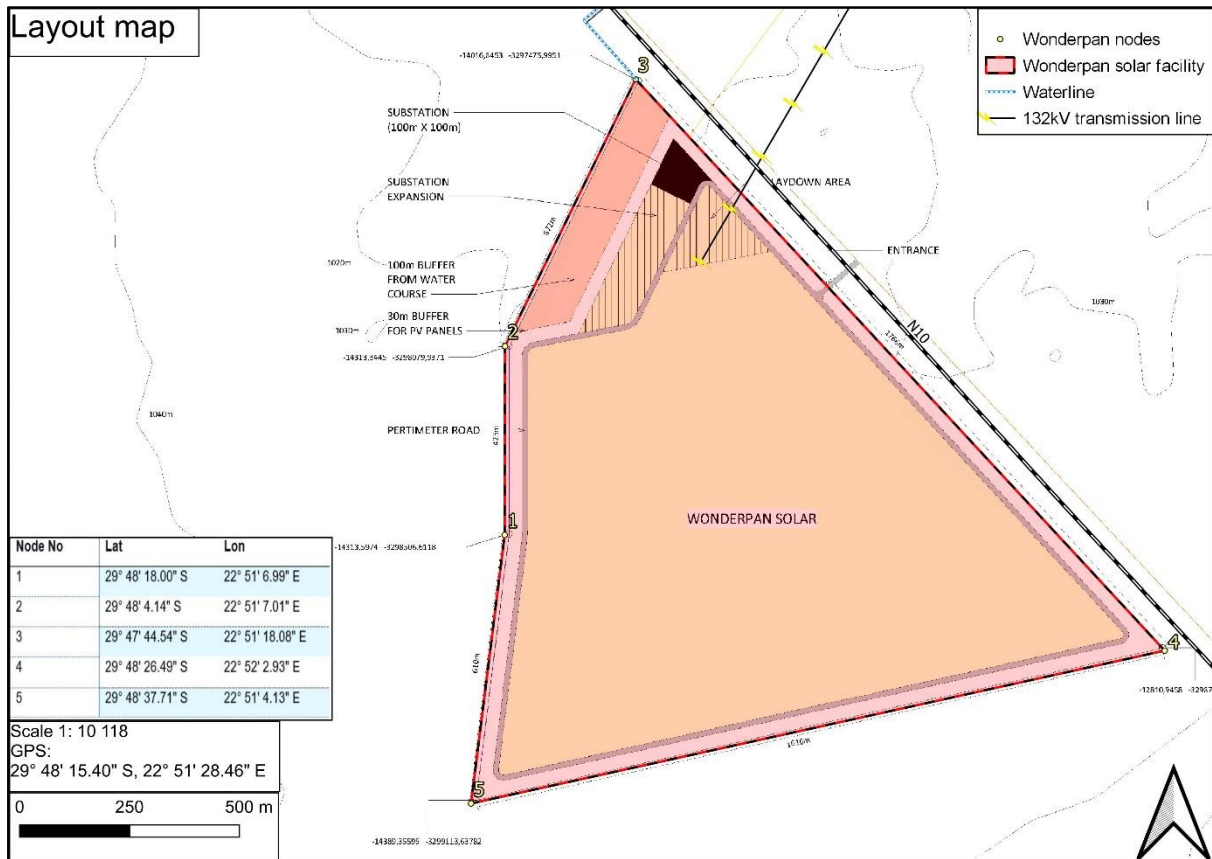


Figure 5 Layout map indicating the Wonderpan Solar facility and its associated infrastructure.

Water use:

The operational needs of any solar plant require regular washing of the solar panels. Without this routine maintenance, dust will settle on the PV panel, decreasing the overall efficiency. The expected daily maintenance water requirement for the Wonderpan solar facility is 297 m³. A water use agreement between the proponent and the Siyathemba Local Municipality allows the facility to receive water via a pipeline between the chemical plant and Prieska’s water purification plant (**Appendix L**). After filtering at the WTW, the water will move via a pipeline toward the Wonderapan solar site. The proposed pipeline specifications presented to the EAP indicated the usage of 63 -75 mm (inner diameter) waterlines between the chemical plant and the Wonderpan solar site.

Utilising water from the WTW limits the facility's need to satisfy its water requirement through groundwater abstraction. If the applicant considers such activities (borehole abstraction) in the future, a Section 21 (a) water use licence will have to be applied.

3. Legislative context

3.1. Introduction

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report 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.”

The proposed development is subject to various legislative requisites in relationship with the South African environmental law. This section provides a brief overview of relevant legislation and their applicability to the proposed development. The proposed development's construction and operation must adhere to all applicable legal requirements pertaining to environmental management. The following acts and policies and their relevance to the proposed development are briefly summarised:

-  The Constitution of South Africa Act, 1996 (Act No. 108 of 1996);
-  National Environmental Management Act (Act No. 107 of 1998);
-  National Environmental management: Air Quality Act, 39 (Act 39 of 2004);
-  National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended
-  National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004);
-  The National Water Act, 1998 (Act No. 36 of 1998);
-  Environmental Conservation Act, (Act No .73 of 1989);
-  The White Paper on Integrated Pollution and Waste Management for South Africa;
-  Occupational Health and Safety Act, 1993 (Act No. 85 of 1993); and
-  Environmental Impact Assessment Regulations, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

3.2. The Constitution of South Africa Act, 1996 (Act No.108 of 1996):

The Constitution is the supreme law of the Republic, and all law and conduct must be consistent with the Constitution. The Bill of Rights emphasises several provisions relevant to securing the protection of the environment. Section 24 states that “Everyone has the right –

- a) To 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 the government to give effect to the people's environmental rights and places the government under a legal duty to act as a responsible custodian of the country's natural environment. The Constitution compels the government to pass legislation which protects the environment, prevents pollution and ecological degradation, promotes conservation, and secures sustainable development.

The proponent must ensure that the proposed development does not contravene the Constitution by ensuring that no pollution or ecological degradation results from the activities undertaken and by undertaking the development in an ecologically sustainable manner.



Note: It is however important to note that though an activity may be allowed in terms of an Act of Parliament or a permit issued under a statute, it may still be declared unlawful if it is harmful to human health or well-being.

Relevance to the proposed development:

The proponent must ensure that the proposed development's construction or operation does not contravene the Constitution. The proponent should comply with the Constitution by providing that no pollution or ecological degradation occurs due to the proposed development and by conducting environmentally sustainable developmental practices.

3.3. National Environmental management: Air Quality Act, 39 (Act No. 39 of 2004):

The National Environmental Management: Air Quality Act 39 of 2004 provides for the setting of national norms and standards for regulating air quality monitoring, management and control and describes specific air quality measures to protect the environment and human health or well-being by:

-  Preventing pollution and ecological degradation; and
-  Promoting sustainable development through reasonable resource use.








The National Environmental management: Air Quality Act also includes reference to the control of offensive odours whereby reasonable steps to prevent the emission of any offensive odours caused by activities on a premises are required. Also relevant is the establishment of national ambient dust fall out levels that may be relevant to the construction and operation of the solar plant.

Relevance to the proposed development:

The proposed solar plant does not trigger registration or licensing in terms of this Act, however during the construction phase, generation of dust and noise could become a factor to surrounding land users. However, it remains the proponent's responsibility to remain within the acceptable limits as stipulated in the NEM:QA (Act No. 39 of 2004)

3.4. National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended:

The National Environmental Management: Waste Act (NEM:WA) aims to reform the law regulating waste management to protect health and the environment. This is achieved by:

-  Providing reasonable measures for the prevention of pollution, ecological degradation and, securing ecologically sustainable development;
-  providing for the national norms and standards for regulating the management of waste by all spheres of government;
-  providing for specific waste management measures;
-  providing for the licensing and control of waste management activities;
-  providing for the remediation of contaminated land;
-  providing for the national waste information system; and
-  providing for compliance and enforcement thereof.





The NEM:WA indicates that certain waste management activities must be licensed, and according to Section 44 of the Act, the licensing procedure must be integrated with an environmental impact assessment process per the EIA Regulations promulgated in terms of the NEMA. Government Notice 921, published in Government Gazette No. 37083, on 29 November 2013, lists the waste management activities that require licensing. A distinction is made between Category A waste management activities, which require a Basic Assessment, and Category B waste management activities, which require the S&EI process to be followed.



Relevance to the proposed development:

The construction and operation of the proposed solar plant for Phase 1 are not subjected to any activity as listed in Category A or B of NEM:WA, 2008 and the updated Waste Act in 2013, and therefore a Waste Licence is not required. It is important for contractors to be appointed and the construction manager to take cognisance of Category C of the Waste Act and its associated norms and standards. It is also recommended that a waste management plan be compiled for the construction and operational phases of the plant. The waste management plan must also promote the re-use and recycling of materials.

3.5. National Environmental Biodiversity Act, 2004 (Act No. 10 of 2004):

The National Environmental Management: Biodiversity Act (NEM:BA), which was promulgated in 2004 aims to provide for the:

-  management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998;
-  protection of species and ecosystems that warrant national protection;
-  sustainable use of indigenous biological resources;
-  fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources;

-  establishment and functions of a South African National Biodiversity Institute;
- and
-  matters connected therewith."

3.5.1. Threatened or protected ecosystems and species:

NEMBA states that biodiversity loss through habitat loss, degradation or fragmentation must be avoided, minimised, or remedied. The loss of biodiversity includes the loss of threatened or protected species and the loss of localised endemics. Chapter 4 of the NEM:BA deals with threatened or protected ecosystems and species, and its purpose is "to—

- a) *provide for the protection of ecosystems that are threatened or in need of protection to ensure the maintenance of their ecological integrity;*
- b) *provide for the protection of species that are threatened or in need of protection to ensure their survival in the wild;*
- c) *give effect to the Republic's obligations under international agreements regulating international trade in specimens of endangered species; and*
- d) *ensure that the utilisation of biodiversity is managed in an ecologically sustainable way."*







Aspects concerning the loss of biodiversity through the loss of localised endemics, the loss of localised species diversity, the loss of ecological functions which support biodiversity, and the loss of threatened and/or protected species are discussed in the ecological assessment (**Appendix D**).





Relevance to the proposed development:

The proposed solar plant is situated within an Ecological Support Area (ESA), and the proposed 132kV electrical powerline traverses through a Critical Biodiversity Area 2 (CBA2). The appointed specialists also identified several provincially protected flora within the proposed site boundaries. The proponent is to remain responsible for low-impact developmental practices, flora removal, and relocation permit acquisition.

3.6. The National Water Act, 1998 (Act No. 36 of 1998):

The National Water Act (NWA) administered by DWS aims to manage and protect the national water act resources to achieve sustainable use of water for the benefit of all water users. The purpose is to achieve sustainable use of water for the benefit of all water users. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, and managed in ways that consider:

-  Promoting equitable access to water;
-  Redressing the results of past racial discrimination;
-  Promoting the efficient, sustainable, and beneficial use of water in the public interest;
-  Facilitating social and economic development;
-  Providing for the growing demand water use;
-  Protecting aquatic and associated ecosystems their biological diversity;

-  Reducing and preventing pollution and degradation of water resources;
-  Meeting international obligations;
-  Promoting dam safety; and
-  Managing floods and drought.

Section 21 of the NWA sets out water uses that may require registration or licencing. In terms of the NWA, water uses include any activity involving the following:

- a) Taking water from a water resource.
- b) Storing water.
- c) Impeding or diverting the flow of water in a watercourse.
- d) Engaging in a stream flow reduction activity contemplated in section 36.
- e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1).
- f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit.
- g) Disposing of waste in a manner which may detrimentally impact on a water resource.
- h) Disposing in any manner of water which contains waste from or which has been heated in, any industrial or power generation process.
- i) Altering the bed, banks, course or characteristics of a watercourse.
- j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.
- k) Using water for recreational purposes.




Relevance to the proposed development:

Optimal functioning of a PV facility requires that panels be cleaned on a regular basis. A water use agreement with the Siyathemba Local Municipality will see the Wonderpan facility receiving water via a proposed pipeline. The PV facility is also situated within a 500 m radius from the boundary of a wetland and ephemeral watercourses. A Section 21 (c) and (i) water use licence will have to be obtained.

3.7. The White Paper on Integrated Pollution and Waste Management for South Africa:

Integrated pollution and waste management is a holistic and integrated system and process of management aimed at pollution prevention and minimisation of source, managing the impact of pollution and waste of the receiving environment and remediation damaged environments.

The White Paper on Integrated Pollution and Waste management for South Africa represent a paradigm shift from dealing with waste only after it is generated (i.e., "end of pipe towards):

-  Pollution prevention;
-  Waste minimisation;
-  Cross media integration;

- 💧 Institution integrated both horizontal and vertical, of department and spheres of government; and
- 💧 Involvement of all sectors of society in pollution and waste management.

The government believes that pollution prevention is one of the most effective means of protecting South Africa people and environment. Pollution prevention eliminates costly and unnecessary waste and promotes sustainable development. It aims to reduce risks to human health and environment by trying to eliminate the causes rather than treating the symptoms of pollution.

This Integrated Pollution and Waste Management for South Africa apply to all government institutions, society at large and to all activities that impact on pollution and waste management. One of the fundamental approaches of this policy is to prevent pollution, minimise waste and to control and remediate impacts. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from “cradle to grave” including the generation, storage, collection, transportation, treatment, and final disposal of waste.

The government aims to:

- 💧 Encourage the prevention and minimisation of waste generation and thus pollution at source;
- 💧 Encourage the management and minimization of the impact of unavoidable waste from its generation to its final disposal;
- 💧 Ensure the integrity and sustained “fitness for use” of all environmental media, i.e., air, water, and land;
- 💧 Ensure that any pollution of the environment is remediated by holding the responsible parties accountable;
- 💧 Ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities, and individuals; and
- 💧 Prosecute non-compliance with authorizations and legislation.

3.8. Environmental Conservation Act, (Act No .73 of 1989):

In terms of section 20 (1) of the Environmental Conservation Act, 1989, (Act 73 of 1989), waste can only be disposed of at a facility that has a permit issued by the Minister of Water Affairs and Forestry. The facility must be sited, designed, operated, and monitored strictly in accordance with the permit conditions. These conditions will include the requirements, standards and procedures set out in the DWS waste management series.

It should be noted that section 20 (1) of the Environmental Conservation Act, 1989 has been amended in terms of the issuing of waste disposal permits and exemptions is now the responsibility of the minister of Environmental Affairs.

Section 24 of the Act allows the Minister to make regulation with respect to several waste management issues and include the following regulations:

- 💧 Disposal site application;
- 💧 Directions for control and management of general and small waste disposal sites;
- 💧 Noise control regulations; and plastic bag Regulations; and
- 💧 The waste will thus be subject to a permit issued under section 20 of the ECA.

3.9. Occupational Health and Safety Act, 1993 (Act No. 85 of 1993):

The Occupational Health and Safety Act 85 of 1993 is South Africa's principal legislation concerning health and safety of employees. It also aims to protect persons who are not at work against hazard to health and safety arising out of or in connection with the activities of persons at work. The Act places the responsibility on the employer to ensure a safe and healthy working environment and to cause every employee to be made conversant with health and safety requirements relevant to their work. At the same time the Act places the responsibility on the employee to follow its employer's health and safety procedures and instructions. Several Regulations have been promulgated under the Act that is relevant to development including the following:

- 💧 General Administrative Regulations, 1994;
- 💧 Asbestos Regulations, 2001;
- 💧 Lead Regulations, 2003;
- 💧 Regulations for Hazardous Chemical Substances, 1995;
- 💧 Hazardous Biological Agents of 2001;
- 💧 General Safety Regulations, 1986;
- 💧 Environmental regulations for workplaces (Department of Labour, 1994); and
- 💧 Construction Regulations, 2003.

Relevance to the proposed development:

All waste management activities need to be carried out in accordance with the requirements of the OHS Act and must include the following activities:

- 💧 Waste Management Practices must be safe and without risk;
- 💧 Risk Assessments conducted should include waste related activities;
- 💧 Waste management training should be provided to employees and contractors;
- 💧 Written work instructions should be provided where necessary; and
- 💧 Relevant personal protective equipment and respiratory protective equipment must be provided as last resort after all mitigatory measures have been reviewed.

3.10. The National Heritage Resources Act (Act 25 of 1999):

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for managing national heritage resources. The NHRA also includes landscapes and natural features of cultural significance as heritage resources.

Section 38 of the NHRA indicates that *"any person who intends to undertake a development categorised as-*

- a) *the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;*
- b) *the construction of a bridge or similar structure exceeding 50 m in length;*
- c) *any development or other activity which will change the character of the site –*
 - i). *exceeding 5000 m² in extent, or*
 - ii). *involving three or more erven or subdivisions thereof; or*
 - iii). *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv). *the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;*
- d) *the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;*
- e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.”*

Relevance to the proposed development:

The proposed 60MW solar site exceeds 5000m² in extent and will alter the character of the landscape. A Phase 1 Heritage Impact Assessment (HIA) was conducted in accordance with the NHA (Act 25 of 1999). Refer to **Appendix D** for the HIA specialist report.

3.11. The National Forest Act (Act No. 84 of 1998):

The National Forests Act (NFA) was passed to protect and conserve trees growing in South Africa. The purpose of the NFA is to preserve trees and forests and to promote the sustainable management and development of forests for the benefit of all South Africans. Government Gazette 46094 (Notice No. 1935), published on 25 March 2022, lists nationally protected trees, which under the Act are protected against specific activities. The effect of 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.

Relevance to the proposed development:

Protected trees identified on-site may not be cut, disturbed, damaged, or destroyed without a relevant permit. If no permit is obtained, the proponent is responsible to ensure that the solar array layout is adapted as to remain compliant to the NFA (Act No. 84 of 1998).

3.12. The Northern Cape Nature Conservation Act (Act No. 9 of 2009)

The Northern Cape Nature Conservation Act (Act No. 9 of 2009) as amended on January 2012, aims to provide for the sustainable utilisation of wild animals, aquatic

biota and plants; to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; to provide for offences and penalties for contravention of the Act; to provide for the appointment of nature conservators to implement the provisions of the Act; to provide for the issuing of permits and other authorisations; and to provide for matters connected therewith.

The NCNC (Act No 9 of 2009) further identifies six schedules of biota, which enables the provisions stipulated in the act:

- Schedule 1 - Specially Protected species;
- Schedule 2 - Protected species;
- Schedule 3 - Common indigenous species;
- Schedule 4 - Damage causing animal species;
- Schedule 5 - Pet species; and
- Schedule 6 - Invasive Species.

Regarding protected flora and fauna, the NCNC (Act No 9 of 2009) also provides a detailed list of plants and animals classified within each schedule.

Relevance to the proposed development:

Provincially protected fauna and flora as indicated by the NCNC (Act No 9 of 2009) should be managed according to the legislative stipulations outlined in the act. The occurrences of such species will be assessed and discussed in the ecological reports contained within this document.

3.13. National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended:

The National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998, as amended) provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

Integrated Environmental Management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development. In terms of the 2014 Environmental Impact Assessment (EIA) Regulations of the National Environment Management Act, 1998 (Act No. 107 of 1998, as amended) published 4 December 2014 (and updated on 7 April 2017), a Basic Assessment Report (BAR) is required for activities listed in Notices R327 and R324, and a Scoping and Environmental Impact Assessment is required for activities listed in Notice R325.

Listed activity nr.	Listed activity description	Relevance to the project
Listing Notice 1 (GN R 327, 07 April 2017)		
Activity 11	<p>The development of facilities or infrastructure for the transmission and distribution of electricity—</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.</p>	<p>The proposed solar development is situated outside the urban edge. On site infrastructure including connection cabling, and the 13 km (132kV) transmission line will be developed.</p>
Activity 19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from a watercourse.</p>	<p>The proposed development will see the removal, transportation and infilling of more than 10 m³ soil, sand, rock. Some of the transported soil, sand and or rock might have to be deposited into nearby watercourses. A Section 21 (c) and (i) water use silence are being applied for.</p>
Activity 28	<p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development:</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</p> <p>Excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>The proposed site for the solar field, Farm Karabee 50/4 is currently being utilized for agricultural purposes (primarily grazing for livestock). The proposed Wonderpan solar facility is considered an commercial/ industrial development and will have an estimated footprint of 133 ha.</p>
Listing Notice 2 (GN R325, 07 April 2017)		
Activity 1	<p>The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity</p>	<p>The proposed Wonderpan solar facility will have a maximum generation capacity of 60MW.</p>

	output is 20 megawatts or more.	
Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation.	The proposed project will cover approximately 133 ha of indigenous vegetation. As a result, more than 20 ha of indigenous vegetation will be cleared.
Listing Notice 3 (GN R324, 07 April 2017)		
Activity 12	(ii) - The clearance of an area of 300 square metres or more of indigenous vegetation Within critical biodiversity areas identified in bioregional plans.	The Wonderpan solar facility is constructed primarily within an Ecological Support Area. The 132 kV transmission line will traverse through areas identified as Other Natural Areas, Ecological Support Areas, and a portion of its layout will be developed within a Critical Biodiversity Area 2.

4. Public participation process

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include *“(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:*

(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.”

Refer to **Appendix E** for the full participation report.

4.1. Objectives of the public participation process:

Public Participation Process (PPP) forms an integral part of the application process. It provides people with the opportunity to raise their issues and concerns about the proposed Prieska Power Reserve solar plant. The public participation process to which this EIA process is subjected to must *“give all potential or registered interested and affected parties, including the competent authority, a period of at least 30 days to submit comments.”* In addition, the public participation process *“must provide access to all information that reasonably has or may have the potential to influence any decision with regard to an application.”* Public participation must include *“consultation with—*

- a) the competent authority.*
- b) every State department that administers a law relating to a matter affecting the environment relevant to an application for an environmental authorisation.*
- c) all organs of state which have jurisdiction in respect of the activity to which the application relates; and*
- d) all potential stakeholders, landowners, land users, where relevant, registered interested and affected parties.”*

In terms of the NEMA, public participation process provides people who may be affected by the proposed development with an opportunity to provide comment and to raise issues of concern about the project, or to make suggestions that may result in enhanced benefits for the project. Comments and issues raised during the PPP will be captured, evaluated, and included in a comments and responses register. Note that this is an ongoing process. The issues will be addressed and included in the final version of the report, submitted to Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR).

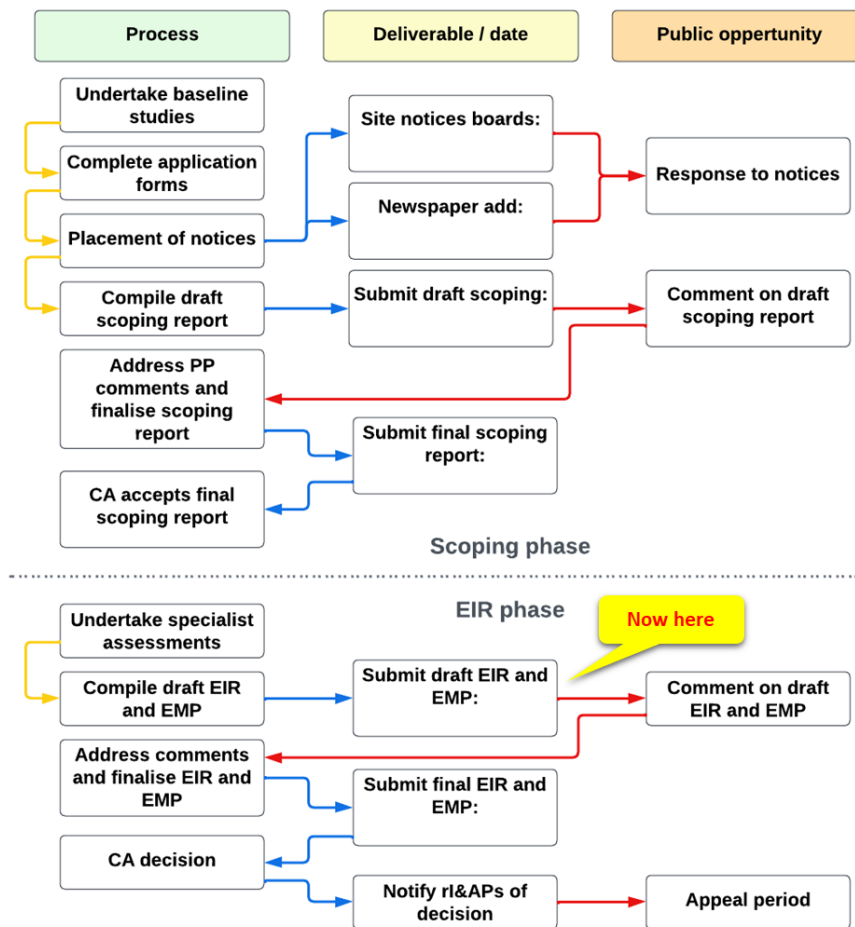


Figure 6 Diagram of the EIA process and where this application currently stands.

4.2. Pre application public participation:

The involvement of Interest and Affected Parties is vital in environmental assessment projects. The announcement of the EIA process and consequently the invitation of Interested and/or Affected Parties (I&APs) to participate was facilitated by the following methods:

- 🔦 Site notice boards;
- 🔦 Newspaper advertisements; and
- 🔦 The distribution of the Background Information Document (BID).

4.3. Identification of stakeholders:

During the inception phase of the project, I&APs and other key stakeholders were identified for the proposed development. This included identification of landowners, land occupants, farm, associations, ward councillors and relevant governmental

officials. Engagements with I&As and other stakeholders is an ongoing process and will continue into the S&EIR process.

4.4. Notification of the EIA process:

The public participation process was initiated with the placement of site notices and the distribution of the BID to pre-identified I&As and stakeholders.

Site notices:

Notice boards were placed where it is accessible by the public, at the site and surrounding boundary. The site notice boards illustrated key details pertaining to the development. Steps for potential I&As to register and contact EMG were clearly illustrated on the site notices.

Distribution of background information documents:

The purpose of the BID is to ensure all relevant information and processes being followed are made available to a wide range of stakeholders. Registered I&As are also furnished with the BID.

Advert:

The EIA guideline document stipulates that notices informing the public of the proposed development be placed on site and the project should be advertised in a local newspaper. All stakeholders and I&As were notified of the availability of the draft reports via newspaper adverts. The published advert illustrated key information pertaining to the development and the steps for potential I&As to lodge any comments they might have.

4.5. Public participation information included in the EIA report:

The Public Participation Process requires that the following information be included as part of the Public Participation Section of the EIA report:

- (i). The steps undertaken in accordance with the Plan of Study For EIA,
- (ii). A list of persons, organisations and government organs that were registered as interested and affected parties.
- (iii). A summary of comments received from, and a summary of issues raised by the interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments.
- (iv). Copies of any representations, objections and comments received from the registered interested and affected parties.

Mitigation measures and guidelines listed in the EIA report are summarised in a user-friendly document named the Environmental Management Plan (EMP). The compilation of an EMP is a requirement of the EIA Process (Section 32 and 34 of the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998).

4.6. Public participation summary:

The public participation process for the proposed development commenced on 11 May 2022 and is currently ongoing. The table below presents a summary of steps already taken regarding the PPP.

Phase	Requirement	Date
Inception Phase	Site notice	11 May 2022
Scoping Phase	Newspaper advert	13 May 2022
	Letters of notification	16 May 2022
	Reminder sent	14 June 2022
	Commenting Period	30 days end 29 th of June 2022
	Submit final scoping report	30 June 2022
	Competent authority's acceptance of the final scoping report	29 August 2022
EIR phase	Submit draft EIA	

5. Project motivation

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report 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 development footprint within the approved site as contemplated in the accepted scoping report.”

5.1. The need for the proposed development:

The newest reports from the Intergovernmental Panel on Climate Change (IPCC) warned that the world is set to reach the 1.5°C temperature increase within the next two decades. Previous IPCC reports have also emphasised the threats of ignorance, strongly suggesting that governments should implement policies to not only reduce but abandon fossil fuel-based electricity generation.

The integrated resource plan (IRP) of 2019 emphasises South Africa's responsibility toward reducing carbon emissions for energy production. Currently, South Africa's energy sector is responsible for around 80% of the country's carbon emissions. Considering that the projected energy demand for South Africa is increasing, the country's overall contribution to carbon emissions is significant. The IRP 2019 highlighted the challenge of combating carbon emissions and proposed that more attention be placed on renewable energy production. The government's support for projects such as the Wonderpan solar facility, which falls within the greater scope of works for the Prieska Power Reserve Project, is demonstrated via support letters from Infrastructure South Africa (ISA). Refer to **Appendix L** for the letter of support signed by the head of investment and infrastructure from the presidency's office.

Since 2008, South Africans have been experiencing the challenges of scheduling power cuts and load shedding. Load shedding has unfortunately become a day-to-day reality for most of the country and was brought on by a reduction in energy production by the country's primary energy producer ESKOM. Grid-connected renewable energy developments directly results from the ever-growing demand for electricity and the need for renewable energy production in South Africa. It's important to note that the decentralized renewable energy plants forming part of the Prieska Power Hub does not directly contribute to the national energy grid, but indirectly lowers potential electrical strain. The alleviation of potential electrical strain from the ESKOM grid is derived from the Chemical plant's renewable energy supply feed. Considering that the chemical plant is already authorised by the DAERL (Reff NC/BA/09/PIX/SIY/PRI1/2022) if the proposed renewable energy plants do not receive the same favourable outcome, the chemical plant would have to receive its electrical supply from the ESKOM grid. Provided the existing outdated electrical infrastructure of the country, this energy supply alternative is not nearly comparable in terms of the benefits arising from the plant's power supply when derived from renewable sources.

5.2. Desirability in the context of relevant policy:

The need and desirability of any given project is an essential element of the EIA process. The guidelines on need and desirability published by the DFFE (formerly known as DEA) in GN R891 (October 2014) indicated that while addressing the growth of the national economy through the implementation of various national policies and strategies, it remains crucial that these policies should take cognisance of strategic concerns such as climate change, food security, and the status of South Africa's ecosystem services. The DFFE guideline further emphasises that at the project level, the need and desirability of development should consider the content of regional and local plans, frameworks and strategies.

The following section will report on the proposed solar development's need and desirability in relation to its alignment with the strategic context of international, national, regional and local policies.

5.2.1. *The United Nations Framework Convention on Climate Change:*

The United Nations Framework Convention on Climate Change (UNFCCC, 1992) is an international environmental treaty that addresses climate change, negotiated and signed by 154 countries at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit. The primary objective of this treaty is to stabilize greenhouse gas emissions in the atmosphere to a level that prevents harmful interference with the earth's climate system. The treaty obliged signatory countries such as South Africa to adopt national policies and take measures to mitigate the impacts of climate change by limiting their anthropogenic emissions of greenhouse gases, as well as to report on the steps undertaken to return their emissions to pre-1990 levels.

To fulfil the requirements of the UNFCCC (1992), the South African government drafted legislation and policy providing the framework and guidelines the country will take to honour its commitments to reducing greenhouse gas emissions. These policies include the National Climate Change Response Policy (2011), the Draft Climate Change Bill (2018) and the Carbon Tax Act (Act No. 15 of 2019).

5.2.2. *Energy White Paper, 1998:*

The 1998 White Paper on the Energy Policy is the overarching legislative document guiding all subsequent policies, strategies, and legislation within the energy sector. It provides policy declarations concerning the government's intentions for the country's energy sector. The White Paper on Energy Policy presents five (5) key objectives. These objectives formed the foundation of and informed the development of energy policy in South Africa and remain relevant. Following the publication of this policy, numerous other energy-relevant policies have been developed and are in different phases of implementation. Key policies drafted following the 1998 White Paper on Energy Policy include:

 The White Paper on Renewable Energy, 2003;

- 💧 The National Energy Efficiency Strategy of the Republic of South Africa, 2008; and
- 💧 The Integrated Resources Plan 2010.

5.2.3. The Integrated Energy Plan, 2016:

The National Integrated Energy Plan (IEP, 2016) was conceived in response to the White Paper on the Energy Policy of 1998 and in terms of the National Energy Act, 2008 (No. 34 of 2008), which set the Minister of the DMRE in an obligation to publish the IEP. The IEP illustrates the way forward for the future of the energy sector in South Africa by guiding future energy infrastructure investments and policy development. The IEP had to consider South Africa's rapidly expanding economy, supply chain bottlenecks and energy demand deficiencies. By evaluating the crucial needs for South Africa's current economic, social and natural resource spheres, it identified eight key objectives:

- 💧 Ensure security of supply;
- 💧 Minimise negative environmental impacts from the energy sector;
- 💧 Promote the conservation of water;
- 💧 Diversify energy supply sources and primary sources of energy;
- 💧 Promote energy efficiency in the economy; and
- 💧 Increase access to modern energy.

The proposed Wonderpan solar facility as part of the larger Prieska Power Reserve Project is wholly aligned with the principles and objectives of the IEP by answering South Africa's need for energy security, job creation, diversification of energy supply and by following the legal EIA process, minimising negative environmental impacts associated with its construction and operation.

5.2.4. Regional plans:

According to the 3rd Draft Integrated Development Plan (IDP) of the Siyathemba Local Municipality, the local municipality is facing the challenge of broadening and encouraging the inclusive participation of local SMMEs across various strategic economic sectors. Amongst others, the renewable energy production sector has proven to be a high value economic sector in which the LM foresees to invest in. The Siyathemba LM's 3rd Draft IDP (2022/23), highlighted the potential to leverage the Renewable Energy Independent Power Produce Procurement Programme (REIPPP) to promote local economic growth in the form of Implementation Agreements (IA) signed between the Department of Mineral Resources and Energy (DMRE) and the Independent Power Producer (IPP). These agreements outline the IPP's involvement within the local socio-economic sphere and enterprise development of the region. Of particular significance are two of the seven Economic Development obligations highlighted in the IDP. These are (1) ownership obligations, and (2) socio-economic development obligations. The LM's IDP (2022/23) indicate that approximately 0.6% of all revenue generated shall be spent on Enterprise development contributions and \pm 1.5% of revenue be spent on socio-economic development contributions.

The REIPP enterprise development and socio-economic development contributions will help achieve the following:

- Optimise and increase the active black local participation across the value chain: including participation in both the O&M Phase and the EPC/Construction Phase etc.
- Optimise and increase the social economic development impact at community level through more impactful IPP Enterprise Development/Socio-economic Development initiatives
- Improve IPP's support for local content within the Siyathemba Local Municipality region.
- Establishment of a Business Incubator for SMMEs in Prieska, Siyathemba Local Municipality.

5.3. Desirability in the context of site suitability:

The desirability for the proposed development with respect to site suitability was assessed based on local solar irradiation values, the preferred alternative area's topography and landscape suitability, the total area available for development, accessibility and the decentralised nature of the Prieska Power Reserve Project. Technicalities associated with the desirability in terms of site suitability are discussed below:

5.3.1. Solar irradiation:

Direct Normal Irradiance (DNI) is the quantity of solar radiation received per unit area by a surface held perpendicular (or normal) to the sun at its current position in the sky. DNI is one of the most crucial parameters for energy yield calculation and performance assessment of tilted or sun-tracking photovoltaic modules. This map summarises the long-term daily average DNI measured in kWh/m². The proposed locality for the Wonderpan solar facility scored an average daily DNI yield of 8.06 kWh/m². The high irradiation values associated with the site are considered highly favourable for installing PV solar energy production.

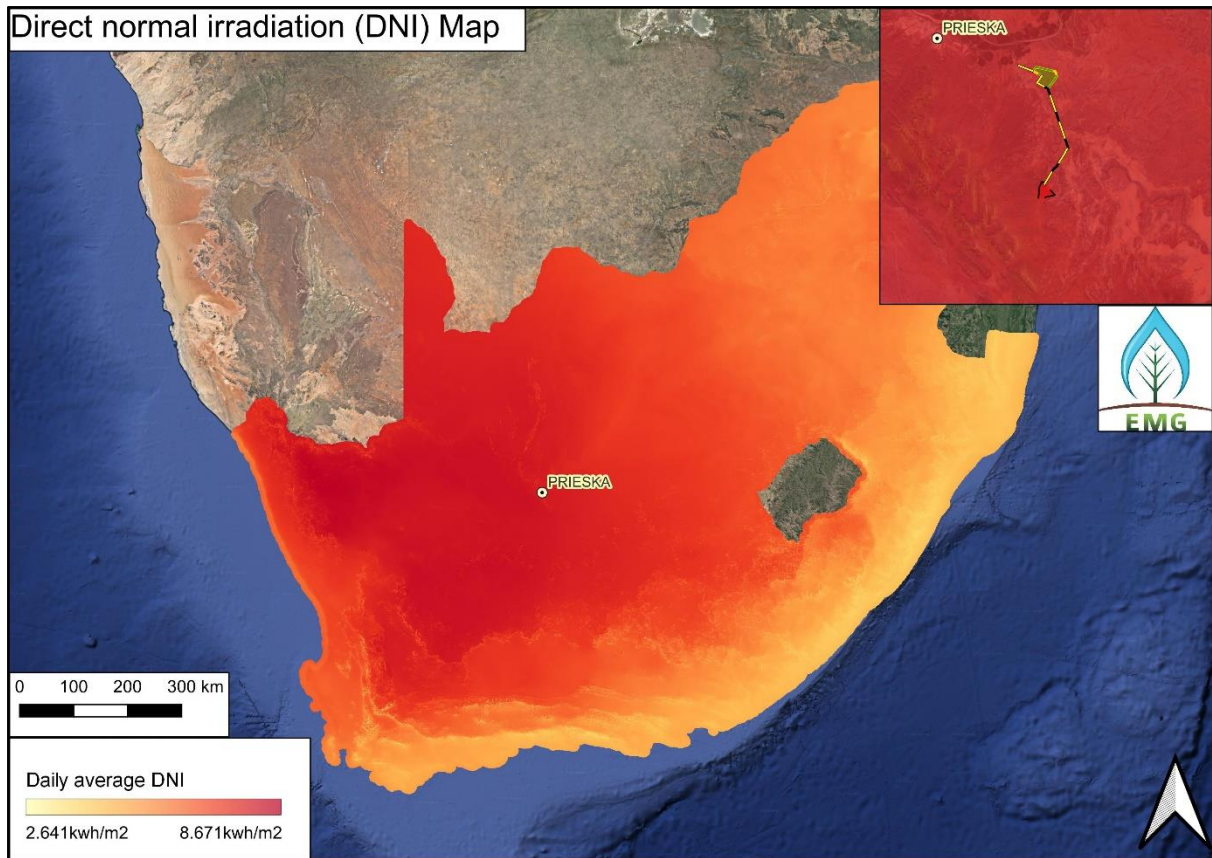


Figure 7 Map illustrating long term daily average Direct Nominal Irradiation (DNI) for South Africa. The smaller map on the top right indicates the proposed site for the Wonderpan solar facility placed within the higher DNI solar yield ranges. The placement of PV solar sites in high DNI yield areas are considered favourable for renewable energy production.

5.3.2. Topography and landscape:

The Wonderpan solar facility's topography features an almost flat plane which gently loses elevation towards the southern and western boundaries. Here altitude remains relatively even, varying from around 1005 m a.s.l. to 998 m a.s.l. The overall landscape of the area features a relatively flat plain irregularly interspersed with low hills and ridges. The generally flat terrain is considered highly favourable for installing a solar field as fewer costs would have to be invested in levelling the terrain.

5.3.3. Extent of the area available for development:

The proposed Wonderpan solar facility will be placed on farm Karabee 50 portion 4, which according to its title deed, is 2402.53 ha. The proposed 133 ha solar facility will be developed just south of the N10 and will take up approximately 5.6% of the entire property's extent. As previously indicated, the proposed 32kV transmission line crosses several properties; however, the extent to which these properties will be affected is restricted to pole placement. The available area for development on the affected properties is considered sufficient for the placement of the Wonderpan solar facility.

5.3.4. Accessibility:

The proposed site for the Wonderpan solar facility is located adjacent to the N10 national road. The proximity of the solar facility to the highway drastically decreases the traffic impact on secondary roads during the construction and operational phases of the development. Site accessibility was essential in the locality selection process as accessibility and location drastically influence transportation costs. Farm Karabee 50/4 is considered a favourable site for the placement of the Wonderpan solar facility due to its proximity to a national highway and ease of access.

6. Alternatives

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include:

“(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;

(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:

(i) details of the development footprint alternatives considered;

(ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and

(x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report.”

The 2014 NEMA EIA Regulations (as amended in 2017) defines alternatives as *“different means of meeting the general purpose and requirements of the activity, which may include alternatives to the—*

(a) property on which or location where the activity is proposed to be undertaken;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity; or

(e) operational aspects of the activity;

and includes the option of not implementing the activity, “No-go”.

The alternatives considered for this application are discussed below. These alternatives were evaluated on their developmental constraints, socio-economic and environmental impacts. This evaluation process was utilised to support the preferred alternative presented in this document ultimately. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognises 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.

6.1. Site locality alternative:

During the pre-planning phase, the applicant investigated three proposed site localities for the Wonderpan Solar Facility. Farm Karabee 50/4 , Farm Karabee 50/5, and Farm

Karabee 50/8 were all investigated as candidate sites. During this process, the applicant evaluated each candidate site on the following requirements:

- Accessibility / site access
- Topography
- Environmental sensitivity
- Distance from other phase 1 solar sites and the chemical plant.

Decentralisation of Phase 1 solar sites was an important evaluation criterion for the applicant. The decentralized nature of solar sites provides several benefits. These include a buffer against reduced solar output due to overcast weather conditions, overall lower environmental impact, providing space for potential future expansion and avoiding transmission knots/ crossing existing powerlines.

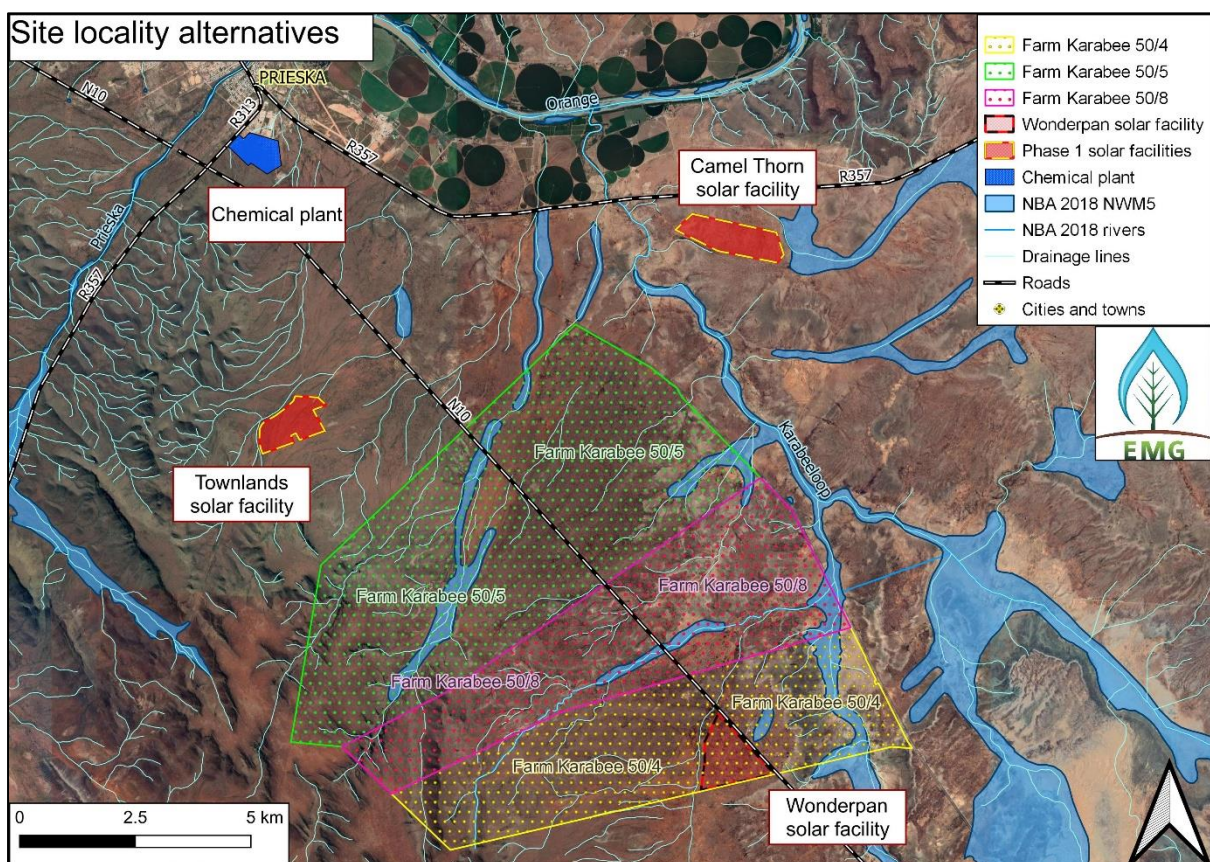


Figure 8 Map indicating the three site alternatives considered. Other information illustrated include drainage features, river systems, and the rest of phase 1 solar developments.

Both **Farm Karabee 50/5** and **Farm Karabee 50/8** was eliminated due to the following:

- Proximity to the Townlands solar facility.
- Irregular terrain which would have greatly increased the overall development cost.
- The presence of various drainage features and wetlands which would have increased the overall environmental impact.

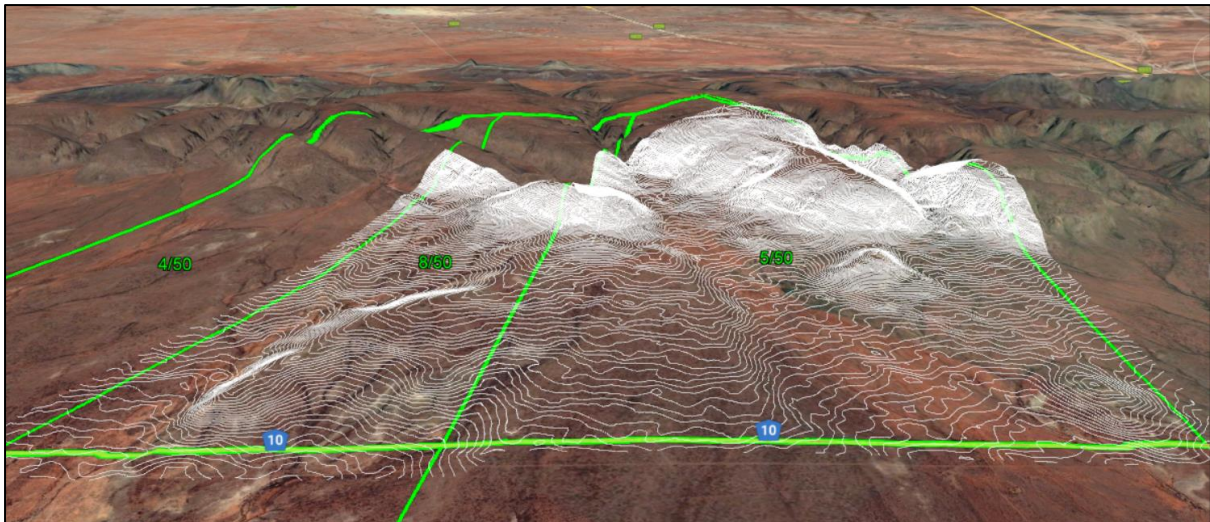


Figure 9 A 3D visualisation overlaid by 2 m contour lines. This view clearly illustrates the irregular terrain present in Farm Karabee 50/8 (middle) and Farm Karabee 50/5 (right).

Following the site evaluation process the only viable site locality was selected. Farm Karabee 50/4, was ultimately selected as the preferred alternative for the development of the Wonderpan solar facility.

6.2. Layout:

EMG appointed various specialists to undertake field-based surveys of the project site prior to the finalisation of designs and layouts. The findings of the mentioned specialists were assessed and used to inform the final layout designs. Sensitive environmental features within the study area were avoided prior to finalising designs. This proactive approach prior to the finalisation of designs prevented back-and-forth alterations. Therefore, the preferred layout alternative presented in this document is the only viable alternative that the competent authority may consider.

The only layout alterations which were made were near the Karabeeloo. Here the proposed powerline's layout was changed to lower its impact on the Karabeeloo and the small ephemeral drainage lines which drain into it. For reference, see **Figure 10** below. By moving the proposed 132 kV transmission line's layout outside the Karabeeloo and changing its crossing angle, significantly reduced the overall impact on this river system.



Figure 10 Overview of layout alterations regarding the 132kV transmission line. The new powerline layout (black line with lightning bolts) perpendicularly crosses the Karabeeloo in one location and does not run within the river system as compared to the previous layout (broken red line).

6.3. Technology:

Considering the proposed development activity's sole purpose is the generation of electricity to supply the chemical plant, two primary technology alternatives were considered. Technology alternatives include Solar energy and wind energy. Based on the preliminary investigations undertaken by the Project Applicant, no other renewable energy technologies are deemed appropriate for the area. The applicability of each technology alternative is discussed in brief below.

6.3.1. Wind energy:

Energy generation through wind turbine technology is restricted to areas which experience a greater consistency of wind exposure. The greater project trajectory of the Prieska Power Reserve Hub already includes the utilisation of wind energy production as part of Phase 2 of its expansion. For optimal wind exposure, these wind farms would have to be situated in the higher altitude areas around the Prieska region. The low-lying topography of the proposed site does not experience the same wind exposure compared to the higher lying areas. Therefore, wind energy production is not considered a viable technology alternative for the proposed locality.

6.3.2. Concentrated solar (CSP) technology:

Concentrating solar power (CSP) systems concentrate the sun's energy using reflective devices such as troughs or mirror panels to produce heat that is then used to generate electricity. CSP technology also requires large volumes of water which is a scarce commodity in the area. Additionally, the highly reflective mirrors/ troughs used in CSP plants will have a very high visual



Figure 11 General appearance of a CSP solar plant.

impact, and considering the proposed site's locality near the N10, such technology would not be preferred. While the irradiation values are high enough to generate sufficient solar power through CSP, the water constraints and visual impact render this alternative not feasible. Therefore, this alternative will not be considered further in this report.

6.4. Water use

The operational requirements of a solar plant necessitate regular maintenance of the PV array. This maintenance always includes the washing of PV panels to clear off built-up dust, which lowers their overall output efficiency. Water provisioning for the solar facility is supplied through a use agreement with the Siyathemba Local Municipality. The solar facility will receive its water supply from the Prieska Water Treatment Works (WTW), which abstracts water from the Orange River. After filtering at the WTW, the water will move via a pipeline toward the chemical plant. Here the water will be screened and pumped to the Wonderapan solar site.

Utilising water from the WTW limits the need for the facility to abstract water via boreholes. If in the future, such activities are considered by the applicant, a Section 21 (a) water use licence will have to be applied.

6.5. No go alternative:

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed development. This alternative would result in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives were compared. The following implications will occur if the “no go” alternative is implemented:

- No benefits will be derived from the implementation of an additional land-use.
- The chemical plant, which's already authorised by the DAERL will opt to receive its electricity from ESKOM's grid.

- This will further enforce more strain on the already outdated electrical grid.
- Considering the national grid is largely supplied by non-renewable energy production facilities (90% coal based), the no go option will indirectly result in more carbon dioxide emissions.
- The authorisation refusal of this solar plant will indirectly create a precedence which will deter future renewable energy developments in the area.
- Socio-economic benefits such as job creation, skills development, and local economic growth will be lost.
- Local economic benefits arising through the REIPPP will not be realised.

Besides the above mentioned, the following benefits might occur if the no go alternative is implemented:

- No vegetation will be removed and or disturbed.
- The ecology will remain largely intact.
- No change/ alteration to the existing landscape.
- No additional waste will end up in landfill sites.

7. The *in situ* environment

7.1. Physical characteristics

7.1.1. Climatic profile

Prieska's climate profile is classified according to the Köppen Geiger climate classification as a hot desert climate (BWh). Areas within hot desert climates typically have higher evaporation to precipitation ratio, i.e. water evaporates quicker than it can accumulate through rainfall events. The average maximum and minimum for the hottest and coldest months around Prieska are 40°C(December-January) and - 3 °C (July), respectively. Rainfall in this region is highly variable, but with precipitation maxima around early Autumn (± 38 mm) and minima around mid-winter (<5 mm). Long-term precipitation projections for the area around Prieska indicate a mean annual precipitation of 223 mm.

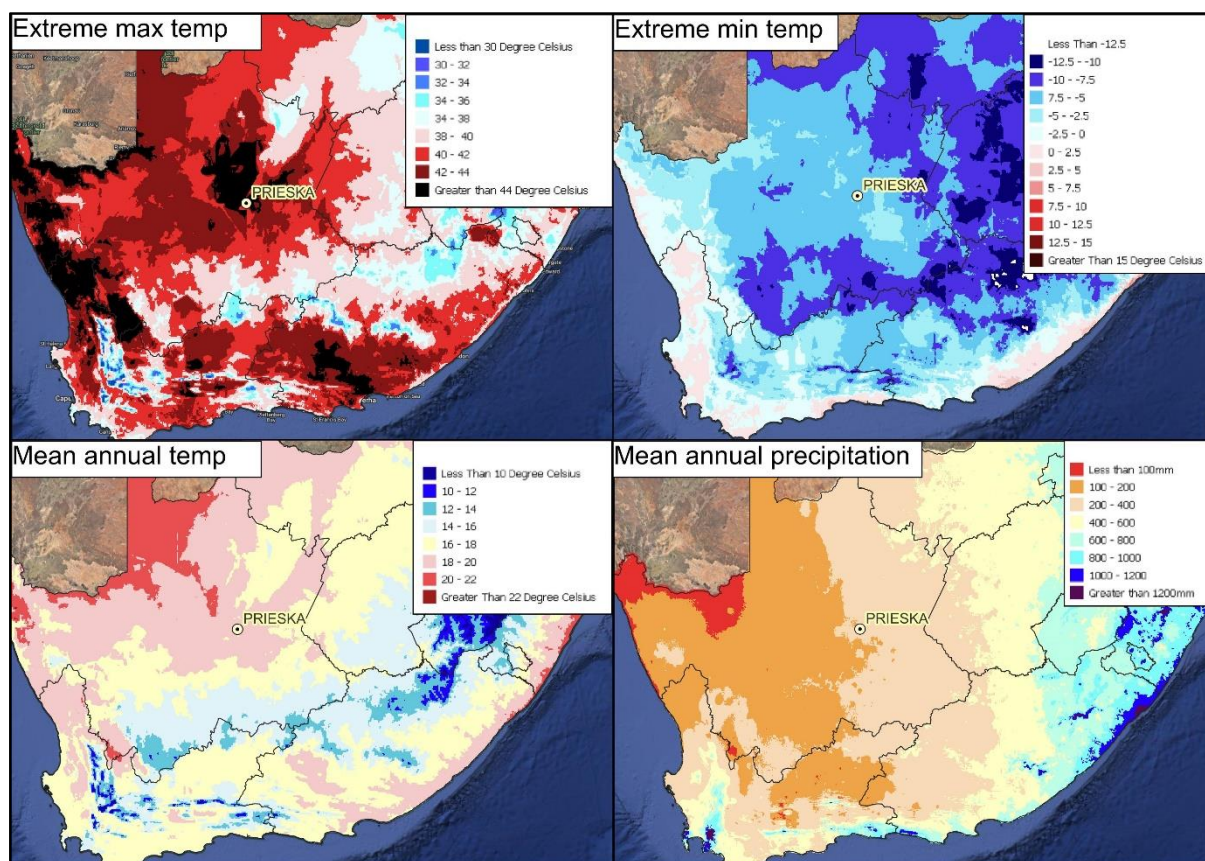
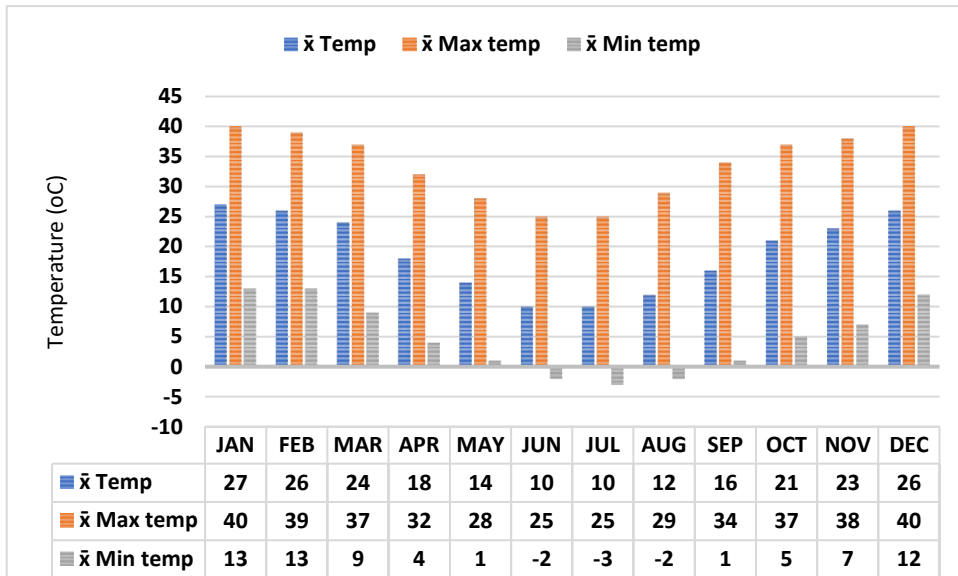


Figure 12 Maps indicating various climate information with a focus on extreme maximum, extreme minimum, the mean annual temperature and the mean annual precipitation.

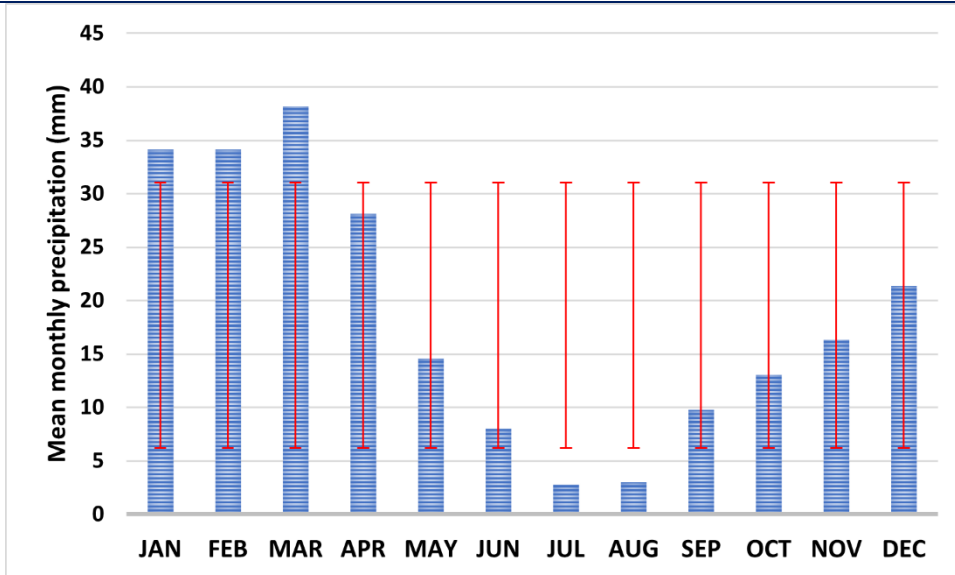
Temperature



Interpretation:

MERRA2 native resolution temperature data from the NASA power access portal calculated averages for the area of Prieska from 2000 – 2020 are illustrated above. The highest mean annual temperatures are recorded in summer months (Dec-Feb) whilst the lowest mean annual temperatures are recorded in winter months (June-July). Extreme maximum temperatures of near 40°C usually occur around December – February whilst extreme minimum temperatures of -2 - -3 °C are recorded in June and July respectively.

Precipitation

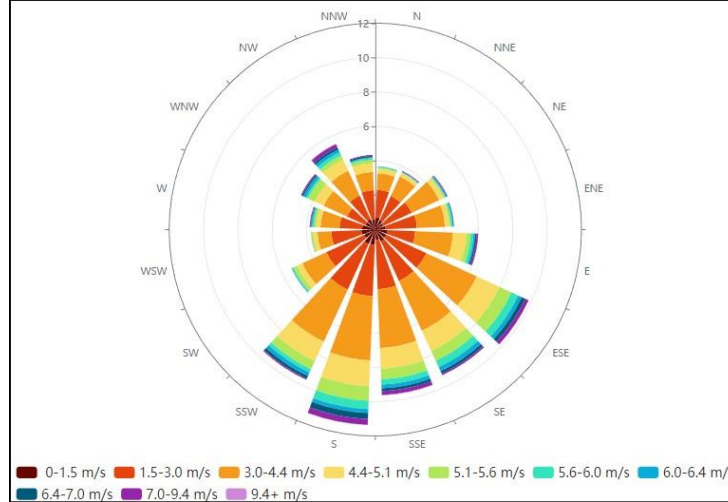


Discussion:

MERRA2 native resolution mean annual precipitation data from the NASA power access portal calculated averages for the area of Prieska from 2000 – 2020 is illustrated above. The graph clearly illustrates precipitation maxima in

the summer months (Jan-Mar) and precipitation minima in winter months (Jul-Aug). Rainfall irregularity is also illustrated by the red error bars set at a standard deviation of 1.

Wind



Discussion:

MERRA2 native resolution mean windrose data (10 meters above ground) from the NASA power access portal calculated averages for the area of Prieska from 2000 – 2020 is illustrated above. The windrose chart indicates a South-wards prevailing wind direction often with speeds of 3.0-4.4 meters/second.

7.1.1. Surface water and landscape drainage features:

The topography is dominated by fairly flat plains, intercepted with low hills and ridges. Elevation contrast between the hills and valleys created by the uneven terrain are associated with numerous ephemeral watercourses. These watercourses become more evident closer to the Karabeeloo, which is a fairly large river system.



Figure 13 Large pools of standing water within patches of the Karabeeloo River. Note, this area is not included within the proposed development plan.

Drainage from the proposed Wonderpan site moves in a southwestern direction towards a small, but still significant tributary of the Karabeeloo. This tributary follows the undulating terrain and eventually drains into the Karabeeloo about 4 km east of the site. From here, the Karabeeloo river traverses approximately 13 km until it drains into the Orange River. With reference to the affected tributary, the wetland ecologist stated that *“The stream forms the low point in the landscape and forms a shallow valley. It contains a substantial floodplain and the entire valley bottom consists of alluvial sand deposits. A defined channel is generally poorly defined and represented by shallow channels in the valley bottom. This is mostly a result of the stream being situated within the lower lying plains where water flow slows down, sands and sediments are being deposited and because water flow is so slow, any channel becomes filled in and obscured. The area has received ample rains recently and yet the stream contained no surface water at the time of the survey. This also confirms the ephemeral nature of the stream.”*



Figure 14 Clear riparian associated vegetation near the mentioned ephemeral tributary. No signs of standing water was observed in this stream near the site, however, soil and vegetation characteristics display associations with a riparian ecosystem.

The proposed Wonderpan solar facility is situated within the D72A Quaternary catchment area. D72A forms part of the greater orange river management area. The proposed Wonderpan.

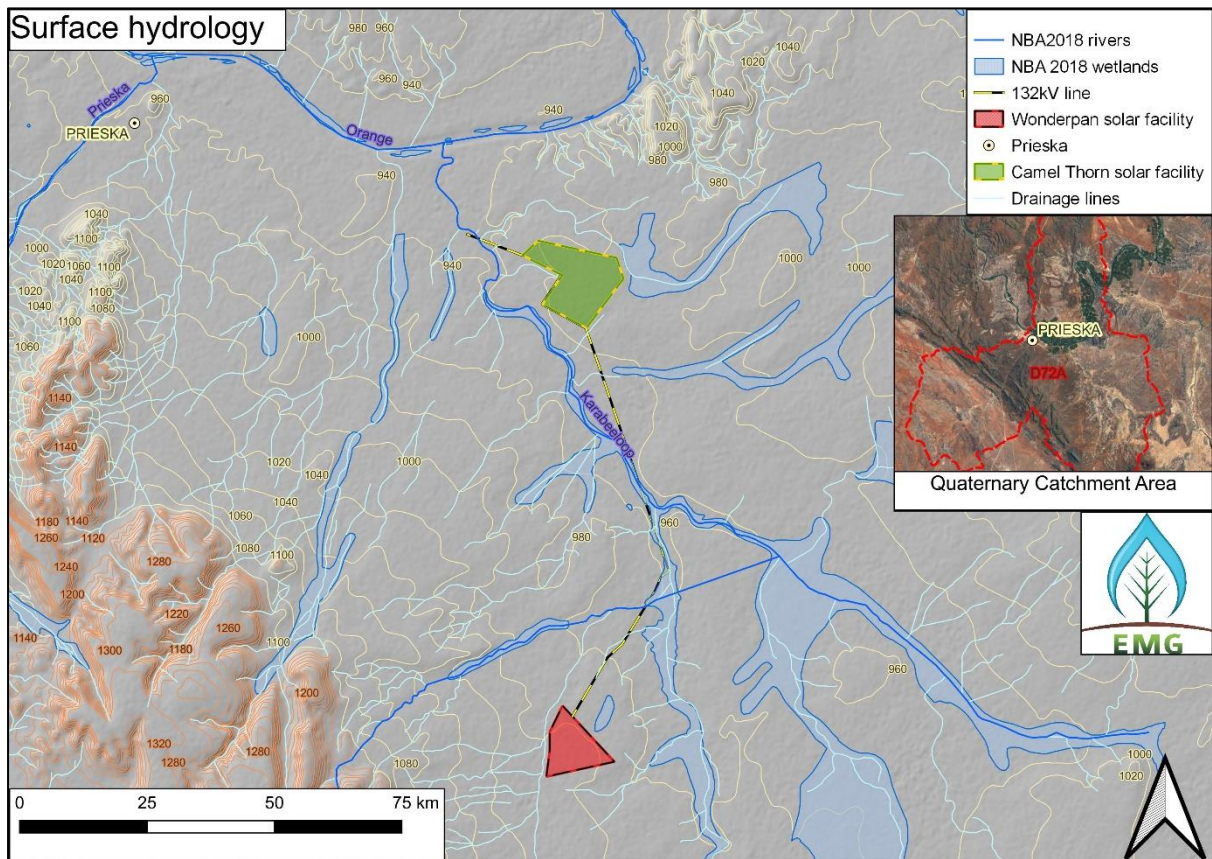


Figure 15 Surface hydrology map indicating surface topography and various drainage features. The site's proximity to major river systems such as the Karabeelops and the Orange rivers are also indicated. The small map illustrates the extent of the D72A Quaternary catchment area.

7.1.2. Geology

The study area is underlain by glacially-related sediments of the Mbizane Formation (Dwyka geological Group). The Mbizane Formation is primarily a heterolithic (a sedimentary structure made up of interbedded deposits of sand and mud) unit recognised in the upper part of the Dwyka group of the Karoo Supergroup. The mudstone and sandstone successions, tillites and conglomerates of the Mbizane Formation represent valley and inlet fill deposits laid down when Dwyka glaciers scoured out valleys and depressions in pre-Karoo rocks. Superficial deposits are primarily represented by late Tertiary surface limestones, windblown Kalahari Group sand, surface gravels and alluvium (fine-grained sediments deposited by rivers and streams).

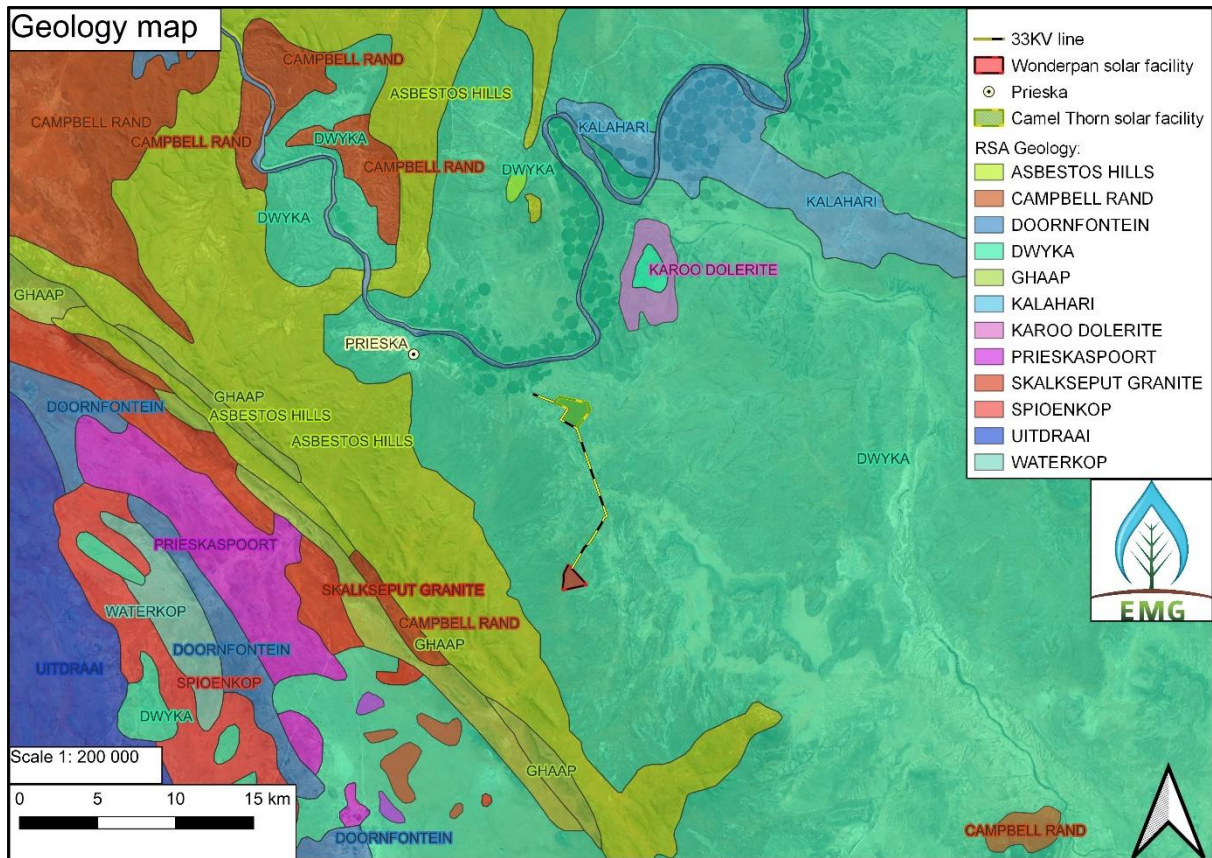


Figure 16 Overview map illustrating the underlying geologies associated with the proposed Wonderpan solar facility.

7.2. Biological characteristics:

7.2.1. Ecological:

7.2.1.1. Regional vegetation:

The Wonderpan solar facility is located near Prieska, Northern Cape Province, primarily dominated by Nama-Karoo associated vegetation. The Nama-Karoo Biome is an arid Biome emerging on the central plateau of the western half of South Africa. It occurs at altitudes ranging between 500 and 2000 m a.s.l., with the majority lying between 1000 and 1400 m a.s.l. The Nama-Karoo Biome is further subdivided into three bioregional classifications: (1) the Lower Karoo bioregion, (2) the Upper Karoo bioregion, and (3) the Bushmanland bioregion (Mucina and Rutherford, 2006). The proposed development traverses two broad-scaled bioregional vegetation classifications viz., Bushmanland (NKb) and Upper Karoo (NKu) Bioregions. A distinction between the Bushmanland bioregion and the other two bioregions in the region is based on climatic disparity, in which NKb features the highest annual rainfall variability, highest annual temperature and the overall lowest mean annual rainfall (Mucina and Rutherford, 2006). In contrast, the NKu features a more reliable annual rainfall predictability, higher mean annual rainfall, and the lowest mean annual temperature. The Wonderpan solar facility and a small portion of the proposed transmission line is located within the Bushmanland Arid Grassland (NKb 3) vegetation

type. The larger portion of the transmission line will be placed within the Northern Upper Karoo (NKu 3) vegetation type.

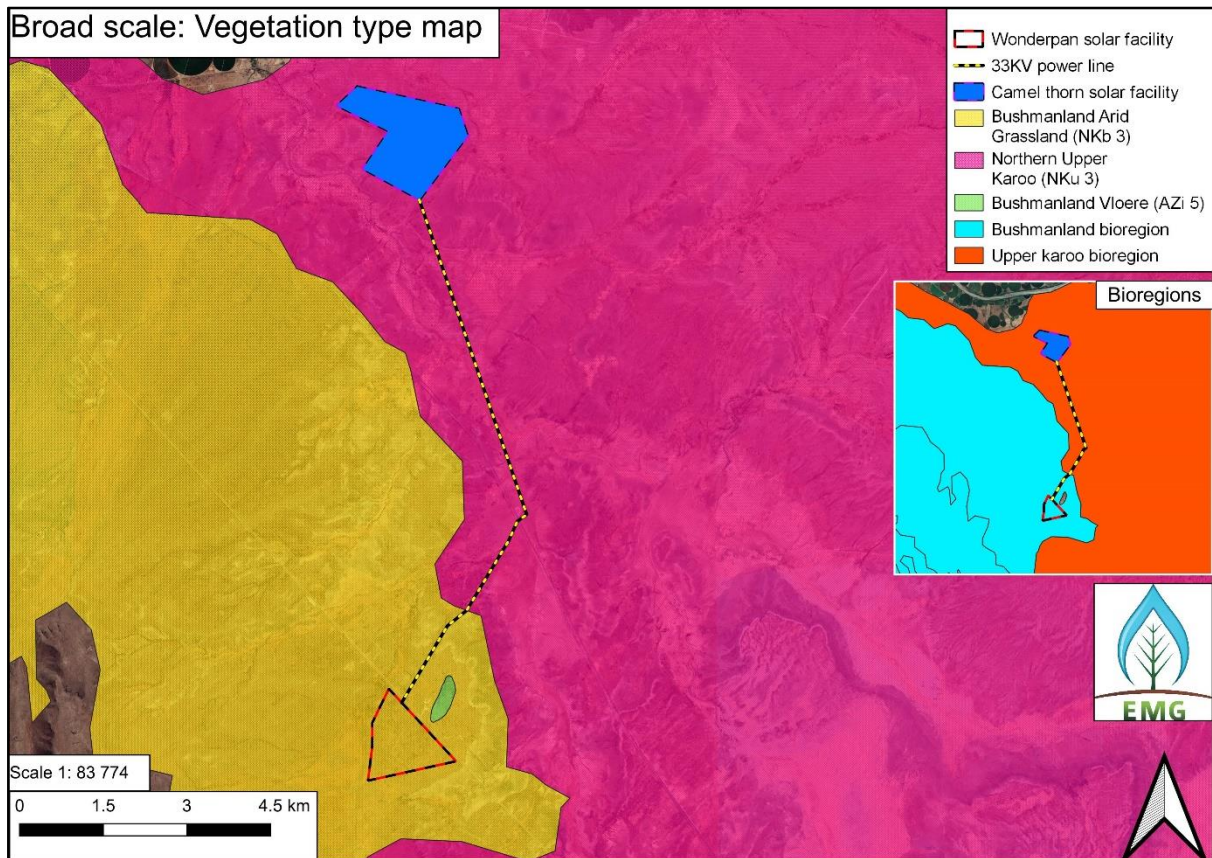


Figure 17 Broad scaled vegetation type map indicating the proposed Wonderpan solar facility and its associated powerline in relationship with regional vegetation types.

The Bushmanland Arid Grassland (NKb 3) is primarily distributed in the Northern Cape, where it spans the area around Aggenys and Springbok (west) and over to Prieska in the east (Mucina and Rutherford, 2006). The southern boundary of NKb 3's distribution is formed by intrusions of the Bushmanland Basin, whilst its northern distribution is somewhat fragmented and irregularly interrupted by Lower Gariep Broken Veld, Kalahari Karoid Shrubland and Gordonia Duenveld. NKb 3's landscape features vast open to irregular plains on a slightly sloping plateau supporting sparsely vegetated arid grasslands dominated by *Stipagrostis* species. In some areas, dwarf shrubs of *Caroxylon* spp. alters the overall landscape's physiognomy to resemble a grassy shrubland. In good rainfall years, the Bushmanland Arid Grassland often features a rich collection of annual herbs and forbs (Mucina and Rutherford, 2006). Important plant taxa, often associated with NKb 3 are listed in Appendix 3B (ecological report). The Bushmanland Arid Grassland is a poorly protected vegetation type (0.5% of its natural distribution is protected) and is listed in the National Biodiversity Assessment (NBA) 2018 as a vegetation type of least conservation concern (Skowno et al., 2019). Northern Upper Karoo (NKu 3) is primarily distributed in the Northern Cape and Free State Provinces (Mucina and Rutherford, 2006). NKu 3 stretches around the area of Swartkoppies and Meruche (north) down to Driefontein in the south.

Its western distribution covers the area around Carnarvon and Vanwyksvlei, while its eastern

7.2.1.2. On site vegetation:

The receiving environment associated with the Wonderpan solar facility can be physiognomically described as a semi-closed shrubland with a well-developed herbaceous stratum. The shrub stratum is almost entirely dominated by *Senegalia mellifera*, which makes traversing the landscape particularly challenging. The site's specific floral composition and vegetation structure is not a good representation of the Bushmanland Arid Grassland in which it is mapped (SANBI, 2006-2018); rather, the overall shrubland associated vegetation features strong associations with the Northern Upper Karoo, which dominates the area immediately north of the site. The receiving environment featured little evidence of significant habitat transformation, and the vegetation is considered natural for the NKu 3.

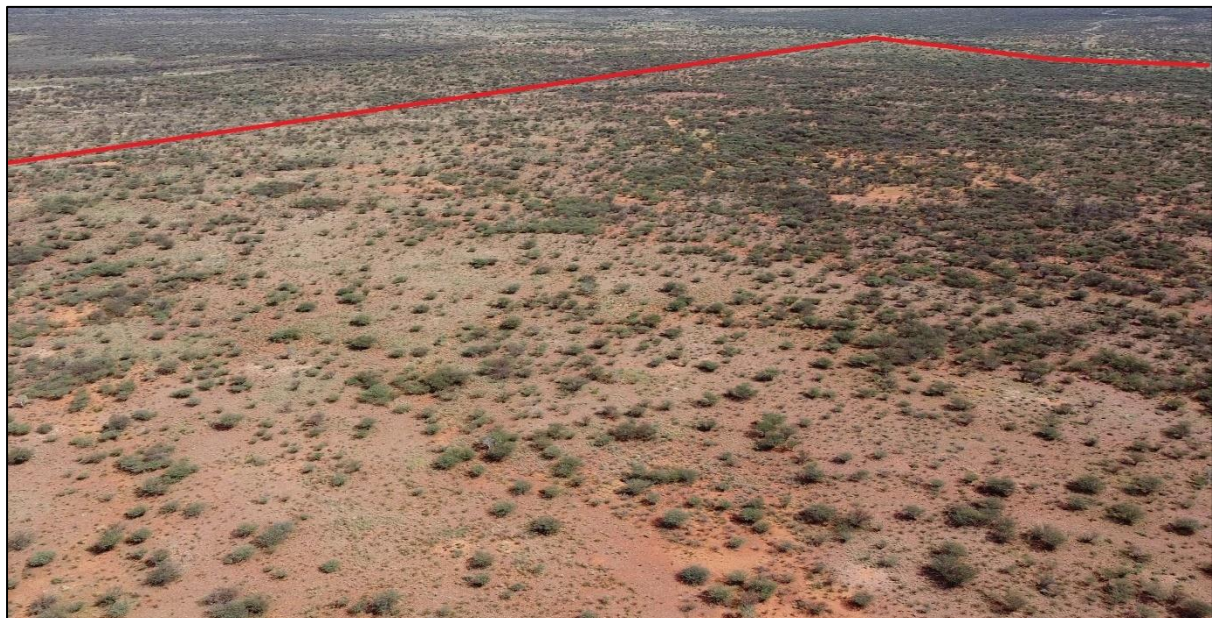


Figure 18 Aerial view of the proposed Wonderpan solar site. This perspective clearly illustrates the dominance of *Senegalia mellifera* (hook thorn) across the landscape.

7.2.1.3. Protected species:

As per the DFFE screening tool, the proposed 50MW solar facility will affect an area with a medium sensitivity. The medium sensitivity rating was attributed to the possible occurrence of one floral SCC i.e. *Tridentea virescens*. This species's status and criteria is indicated as Rare ([Victor and Dold, 2003](#)). The terrestrial ecological report yielded no observations of this species. Species protected under national and provincial legislation, identified on site are listed below:

Table 8 Protected plant species located within the proposed Wonderpan site. Species highlighted in **Orange** are regarded as species of conservation concern.

Family	Species	Red list status	Protection level
Aizoaceae	<i>Trianthema triquetrum</i>	NE	NCNCA (2009), Schedule 2

Aizoaceae	<i>Aizoon africanum</i> (<i>Galenia africana</i>)	LC	NCNCA (2009), Schedule 2
Aizoaceae	<i>Drosanthemum hispidum</i>	LC	NCNCA (2009), Schedule 2
Aizoaceae	<i>Tetragonia arbuscula</i>	LC	NCNCA (2009), Schedule 2
Amaryllidaceae	<i>Ammocharis coranica</i>	LC	NCNCA (2009), Schedule 2
Amaryllidaceae	<i>Nerine laticoma</i>	LC	NCNCA (2009), Schedule 2
Apocynaceae	<i>Hoodia gordonii</i>	DDD	NCNCA (2009), Schedule 1
Capparaceae	<i>Boscia albitrunca</i>	LC	NCNCA (2009), Schedule 2 NFA (1998)
Euphorbiaceae	<i>Euphorbia mauritanica</i>	LC	NCNCA (2009), Schedule 2
Iridaceae	<i>Moraea polystachya</i>	LC	NCNCA (2009), Schedule 2
Oxalidaceae	<i>Oxalis haedulipes</i>	LC	NCNCA (2009), Schedule 2
Oxalidaceae	<i>Oxalis lawsonii</i>	LC	NCNCA (2009), Schedule 2
Oxalidaceae	<i>Oxalis obliquifolia</i>	LC	NCNCA (2009), Schedule 2
Asphodelaceae	<i>Aloe claviflora</i>	LC	NCNCA (2009), Schedule 2
Asphodelaceae	<i>Bulbine cf. abyssinica</i>	LC	NCNCA (2009), Schedule 2

The ecological report identified one floral SCC (*Hoodia gordonii*) which occurs on the preferred site. *H. gordonii* is currently listed as being data deficient (DDD) and should be regarded as a species of conservation concern. Geotagging of all individuals were reported to be unfeasible as individuals of this species were irregularly distributed featuring areas with a higher occurrence density and other areas entirely devoid of individuals. Instead, it is estimated that the local *H. gordonii* population occurring on site ranges between 150 – 250 individuals.



Figure 19 (left) *Boscia albitrunca*, (right) *Hoodia gordonii*.

The site also featured a healthy population of *Boscia albitrunca*, a tree species protected under the National Forests Act (Act no.84 of 1998) (NFA, 1998). Population size for mature individuals was easily calculated via drone footage whereas the population size of saplings was estimated using the same methodology applied for *Hoodia gordonii*. Population estimates for *Boscia albitrunca* on the preferred site ranges between 300 – 500 individuals.

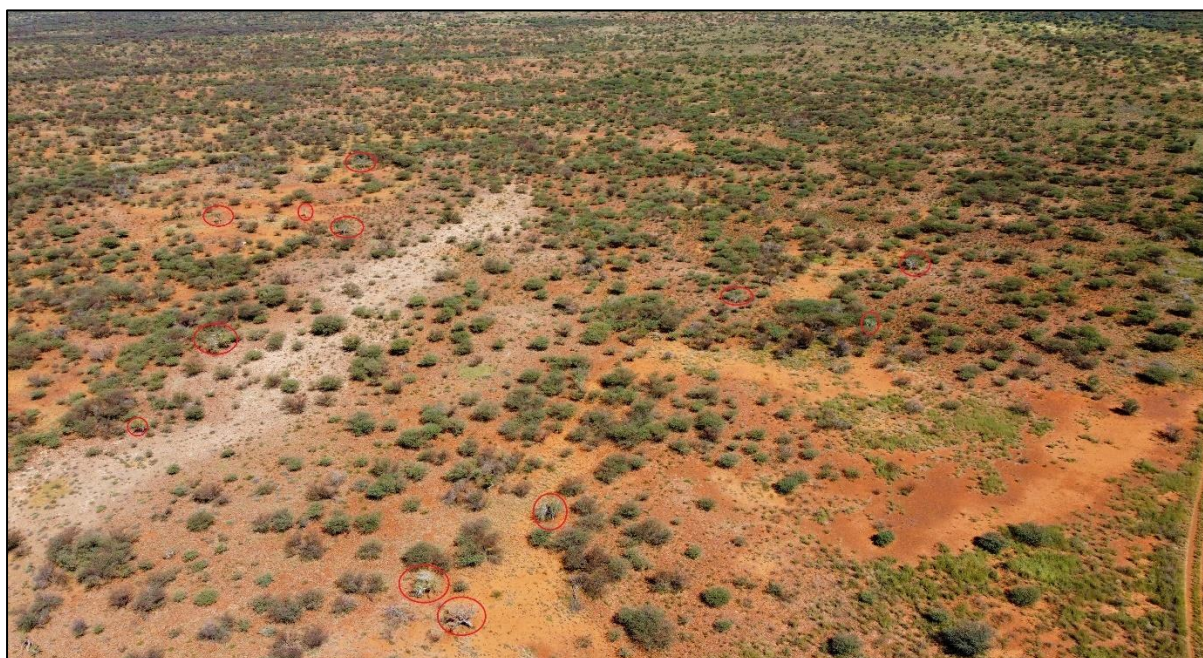


Figure 20 An aerial perspective of a portion of the site indicating *Boscia albitrunca* individuals (red circles).

7.3. Socio-economic characteristics:

This section describes the socio-economic profile for the region within which the proposed development will take place. The Socio-economic environment is defined within this section with specific reference to social, cultural and heritage related aspects.

7.3.1. Locality and setting:

The proposed Wonderpan solar facility is located within Ward 4 of the Siyathemba Local Municipality, in the Northern Cape Province (NCP) (**Figure 21**). The Siyathemba Municipality is classified as a Category B Municipality which was established in 2001, in agreement with the demarcation process (Siyathemba IDP, 2018/19). The municipality is located in the central eastern parts of the NCP, situated on the banks of the Orange River and falls under the Pixley Ka Seme District. Siyathemba Municipality was originally comprised of three entities, namely, Prieska, Niekerkshoop, and Marydale, although the area was extended after the demarcation to include Copperton.

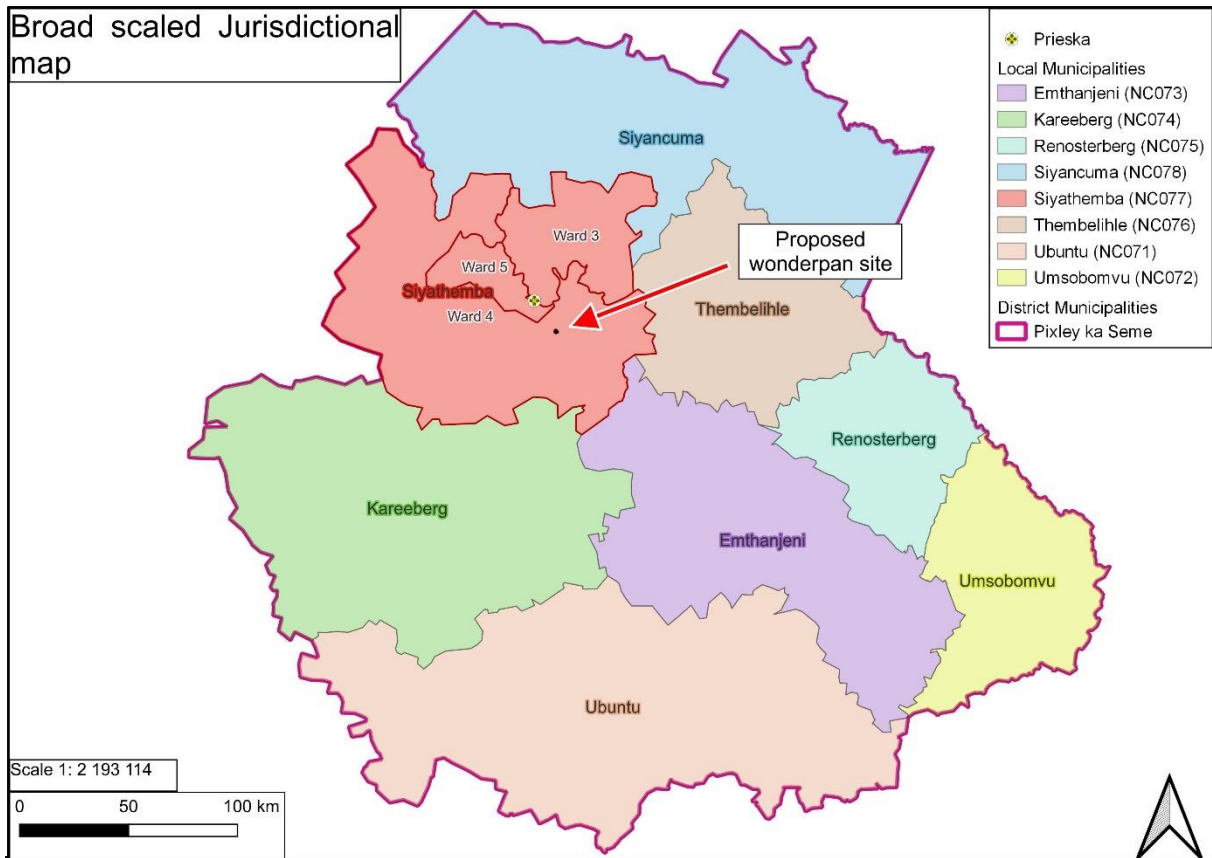


Figure 21 Map indicating the proposed Wonderpan site located within Ward 4 of the Siyathemba Local Municipality. Other municipalities located in the district is also indicated.

7.3.2. Municipal population statistics:

According to the Siyathemba IDP, (2018/19), the municipality is experiencing a declining population trend and currently has 23 075 people. There was a decline in the population of Siyathemba from just over 21,370 people in 2000 to approximately 21,330 in 2010. The local municipality's population contributes approximately 12% to the regional population and is the second largest local municipality concerning population size within the Pixley Ka Seme District Municipality. The Siyathemba Municipality is dominated by the Coloured population which represents 80% of the total population in the area, whereas the black population represents 12% and the white population 8%. The most dominate language is Afrikaans, which represents 78% of the population (Siyathemba IDP, 2018/19).

7.3.3. Age and gender composition:

According to Siyathemba IDP, (2018/19), the statistics of 2010 indicated slightly more females, 51.4%, than males, 48.6%, represented within the local municipality. The working age population was slightly more male dominant as male working age population in 2000 increased by approximately 928 men in absolute terms whereas the number of women only increased by about 282. There was also a decline in the proportion of children under the age of 15 by 6.7%, in other words the age profile of

the population is getting older with a decline from 14,700 children in 2000 to just above 12,000 children in 2010.

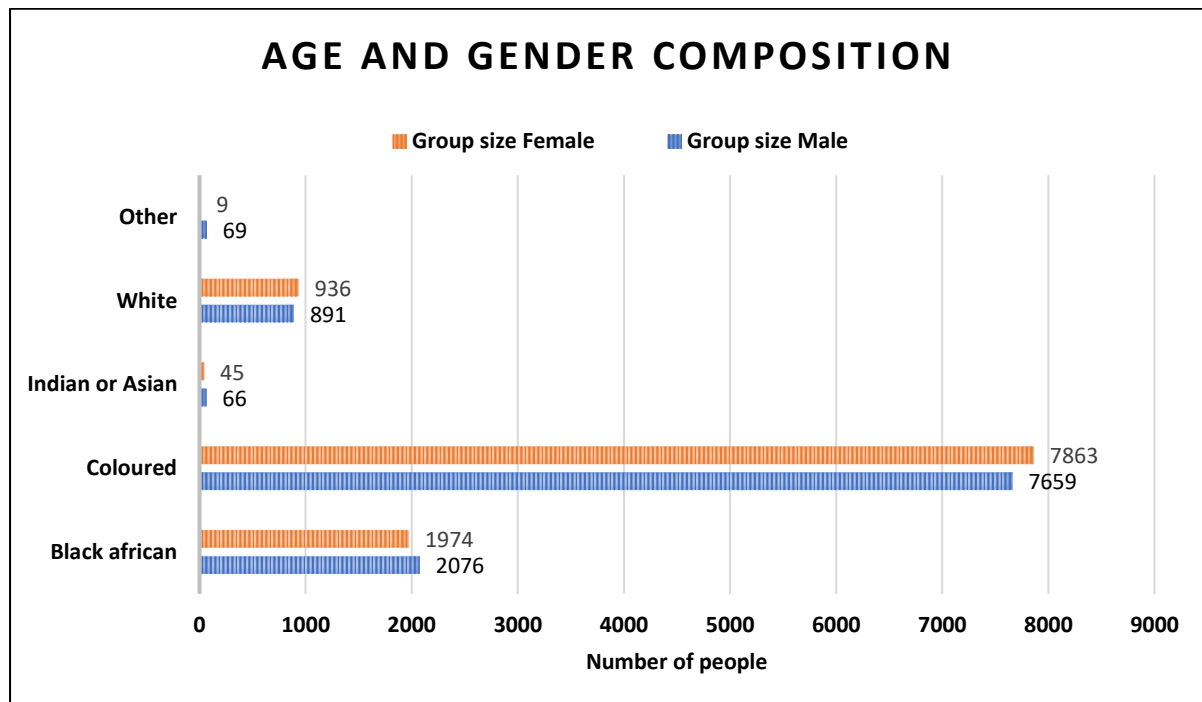


Figure 22 Graph indicating gender specific population size for various race groups within the local municipality.

7.3.4. Educational and employment demographics:

The Siyathemba Municipality experienced an increase in the number of learners that have had access to education between 1996 and 2001 and a 27.1% increase in learners that have matriculated. The persons of 20 years and older who have no schooling have decreased from 19.1% in 1996 to 8.7% in 2011. These statistics almost halved since 2001 as 19% of aged 20+ had no schooling decreased from 22% to 11%.

The working age group ranges between the ages of 15 to 64 which contributed to 64.4% of the population and have increased consistently, with regard to the other age groups, by approximately 1,210 people since 2000. Siyathemba IDP, (2018/19) states that there was a decline in the age dependency ratio from 0.7 in the year 2000 to 0.6 dependents in 2010 for each working age adult.

The unemployment rate of the Siyathemba Municipality has increased whilst the population consistently rises between the 2001 and 2011 censuses. Unemployment have reached up to 28% in 2011 and Youth unemployment reached up to 34% in 2011 (Siyathemba IDP, 2018/19). The most people unemployed are within the Emthanjeni, Siyacuma, Umsobomvu and Siyathemba municipalities which account for 20 153 (70,8%) of the unemployment within the district.

The proposed Wonderpan solar facility is located within Ward 4 of the Siyathemba Local Municipality, Northern Cape Province. According to the Siyathemba Local Municipality's Integrated Development Plan (IDP), the municipality is experiencing a declining population trend and currently sits at 23 075 people (Siyathemba IDP, 2018/19). The local municipality's population contributes approximately 12% to the regional population and is the second largest local municipality concerning population size within the Pixley Ka Seme District Municipality.

7.3.5. Economic characteristics:

The district contribution to the provincial GDP has consistently been the lowest over recent years with its contribution declining from 10,6% to 9,6% between 2003 and 2004. The economy is predominantly primary sector focused with manufacturing and tourism also contributing to the district economy. The economic sectors that contribute the most to the GDP of Pixley Ka Seme are agriculture, mining, tourism and manufacturing.

8. Specialist investigations

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include “(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.*”

8.1. Introduction:

The compilation of this document required niche-specific expertise, specifically in the fields of terrestrial and aquatic ecology, palaeontology, anthropology, and ornithology. Experts in these fields were appointed for the compilation of specialist reports which reported on the *in situ* condition of the receiving environment and the anticipated impacts associated with the proposed development. This section outlines the assessment methodology and findings of the various specialist studies conducted.

8.1.1. Avifaunal study – Mr. C van Rooyen:

The transformation of large areas of natural vegetation for photovoltaic renewable energy production will adversely affect the local and possibly regional avifaunal community. An avifaunal specialist was therefore appointed to conduct an avifaunal-specific impact assessment study, which intended to determine the severity of possible impacts generated by the proposed development. Refer to **Appendix D4** for the full specialist report.

8.1.1. Freshwater ecological assessment – conducted by Mr. D van Rensburg

Healthy functioning wetlands are vital for the longevity of any ecosystem. These aquatic systems sustain the immediate biodiversity and provide invaluable ecosystem services humans reap for free. The large scaled transformation of land for renewable energy production will to some degree, have adverse effects on aquatic ecosystems. A freshwater ecological assessment was conducted by a relevant specialist to assess the potential impacts generated by the proposed development on the surrounding aquatic ecosystems. The specialist's findings, recommendations and mitigations were used to finalise the proposed design layout. Refer to **Appendix D2** for the full specialist report.

8.1.2. Phase 1 heritage impact assessment - conducted by Dr. L Rossouw

Heritage resources in South Africa include a wide range of sites, features, objects, and beliefs. Section 27(18) of the National Heritage Resources Act (NHRA), No. 25 of 1999, states that no person may destroy, damage, deface, excavate, remove from its original position, subdivide or alter the planning status of any heritage site without a permit issued by the heritage resources authority which is responsible for the protection of the such site. As per Section 38 of the NHRA, a relevant specialist was

appointed to conduct a Heritage Impact Assessment (HIA). This specialist report aimed to:

- Identify and map possible heritage sites and occurrences using available resources;
- determine and assess the potential impacts of the proposed development on potential heritage resources;
- recommend mitigation measures to minimise potential impacts associated with the proposed development.

8.1.3. Terrestrial ecological assessment – conducted by Mr. R Nel

Ecological infrastructure refers to the natural functioning ecosystems which provide essential services to people. An ecosystem functions as a collective of components, living and non-living, interacting with one another (Wohlitz, 2016). Humans benefit from healthy functioning ecosystems in the utilisation of the services they provide. Ecosystem services include provisioning services (food, raw materials, freshwater), regulating services (climate and air quality, carbon sequestration, water purification), supporting services (habitats and genetic diversity), and cultural services (recreation, tourism and spiritual) (Costanza et al., 1997; Fy et al., 2015; Wohlitz, 2016). Ecosystems can only provide these services as long as they are in a healthy state. Habitat fragmentation, pollution, erosion and unsustainable harvest are only a few anthropogenic activities threatening healthy ecosystems. These anthropogenic activities destabilise ecosystems and will ultimately result in an ecological breakdown. Poorly functioning ecosystems cannot provide these ecosystem services, which ultimately raise the costs of living.

A terrestrial ecological assessment was conducted to assess the potential impacts generated by the proposed development. The terrestrial ecological assessment aimed to:

- Evaluate the present ecological functioning of the area within which the proposed development will take place;
- identify and assess possible environmental impacts that the proposed development could generate on the receiving environment;
- identify sensitive biological units which may possibly be affected by the proposed development.

Refer to **Appendix D1** for the full specialist report.

8.2. Summary of findings:

8.2.1. Avifaunal assessment:

The SABAP2 data, combined with the result of the two pre-construction monitoring surveys, indicate that a total of 179 bird species could potentially occur within the broader area – Appendix 1 (*in the specialist report*) provides a comprehensive list of all the species. Of these, 60 species are classified as solar priority species and 50 as powerline sensitive species. Nine (9) of these are South African Red List species. Of the solar priority species, 26 are likely to occur at the development area regularly. Of

the powerline sensitive species, 25 are likely to occur at the development area regularly. The table below contains a summarised assessment of the anticipated impacts.

Table 9 Avifaunal impact assessment summary. Refer to the specialist report for more details.

Nature of the Impact	Rating prior to mitigation	Rating post mitigation
Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure.	55 Medium	45 Medium
Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure.	65 High	44 Medium
Mortality of priority species due to collisions with solar panels.	18 Low	18 Low
Entrapment of large-bodied birds in the double perimeter fence.	36 Medium	20 Low
Mortality of priority species due to electrocution in the substations	36 Medium	10 Low
Mortality of priority species due to collisions with the 132kV powerline	36 Medium	20 Low
Mortality of priority species due to electrocution on the 132kV powerline	60 High	10 Low
Displacement of priority species due to disturbance associated with decommissioning of the PV plant and associated infrastructure.	55 Medium	45 Medium
Displacement of priority species due to disturbance associated with construction of the 132kV overhead power line.	44 Medium	18 Low
Average significance rating	45 Medium	25 Low

The avifaunal specialist made an additional comment on the recorded presence of other sensitive avifaunal elements. No sensitive avifaunal elements were recorded directly within the Wonderpan solar site and its project area of impact (PAOI). However, three avifaunal sensitive elements were recorded just outside the solar site and its associated infrastructure's PAOI. These sensitive elements are the Verreaux's Eagles, White-backed Vulture, and Lappet-faced Vulture. The specialist concluded that these sensitive birds were all recorded outside the PAOI and therefore do not require buffering.

The proposed Wonderpan Solar 1 PV Facility could have a range of potential pre-mitigation impacts on priority avifauna ranging from low to high, which is expected to be reduced to medium and low with appropriate mitigation measures. No fatal flaws

were discovered during the investigations. The proposed Project is supported provided that all mitigation measures are adhered to.

8.2.2. Freshwater ecological assessment:

The area contains a multitude of watercourses ranging from small indistinct drainage lines to larger seasonal streams. The site itself contains no watercourses but will border along the northwest on a small stream system. The powerline will also cross over several watercourses of which the Karabeeloo forms a large stream system with prominent wetland areas.

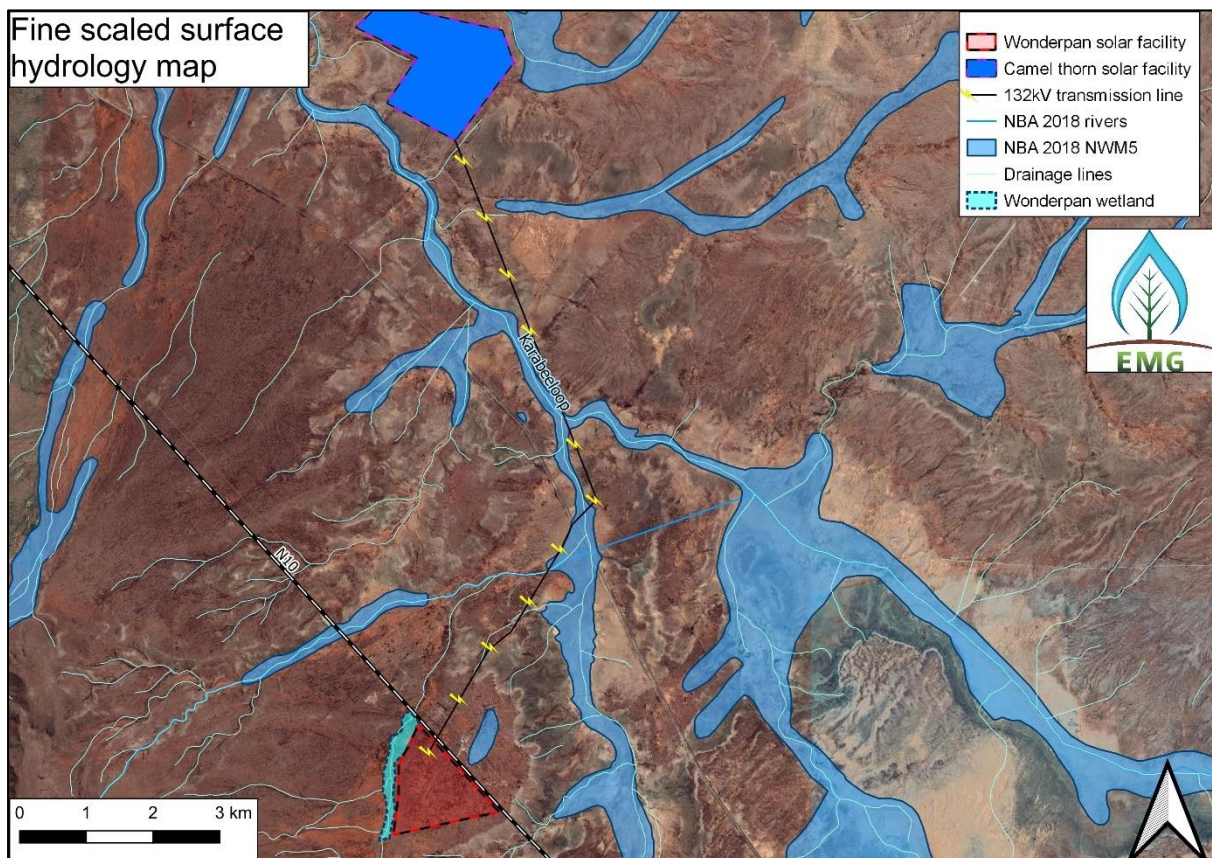


Figure 23 Fine scaled surface hydrology map illustrating the proposed Wonderpan solar site and its associated infrastructure. The proposed development's spatial relationship to various surface hydrological features is indicated on this map.

The surface water features in this area is dominated by the Karabeeloo which is a large stream system but will only be affected by the proposed grid connection powerline where this line will be constructed in the watercourse.

A smaller but still fairly significant tributary of the Karabeeloo occurs adjacent to the PV solar footprint and will most likely be affected by it (**Figure 23**). A few smaller drainage lines will also be crossed by the powerline and will also be assessed in overview. The Karabeeloo will most likely contain some surface water during the rainy season while the smaller tributary adjacent to the PV solar site and those being crossed by the powerline are all ephemeral, i.e. they will only flow during times of high

rainfall. Flood debris within these watercourses does however indicate that flash floods do occur from time to time. All of these watercourses contain prominent riparian vegetation while wetland areas are uncommon but still present in some areas. The Karabeeloo does however contain quite extensive wetland areas.

The affected stream, associated Karabeeloo and the smaller drainage lines are only affected by a few impacts and which are generally not large impacts. An Index of Habitat Integrity (IHI) was conducted for these watercourses within the study area (Refer to the specialist study for more details). The results of the IHI indicated that the stream system has an Instream IHI of **Category B: Largely Natural** and Riparian IHI of **Category B: Largely Natural**. This is considered accurate since the stream is located entirely in a natural area with few impacts. The EI&S of the floodplains associated with the ephemeral stream and associated tributaries has been rated as being **Moderate**.

The stream system situated adjacent to the solar development is still a largely natural system and therefore regarded to have a **high conservation** value. The stream system should therefore be completely excluded from the development and should not encroach into the riparian zone of the stream as delineated. The **stream** and associated **riparian zone** should also be regarded as **no-go areas** and no construction or operational activities including stockpiling, clearing, laydown areas, vehicle movement or any other associated activities should occur in or near this stream system. **As long as this is implemented successfully, the anticipated risk on the stream should remain low.** Furthermore, although it should not be directly affected, it may however still be indirectly affected by the development, most probably as a result of increased runoff from the panels and an increased sediment load. Erosion is therefore also probable. The development will therefore have to design and implement a comprehensive storm water management system in order to manage runoff and prevent erosion which will affect the stream system.

The powerline will cross several smaller watercourses perpendicularly which will minimise the disturbance footprint. The powerline alignment should also endeavour to place pylons on either side of the drainage lines and not within the channel as this will increase erosion. Given the small size of these drainage lines and the low anticipated impact of the powerline, the **risk is anticipated to remain low.**

According to the current powerline alignment a large portion of it (Approximately 3 km section) will be situated within the main channel of the Karabeeloo and as can be expected this will result in significant disturbance of the stream. Construction and pylons in the main channel is also likely to cause significant scouring and erosion of the stream. As a result, this will be regarded as a moderate risk and will consequently require significant mitigation. Re-alignment of the powerline should also be considered which should aim to perpendicularly cross the Karabeeloo only once and should not be located parallel within the main channel. This will minimise the anticipated impacts of the powerline and should such an alignment be taken the risk is anticipated to be considerably lower. This is also subject to the powerline avoiding the placement of pylons directly within the main channel of this watercourse.

The previous paragraph was extracted from the wetland delineation report and was instrumental in motivating for a slight layout alteration. Since then, the proposed 132kV

transmission line's layout was slightly changed as to perpendicularly cross the Karabeeloo in one area. This layout alteration results in a **significant decrease** in **overall environmental impact** on the mentioned river system. See **Figure 24** below for reference.



Figure 24 Overview of layout alterations regarding the 132kV transmission line. The new powerline layout (black line with lightning bolts) perpendicularly crosses the Karabeeloo in one location and does not run within the river system as compared to the previous layout (broken red line).

8.2.3. Phase 1 heritage impact assessment:

The study area is capped by bedrock-derived surface gravels, surface limestones (T-Qc), occasional pockets of well-developed Quaternary sand (Qs) and shallow alluvium from the Karabeeloo, resting on Mbizane Formation outcrop.



Figure 25 The study area is primarily capped by bedrock- derived surface gravels (right) and surface limestones (left).

No fossils or potential fossil exposures were observed within superficial sediments, including exposures from an old borrow pit situated next to the highway. Low-density finds of locally derived and mostly isolated and weathered stone tools were observed, mapped and recorded within the two footprints. The sporadic evidence of Stone Age/Prehistoric presence is considered minor in terms of overall impact. Further, there is **no evidence** of *in situ* Stone Age archaeological material, either as capped assemblages or distributed as intact surface scatters on the landscape within the boundaries of the proposed development footprints. Low density (<1/100m) isolated finds were observed as locally derived surface scatters.



Figure 26 Examples of low-density scatters recorded during the survey: high-backed blade with secondary retouch and small core on banded ironstone (right) and ventral aspect of convergent flake-blade and scraper (left).

There are no indications of rock art (engravings), stonewalled structures or historically significant buildings older than 60 years, or aboveground evidence of graves within the boundary of the site. Both solar and powerline footprints are assigned an archaeological site rating of **Generally Protected C (Low significance)**, but it is noted that the potential occurrence of isolated and unmarked graves, subsurface burial cairns or intact subsurface archaeological finds not recorded during this survey can never be excluded. Therefore, it is advised that the relevant heritage authority (SAHRA) and a qualified archaeologist be informed immediately in the event of potential archaeological exposure during the construction phase of the proposed project (Chance Find Protocol attached).

8.2.4. Terrestrial ecological assessment:

Three relatively homogenous Vegetation Units (VUs) were identified within the Wonderpan Solar Facility's proposed development boundary. These units were delineated based on overall floral compositional homogeneity. On a broader scale, the site's vegetation resembles a semi-closed shrubland with a well-developed medium-low shrub stratum. The sub-shrub stratum was very well developed and featured an

unexpected high species richness of shrubs, bulbs, and forbs. The high species diversity of the mentioned vegetative growth forms is assumed to be attributed to the ample rainfall received in the area this year.

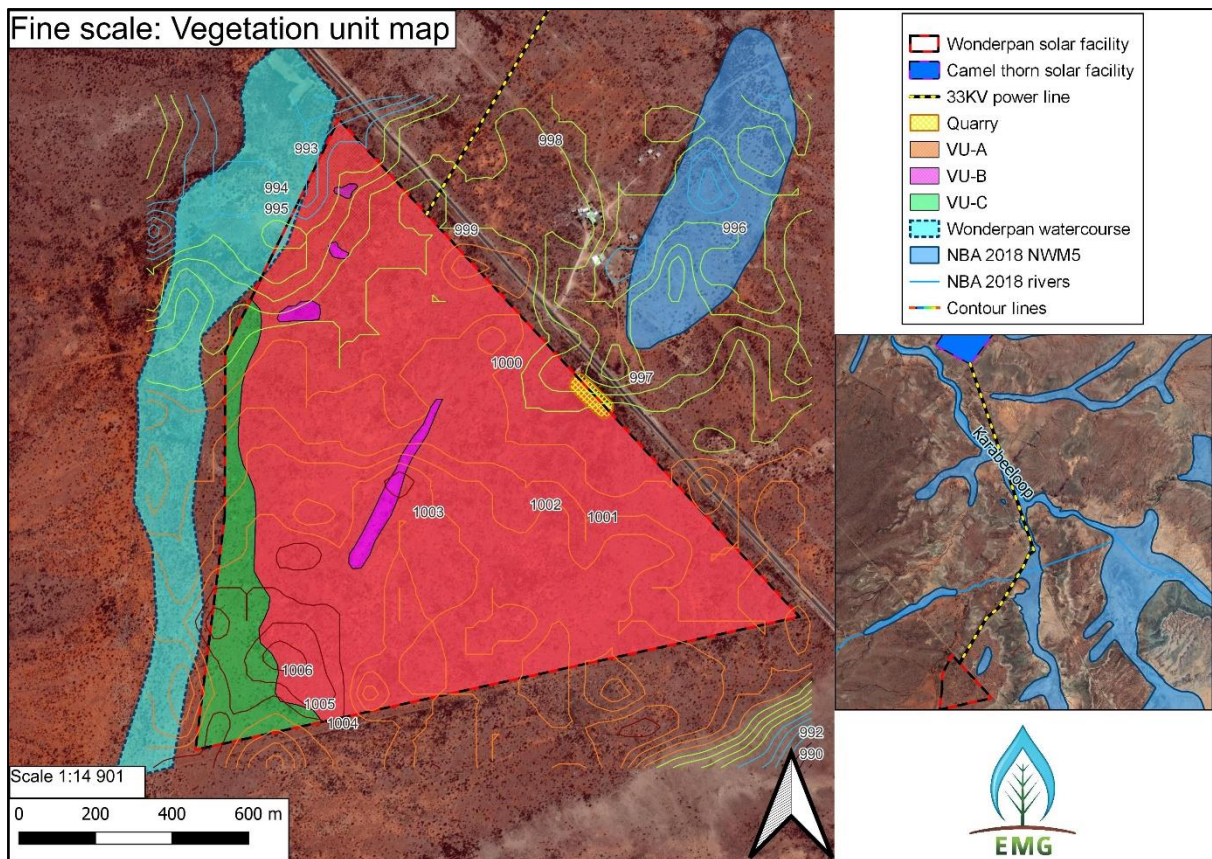


Figure 27 Vegetation unit map indicating the various relatively homogenous vegetation units identified by the terrestrial ecologist.

Several provincially protected flora and one plant species of conservation concern (*Hoodia gordonii*) were recorded on site (**Table 8**). A literature study also revealed the possible occurrence of another floral SCC (*H. officinalis*); however, this species was not recorded on site. The Unit sensitivity analysis concluded that all **VUs should be regarded as moderately sensitive units**. Mitigation measures, especially concerning the possible occurrence and known observations of floral SCCs should be strongly enforced and overseen by a suitable specialist.

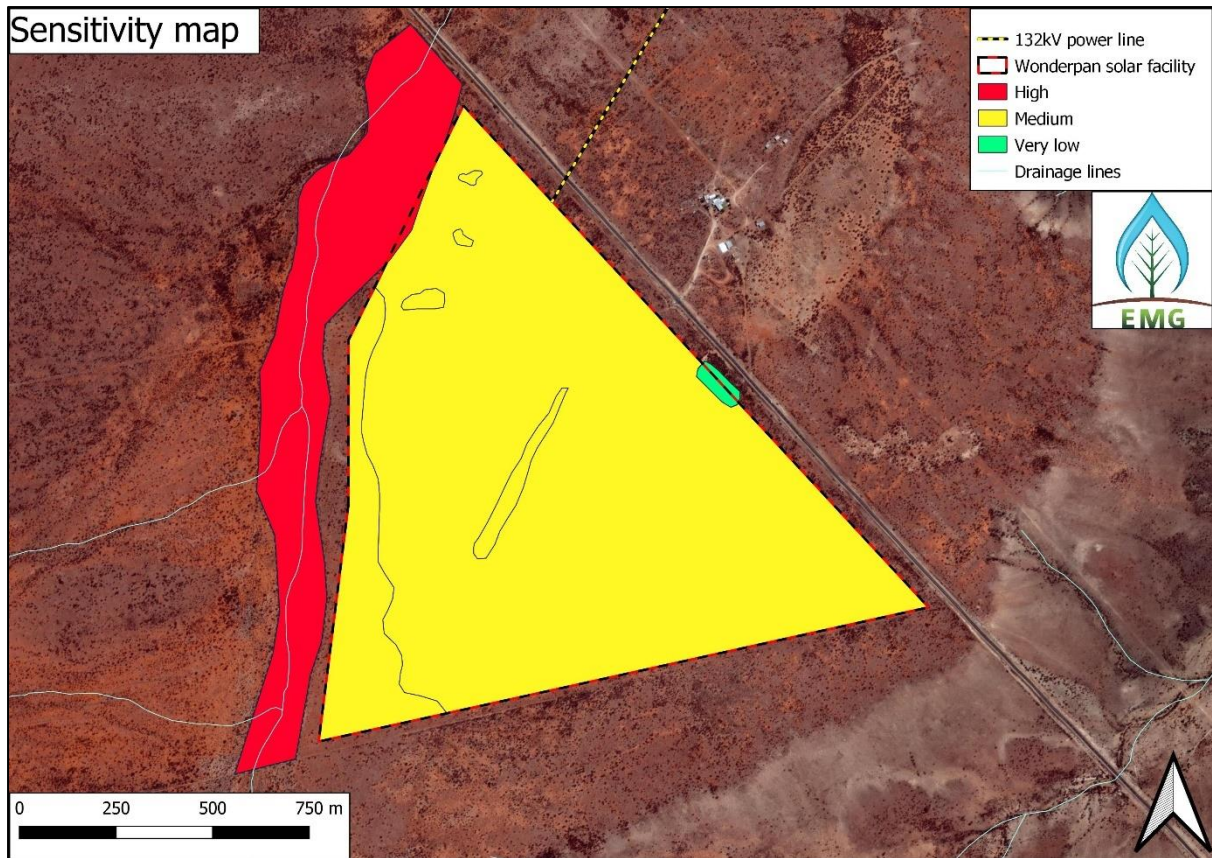


Figure 28 Terrestrial ecological sensitivity map. The DWS drainage line data is also indicated.

The overall anticipated environmental impact evaluation has indicated that the development will generate a **moderate** and **low** environmental impact for the **construction and operational phases respectively**. A moderate environmental impact is primarily attributed to the clearing nature of solar developments. PV solar developments usually result in clearing an entire area's vegetation and consequently habitat for flora and fauna. It's important to emphasise that the impact generated through the facility's operational phase was calculated at the higher threshold of the low impact category. Any deviation from the proposed development plan may significantly influence this score. The developer and the appointed contractor should remain mindful of low-impact developmental practices. The recommended mitigation measures should be strongly enforced. The possible occurrence of several provincially protected flora and possibly two flora SCCs significantly contributed to the anticipated impact scores. **Development may still be favourably considered, but only if all mitigation measures are followed.**

9. Impact assessment and mitigations

According to Appendix 3, Section 3 (1), of the 2014 EIA Regulations (as amended in 2017), an Environmental Impact Assessment Report must include

“(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:

- (v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts—
 - (aa) can be reversed;*
 - (bb) may cause irreplaceable loss of resources; and*
 - (cc) can be avoided, managed or mitigated;**
- (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;*
- (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*
- (viii) the possible mitigation measures that could be applied and level of residual risk.*
- (i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—
 - (i) a description of all environmental issues and risks that were identified during the environmental impact assessment 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.”**

The impacts arising from the proposed development’s design, construction, operation, and decommissioning phases have been assessed. A summary of the findings are presented in this chapter. Refer to **Appendix F** for an in-depth methodology, rationale, impacts and mitigations description.

9.1. Design and planning phase:

Activities associated with the design and pre-construction phase are primarily restricted to planning and design around the proposed development. As such, this

phase relies largely upon on-site inspections and desktop assessments. Therefore, the impacts limited to this phase are considered insignificant.

9.2. Construction phase:

Impacts limited within the construction phase have far more significant consequences compared to the design and planning phase of the proposed development. During this phase, the environmental impacts occur as both direct and indirect impacts associated with the disturbance of a naturally functioning ecosystem. Any disruption, whether small/concentrated or large/expansive, will adversely influence a naturally functioning ecosystem. The severity and consequences depend on the type of development, the extent of disturbance, the severity and the environment's ability to recover from such disruptions.

The construction/ development of renewable PV facilities typically requires the displacement of large areas. Clearance activities such as these could seriously impact the environment and consequently hamper the environment's ability to produce invaluable ecosystem services, which humans reap for free. As such, the impact assessment contained within this report diligently assessed all relevant and possible environmental impacts which may be generated due to the construction of the proposed solar site.

9.3. Operational phase:

During the operational phase, much of the directly affected environment has already been transformed. As such direct environmental impacts are likely to negatively impact energy transfers between biota. Such interferences include increased road collisions (due to increased human activity), light pollution, obstruction of natural migration behaviour, soil erosion etc. Indirect positive environmental impacts are derived from the solar plant supplying green energy to the chemical plant rather than the plant's alternative of utilising the ESKOM grid for its electrical supply (refer to the no-go alternative discussion). The operational phase of the proposed solar site provides an undoubtedly positive socio-economic benefit. Positive socio-economic benefits include job creation, the positive feedback luring in investment opportunities, and local economic boost through the REIPP socio-economic involvement programme.

9.4. Decommissioning phase:

It is unlikely that the proposed solar plant and its associated infrastructure will be decommissioned as it is envisaged to continue for the foreseeable future. In the unlikely event of decommissioning, the impacts would be expected to be of similar degree to the construction phase, albeit likely of lower intensity and consequence.

9.5. Summary of impacts:

The table below summarises the assessed impacts and their significance pre and post-mitigation. Refer to the full environmental impact assessment for more details.

Table 10 Environmental impact assessment summary.

Impact type	Phase	Status	Significance pre mitigation	Significance post mitigation
Aspect: Ecological impacts				
Habitat loss <i>Loss of habitat and species diversity as a result of construction and the removal natural elements.</i>	Construction	Negative	Medium-high (20)	Medium (12)
	Operation	N/A	N/A	N/A
Invasive plant species <i>Proliferation of exotic plant species due to environmental disturbance.</i>	Construction	Negative	Low-medium (6)	Low (2)
	Operation	Negative	Low-medium (6)	Low (2)
Loss of floral and faunal SCC <i>The loss of floral and faunal species of conservation concern as a result of the proposed development.</i>	Construction	Negative	Medium-high (16)	Low-medium (9)
	Operation	Negative	Medium (12)	Low-medium (6)
Loss of ecological support areas (ESA) <i>The loss of ESA areas due to the proposed development.</i>	Construction	Negative	Medium (12)	Low-medium (8)
	Operation	N/A	N/A	N/A
Loss of avifaunal priority species <i>The displacement or loss of priority avifaunal species due to the proposed development</i>	Construction	Negative	Medium (12)	Low-medium (6)
	Operation	Negative	Low-medium (9)	Low (4)
Cumulative impacts <i>The cumulative impact on the receiving environment's ecology regarding the proposed development total footprint assessed in</i>	Construction	Negative	Low-medium (10)	Low-medium (8)
	Operation	N/A	N/A	N/A

<i>conjunction with other renewable developments in a 30 km radius.</i>				
Aspect: Heritage impacts				
The loss of artefacts and fossils <i>Destruction of any archaeological artefacts or fossils.</i>	Construction	Negative	Low (4)	Low (1)
	Operation	Negative	Low (4)	Low (1)
Aspect: Water resource impacts				
Surface and ground water quality <i>The pollution of surface and groundwater resources due to the proposed development.</i>	Construction	Negative	Medium (12)	Low-medium (6)
	Operation	Negative	Low-medium (6)	Low(4)
Aspect: Aesthetics				
Construction of infrastructure <i>The alteration of landscape appreciation, visual deterioration and visual impacts from the solar array.</i>	Construction	Negative	Low-medium (8)	Low-medium (6)
	Operation	Negative	Medium (12)	Low-medium (9)
Aspect: Air quality and noise				
Air quality <i>Additional air pollution introduced due to the mobilisation of vehicles and land clearance.</i>	Construction	Negative	Low-medium (9)	Low (4)
	Operation	Positive	Medium (15)	N/A
Noise and vibrations <i>Sound pollution through the operations of vehicles and equipment.</i>	Construction	Negative	Low-medium (9)	Low (4)
	Operation	N/A	N/A	N/A
Aspect: Socio-economic impacts				
Job creation and the influx of job seekers <i>Impacts associated with the need for locally appointed construction/ operation workers.</i>	Construction	Positive	Medium (15)	N/A
	Operation	Positive	Medium (12)	NA

Aspect: Waste impacts				
General solid waste <i>General solid waste pollution.</i>	Construction	Negative	Low-medium (9)	Low (4)
	Operation	Negative	Low-medium (9)	Low (4)

9.6. No go alternative

The no-go alternative assumes that the proposed project will not go ahead i.e. it is the option of not constructing the proposed development. This alternative would result in no environmental impacts on the site or surrounding local area. It provides the baseline against which other alternatives were compared. The following implications will occur if the “no go” alternative is implemented:

- No benefits will be derived from the implementation of an additional land-use.
- The chemical plant, which’s already authorised by the DAERL will opt to receive its electricity from ESKOM’s grid.
- This will further enforce more strain on the already outdated electrical grid.
- Considering the national grid is largely supplied by non-renewable energy production facilities (90% coal based), the no go option will indirectly result in more carbon dioxide emissions.
- The authorisation refusal of this solar plant will indirectly create a precedence which will deter future renewable energy developments in the area.
- Socio-economic benefits such as job creation, skills development, and local economic growth will be lost.
- Local economic benefits arising through the REIPPP will not be realised.

Besides the above mentioned, the following benefits might occur if the no go alternative is implemented:

- No vegetation will be removed and or disturbed.
- The ecology will remain largely intact.
- No change/ alteration to the existing landscape.
- No additional waste will end up in landfill sites.

While the no go alternative will not generate any negative environmental impacts, it will surely remove any socio-economic benefit the local community will receive. The no go alternative will also not aid the government in addressing climate change, reaching its greenhouse gas emission targets, and will further place more strain on the existing electrical grid. Therefore, the **no go alternative is not considered the preferred alternative.**






10. Recommendations and Opinion of the EAP

This draft EIA has comprehensively assessed the potential environmental impacts associated with the proposed Wonderpan Solar Facility. These impacts were identified and evaluated by the specialist team and the EAP. This chapter contains the main conclusions and recommendations derived from the EIA process. The compilation of this report was guided by the expertise of various specialists, inputs from the public participation process, and the EAP's experience.

The introduction of alternative energy sources into South Africa's energy mix is vital. Consequently, the government's support for projects such as the Wonderpan solar facility, which falls within the greater scope of works for the Prieska Power Reserve Project, is demonstrated via support letters from Infrastructure South Africa (ISA). Refer to **Appendix L** for the letter of support signed by the head of investment and infrastructure from the presidency's office.

The approval of this project will coincide with the proponent's vision of developing a decentralised renewable energy network in the Prieska region. Cumulatively, these decentralised renewable power plants will feed into the chemical plant, which produces alternative energy resources such as ammonia and hydrogen.

The Wonderpan Solar Facility's construction and operation present several notable benefits to the local community and the larger area around Prieska. These benefits include:

-  Green development incentives such as the proposed project sustain a positive momentum for future renewable developments and investments to take precedence.
-  The construction and operational phases of this facility present ample job opportunities and significant potential for economic growth.
-  Regional economic growth through utilising the REIPP enterprise and socio-economic development contributions.
-  Indirect contribution² towards relieving additional usage stress off the ESKOM grid.
-  Indirect contribution towards aiding the country to meet its carbon emission targets.

Besides the apparent benefits arising from the Wonderpan Solar facility's operation, several adverse environmental impacts were also identified. The assessed

² The alleviation of potential electrical strain from the ESKOM grid is derived from the Chemical plant's renewable energy supply feed. Considering that the chemical plant is already authorised by the DAERL (Reff NC/BA/09/PIX/SIY/PRI1/2022) if the proposed renewable energy plants do not receive the same favourable outcome, the chemical plant would have to receive its electrical supply from the ESKOM grid. Provided the existing outdated electrical infrastructure of the country, this energy supply alternative is not nearly comparable in terms of the benefits arising from the plant's power supply when derived from renewable sources.






environmental themes' impacts range from insignificant to moderately high, all of which can, with adequate mitigation, be lowered. Refer to the summary of impacts in the previous chapter for reference.

Additional consideration:

During the decision-making phase, the EAP encourages the competent authority to weigh in the following information as part of the larger scope of works associated with the Prieska Power Reserve Hub:

As indicated in the project background, the Wonderpan Solar facility forms part of two other solar PV developments, a wind farm, and the chemical plant. These renewable energy developments each play a vital role in realising the larger overarching project. The DAERL and DFFE, respectively, have already authorised both the townlands and camel thorn solar facilities. The Prieska Power Reserve's chemical plant was already authorised by the DAERL.

To conclude, the EAP recommends the competent authority to favourably consider the proposed development based on the provided information and subject to the following conditions, which ensure the underlying principles of Integrated Environmental Management be upheld:

-  Implementation of the proposed mitigation measures set out in the EMPr.
-  Implementation of the proposed mitigation measures set out in the specialist studies.
-  The proposed solar facility must comply with all relevant national environmental laws and regulations.
-  All actions and tasks indicated in the EMPr may not be neglected and a copy of the EMPr should be made available onsite at all times.
-  Applicant/ appointed environmental representative to liaise with the DFFE and the DAERL regarding the acquisition for the issuing of Forest Act License and Biodiversity Permit.

11. Appendices

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Appendix B	Site photographs
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Appendix D2	Aquatic ecological report
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