




UPGRADE ENERGY (PTY) LTD

**Proposed Development of the Leeumax
Solar Photovoltaic (PV) Energy Facility
and Associated Infrastructure near
Leeudoringstad in the North West
Province**

**Draft Environmental Management
Programme (EMPr)**

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LEEUMAX SOLAR PV ENERGY FACILITY

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

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LEEUMAX PV SOLAR ENERGY FACILITY

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

1. INTRODUCTION

Upgrade Energy (Pty) Ltd (hereafter referred to as Upgrade Energy) proposes the development of a Solar Photovoltaic (PV) plant and associated infrastructures on a site located approximately 6km north-east of the town of Leeudoringstad in the Maquassi Hills Local Municipality, within the Dr Kenneth Kaunda District Municipality in the North West Province (**Figure 1**).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the required Draft Environmental Management Programme (EMPr) (in line with the National Environmental Management Act, 1998 (Act 107 of 1998)) for the proposed development of the Leeumax SEF and associated grid infrastructure.

The proposed development will comprise several arrays of PV panels, and associated infrastructure. The associated infrastructure would include, but not be limited to, additional internal access roads, one (1) switching substation, one (1) permanent guard house and one (1) temporary building zone. The total capacity of the Solar PV plant will have a contracted capacity of up to +/- 15MWac and will be known as the Leeumax Solar PV Facility.

This EMPr provides a set of guidelines for the environmental management of all works executed by the Developer, Engineer, Contractor and Sub-contractor/s to have a minimum impact on the environment in accordance with all relevant legislation, policies and standards. In this context, it should be viewed as a dynamic or “living” document which may require updating or revision during the life-cycle of the development to address new circumstances as the need arises. It is essentially, a written plan of how the environment is to be managed in practical and achievable terms. The EMPr shall be deemed to have contractual standing on the developer and contractors onsite.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in this report by the Developer and the Contractor and Sub-contractors. It is further assumed that compliance with the EMPr will be monitored and audited on a regular basis as set out in the EMPr and contractual clauses.

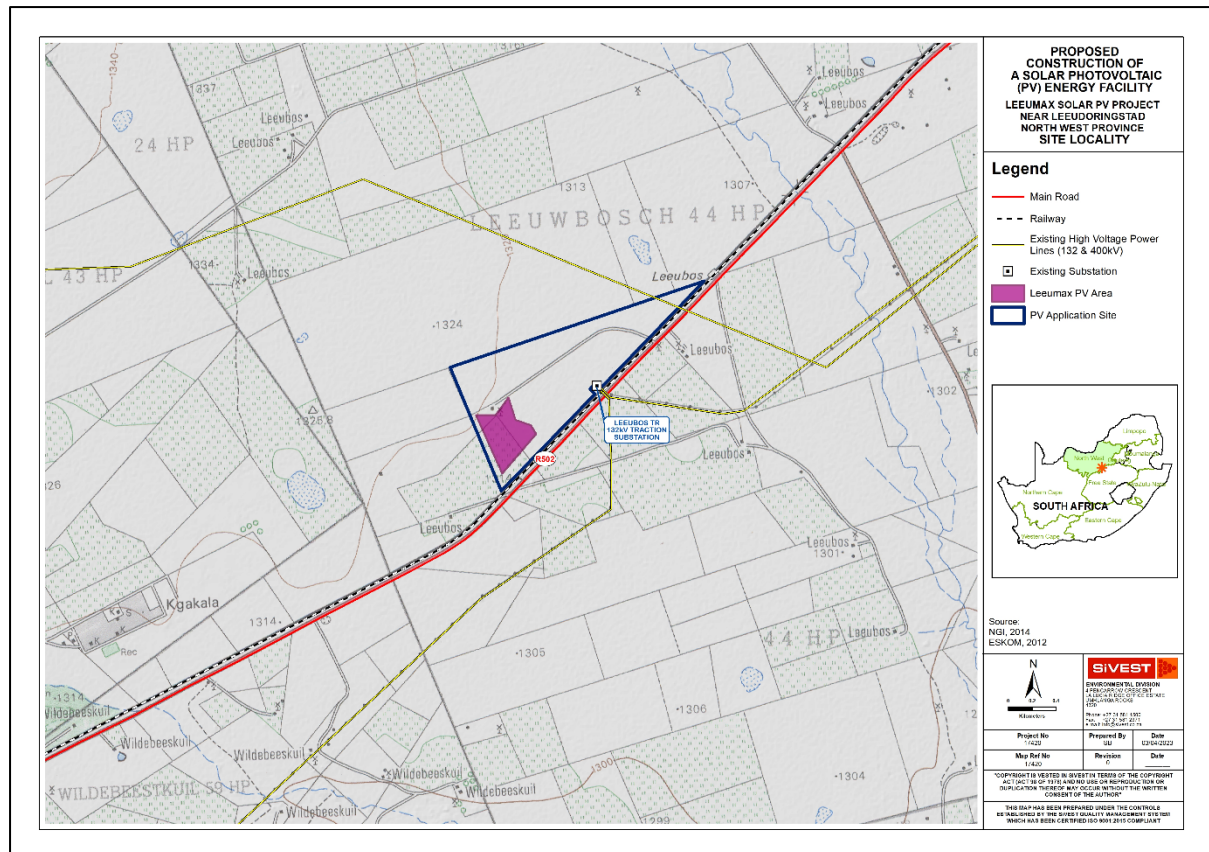


Figure 1: Site Locality

1.1 Content Requirements for an Environmental Management Programme (EMPr)

The content requirements for an EMPr (as provided in Appendix 4 of the EIA Regulations 2014, as amended), as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

Table 1: Content requirements for a EMPr

2014 EIA Regulations, as amended.	Requirements for an EMPr	Location in this EMPr
Appendix 4, Section 1. (1)	An EMPr must comply with section 24N of the Act and include -	Refer to relevant sections below:
Appendix 4, Section 1 (a)	Details of –	-
	(i) The EAP who prepared the EMPr; and	Section 3.1 Section 3.2
	(ii) The expertise of that EAP to prepare an EMPr, including a curriculum vitae.	Section 3.2
Appendix 1, Section 3 (b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 4.1
Appendix 4, Section 1 (c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Figure 1 and Figure 5

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2014 EIA Regulations, as amended.	Requirements for an EMPr	Location in this EMPr
Appendix 4, Section 1 (d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Section 9
Appendix 4, Section 3 (f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to — (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 9
Appendix 4, Section 3 (g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 8 Section 9
Appendix 4, Section 3 (j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 9
Appendix 4, Section 3 (k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 9
Appendix 4, Section 3 (l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 9
Appendix 4, Section 3 (m)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 11
Appendix 4, Section 3 (n)	any specific information that may be required by the competent authority.	Section 7.3 Section 10
Appendix 4 Section 2	Where a government notice gazetted by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Generic EMPr has been compiled and included.

2. DETAILS OF APPLICANT

2.1 Name and contact details of the Applicant

Name and contact details of Applicant:

Table 2: Name and contact details of the applicant

Business Name of Applicant	Upgrade Energy (Pty) Ltd
Physical Address	8 Farm Road, Fisherhaven, Western Cape, 7200
Postal Address	P.O. Box 1171, Umhlanga Rocks
Postal Code	4320
Telephone	083 465 9825
Fax	086 600 8622
Email	emil@megatrade.co.za

3. DETAILS AND EXPERTISE OF THE EAP

3.1 Name and contact details of the Environmental Assessment Practitioner (EAP)

The table below provides the name and contact details of the Lead EAP for the project:

Table 3: Name and contact details of the Environmental Consultant who prepared the report

Business Name of EAP	SIVEST SA (PTY) Ltd
Name of Lead EAP	Michelle Nevette
Physical Address	4 Pencarrow Crescent, La Lucia Ridge Office Estate
Postal Address	PO Box 1899, Umhlanga Rocks
Postal Code	4320
Telephone	031 581 1500
Fax	031 566 2371
Email	michellen@sivest.co.za

3.2 Names and expertise of the EAPs

The table below provides the names of the people who prepared this report and their expertise:

Table 4: Names and details of the expertise of the EAP's involved in the preparation of this report

Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
Michelle Nevette (<i>Cert.Sci.Nat.</i>)	MEnvMgt. (Environmental Management)	SACNASP Registration No. 120356 EAPASA Registration No. 2019/1560 IAIAsa	19

Name of representative of the EAP	Educational Qualifications	Professional Affiliations	Experience (years)
Luvanya Naidoo (Pr.Sci.Nat)	BSc Hons Environmental Monitoring & Modelling	SACNASP Registration No. 126107 EAPASA Registration No. 2019/1404 IAIA	12

CV's of SiVEST personnel and EAP declaration are attached in **Appendix A**.

3.3 Names and expertise of the specialists

Specialist studies have been conducted in terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) And 44 of the NEMA when applying for EA, as well as the EIA Regulations, 2014 (as amended). The table below provides the names of the specialists involved in the project:

Table 5: Names of specialists involved in the project

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
SLR Consulting (South Africa) (Pty) Ltd	Kerry Schwartz	Visual Impact Assessment	BA (Geography) GTc GISc 1187	25
Johann Lanz Consulting	Johann Lanz	Agriculture and Soils Assessment	M.Sc. (Environmental Geochemistry)	24
Chris Van Rooyen Consulting	Chris van Rooyen	Avifaunal Impact Assessment	BA LLB	22
	Albert Froneman		MSc Conservation	22
Banzai Environmental (Pty) Ltd	Elize Butler	Palaeontological Impact Assessment	MSc (cum laude) Zoology specialising in Palaeontology Palaeontological Society of South Africa	25
PGS Heritage (Pty) Ltd	Wouter Fourie	Heritage Impact Assessment	Professional Archaeologist registered ASAPA, CRM accreditation (ASAPA) Professional Heritage Practitioner (APHP- Western Cape).	21
Eco Assist Environmental Consulting	Wayne Jackson	Wetland Assessment	BSc Soil Science & Hydrology	13

Company	Name of representative of the specialist	Specialist	Educational Qualifications	Experience (years)
			South African Council for Natural Scientific Professionals (SACNASP) reg No. 119037	
Urban-Econ Development Economist	Ruan Oberholzer	Socio-Economic Impact Assessment	BTRP (Hons); MSc (Real Estate)	16
	Nthabiseng Makhoali		BCom Hons (Transport Economics), BCom (Economics & International Trade)	3
JG Afrika (Pty) Ltd	Keval Sigh	Desktop Geotechnical Assessment	MSc (Engineering Geology)	10
SiVEST SA (Pty) Ltd	Ntuthuko Hlanguza (Pr. Eng)	Stormwater Management Plan	BSc.Eng (Civil) Engineering Council of South Africa Reg No. 202202263	8

4. ACTIVITY INFORMATION

4.1 Project Description

The site area to be developed is approximately 15 ha in extent. It is anticipated that the Solar PV energy facility will include PV fields (arrays) comprising of multiple PV panels. In summary, the proposed SEF development will include the following components:

- The proposed solar PV plant will include PV fields (arrays) comprising multiple PV modules;
- PV panels will be single axis tracking mounting, and the modules will be either crystalline silicon or thin film technology;
- Each PV module will be approximately 2274mm (≈2.3m) long and 1134mm (≈1.1m) wide and mounted on supporting structures above ground;
- The foundations will most likely be either concrete or rammed piles;
- Generation capacity of up to +/-15MWac;
- One (1) new 33/132kV on-site substation (facility substation) occupying an area of up to approximately 0.2003ha (2 003m²);
- One (1) guard house approximately 0.0876 ha (876m²) in size;
- One (1) temporary building zone 0.2944 ha (2 944m²);
- Site and internal access roads, up to 4m wide, will provide access to the PV arrays. Existing site roads will be used wherever possible, although new site roads will be constructed where necessary;
- Galvanized steel fencing with electrification approximately 2.1m in height;

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- Existing boreholes will be used where possible. Water will potentially be stored in water storage tanks;

The proposed layout is reflected below in **Figure 2**.

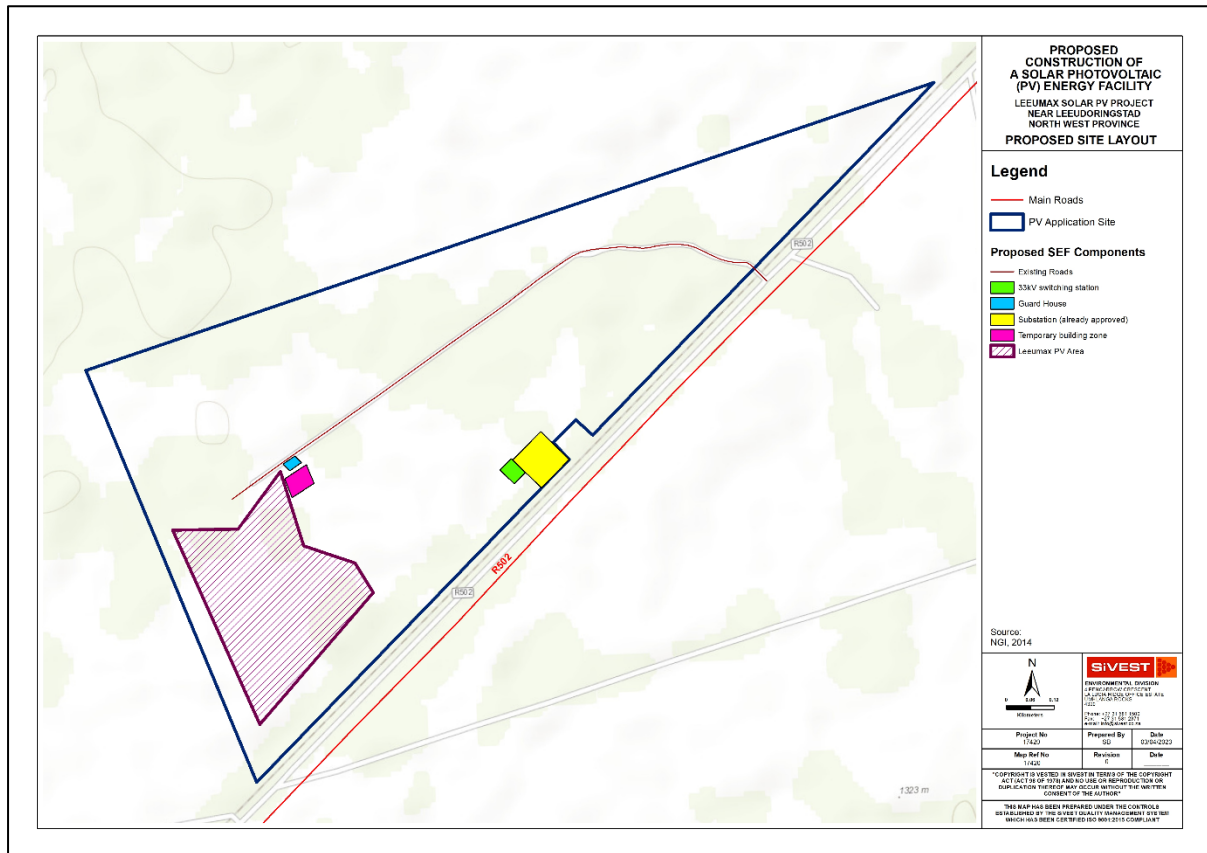


Figure 2: Proposed layout

A summary of the project technical details is provided in **Table 6** below.

Table 6: Technical Detail Summary

Component	Description / Dimensions
Location of site (centre point)	Latitude: 27°12'24.03" S Longitude: 26°18'2.64" E
Site area	Approximately 15 ha
Technology	<ul style="list-style-type: none"> The proposed solar PV plant will include PV fields (arrays) comprising multiple PV modules. PV panel mountings. PV panels will be single axis tracking mounting, and the modules will be either crystalline silicon or thin film technology. Each PV module will be approximately 2274mm (≈2.3 m) long and 1134 mm (≈1.1 m) wide and mounted on supporting structures above ground. At this stage it is anticipated that the structures will be mono-facial modules. The final design details will become available during the detailed design phase of the

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Component	Description / Dimensions
	<p>proposed development, prior to the start of construction.</p> <ul style="list-style-type: none"> The foundations will most likely be either concrete or rammed piles. The final foundation design will be determined at the detailed design phase of the proposed development.
SG codes	T0HP00000000004400037
Generation Capacity of Solar PV Plant	Maximum of up to $\pm 15\text{MW}$ ac ○
Capacity of Switching Substation	More than 33 kV but less than 275 kV. Exact capacity of the proposed on-site switching substation will be determined and confirmed at a later stage.
Dimensions of PV Panels	<ul style="list-style-type: none"> Width: up to $\pm 2274\text{mm}$ ($\approx 2.3\text{m}$) Length: up to $\pm 1134\text{mm}$ ($\approx 1.1\text{m}$)
On-site Switching Substation	<ul style="list-style-type: none"> One (1) new on-site switching substation with a capacity of more than 33 but less than 275 kV. Total footprint: up to $\pm 0.2003\text{ ha}$ ($2\,003\text{ m}^2$). To contain transformers for voltage, step up from medium voltage to high voltage. DC power from the PV modules will be converted into AC power in the inverters and the voltage will be stepped up to medium voltage in the inverter transformers.
Guard House	One (1) permanent guard house of $\pm 0.0876\text{ha}$ (876 m^2).
Temporary Building Zone	One (1) temporary building zone of $\pm 0.2944\text{ha}$ ($2\,944\text{ m}^2$).
Area Occupied by Buildings	Up to $\pm 1.3807\text{ ha}$ ($13\,807\text{ m}^2$)
Width of Existing Internal Gravel Roads	<ul style="list-style-type: none"> Up to $\pm 4\text{ m}$; Existing internal gravel site roads will be used wherever possible. However, where required, new internal gravel roads may be constructed.
Length of existing internal roads (to be potentially upgraded)	Up to $\pm 1.57\text{ km}$
Site Access	Access to the proposed development will be via an existing gravel road which connects to the tarred R502 road.
Proximity to grid connection	<ul style="list-style-type: none"> Grid connection is to the 132/11kV Leeudoringstad Solar Plant Substation, which has been authorised as part of a separate BA process; and The 132/11kV Leeudoringstad Solar Plant Substation is located within the proposed Leumax Solar PV Plant application site (namely Portion 37 of the Farm Leeuwbosch No. 44). Medium voltage cabling (anticipated to be $\pm 0.8\text{m} \times 0.6\text{m}$ wide at this stage) will link the various PV arrays to the switching substation, as well as the Leeudoringstad Solar Plant Substation. These cables will be laid underground, wherever technically feasible.
Height of fencing	<ul style="list-style-type: none"> $\pm 2.1\text{ m}$ high

Component	Description / Dimensions
	<ul style="list-style-type: none"> Fencing will surround the entire proposed solar PV plant.
Type of fencing	Galvanised steel with electrification on top.
Area covered by fencing	Up to approximately 18 ha
Boreholes and storage tanks	<ul style="list-style-type: none"> At this stage it is anticipated that existing boreholes will be utilised; Water will potentially be stored in temporary water storage tanks.

4.2 NEMA Listed Activities

The amended EIA Regulations promulgated under Section 24(5) of the National Environmental Management Act, Act 107 of 1998 and published in Government Notice No. R. 326 list activities which may not commence without environmental authorization from the Competent Authority. The proposed activity is identified in terms of Government Notice No. R. 327, 325 and 324 for activities which must follow a full Environmental Impact Assessment Process. The project will trigger the following listed activities:

Table 7: Listed activities in terms of NEMA: EIA Regulations 2014 (as amended in 2017), applicable to the proposed project

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
Relevant Basic Assessment Activities as set out in Listing Notice 1		
1	GN R. 327 Item 1: The development of facilities or infrastructure for the generation of electricity from a renewable resource where— <ul style="list-style-type: none"> (i) the electricity output is more than 10 megawatts but less than 20 megawatts or the output is 10 megawatts or less but the total extent of the facility covers an area in excess of 1 hectare; 	The proposed development will entail the construction of a solar photovoltaic (PV) plant within the proposed application site which will have a capacity of up to approximately 15MWac. The proposed solar PV plant development will occupy an area in excess of 1 hectare (ha). In addition, the proposed solar PV plant development will be located outside an urban area.
11 (i)	GN R. 327 Item 11: The development of facilities or infrastructure for the transmission and distribution of electricity— <ul style="list-style-type: none"> (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts. 	<p>The application involves the construction of an on-site IPP substation within the proposed application site which will be located outside an urban area. The proposed switching substation will have a capacity of more than 33 but less than 275 kilovolts (kV).</p> <p>The proposed application also involves the construction of medium voltage cabling to link the various PV arrays to the proposed switching substation, as</p>

Activity No(s):	Relevant activities as set out in Listing Notices 1, 2 and 3 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
		well as the Leeudoringstad Solar Plant Substation.
27	<p>GN R. 327 Item 27: The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	The proposed application will include the clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation within the proposed application site. The extent of the clearance is approximately 15ha.
28 (ii)	<p>GN R. 327 Item 28: Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes 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>The proposed site is currently used and zoned for agricultural purposes. The proposed development will result in an area of agricultural land greater than 1ha being transformed to industrial / commercial use for the proposed facility.</p> <p>Consent has however been received from DALRRD and the Maquassi Hills Local Municipality to establish a solar panel farm on the property.</p>

5. LOCATION OF THE ACTIVITY

5.1 Regional Locality

The proposed development is located approximately 6 km north east of the town of Leeudoringstad in the Maquassi Hills Local Municipality, within the Dr Kenneth Kaunda District Municipality in the North West Province (**Figure 3**).

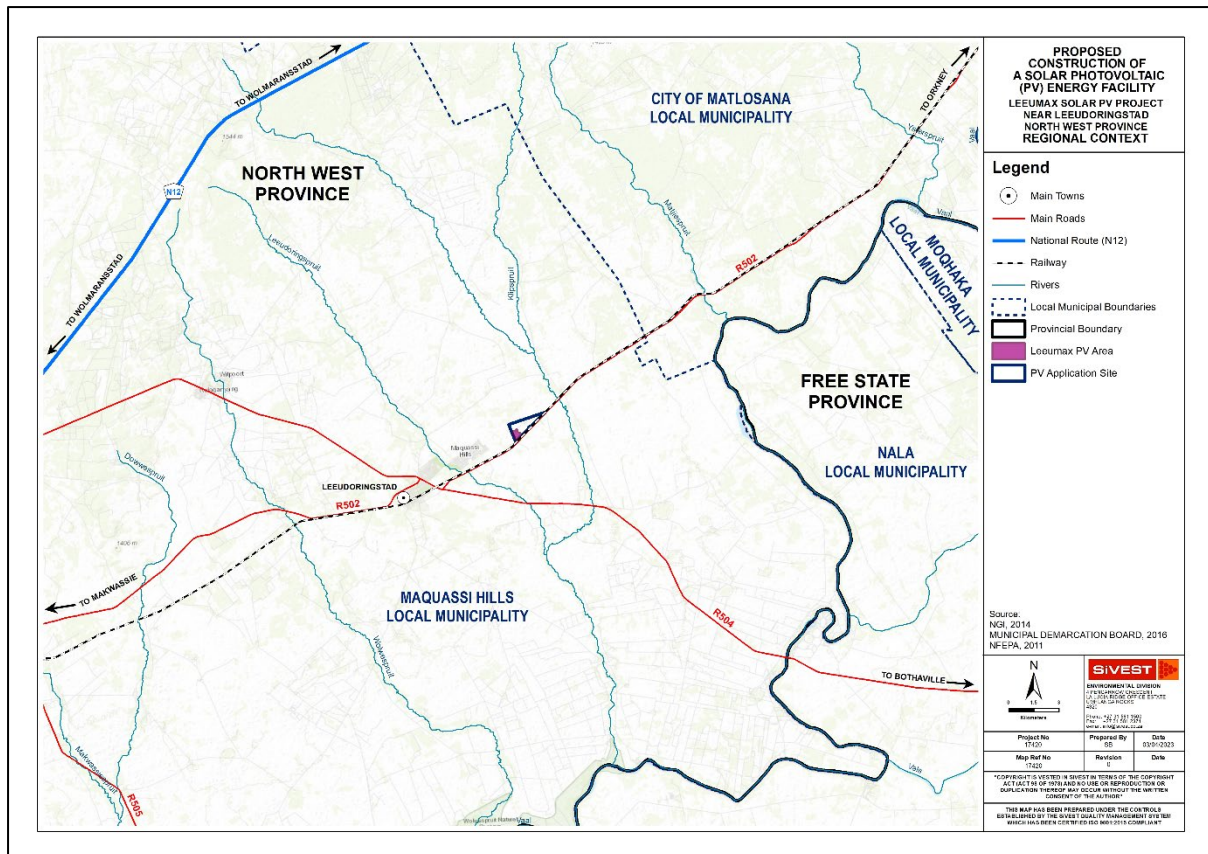


Figure 3: Regional Context

5.2 Summary of affected properties (including SG codes and Farm Names)

Table 8: Summary of affected properties (including SG Codes and Farm Names)

21-DIGIT SURVEYOR GENERAL (SG) CODE	FARM DESCRIPTION
T0HP00000000004400037	Portion 37 of the Farm Leeuwbosch No. 44

5.3 Coordinates of the site

Table 9: SEF Coordinates – Application site

LEEUMAX SEF: APPLICATION SITE		
COORDINATES AT CORNER POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
1	27°12'18.76"S	26°17'51.68"E
2	27°12'18.87"S	26°17'57.62"E
3	27°12'14.32"S	26°18'1.71"E
4	27°12'20.43"S	26°18'3.57"E
5	27°12'22.00"S	26°18'8.17"E
6	27°12'24.45"S	26°18'9.71"E
7	27°12'34.83"S	26°17'58.96"E

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Date: April 2023

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COORDINATES AT CENTRE POINT (DD MM SS.sss)		
POINT	SOUTH	EAST
8	27°12'24.91"S	26°18'1.14"E

LEEUMAX SEF: SUBSTATION AND ASSOCIATED INFRASTRUCTURE LOCATION		
COORDINATES AT CENTRE POINTS (DD MM SS.sss)		
POINT	SOUTH	EAST
33kV Switching Station	27°12'15.08"S	26°18'22.83"E
Temporary Building Zone	27°12'15.19"S	26°18'3.43"E
Guard House	27°12'13.71"S	26°18'2.79"E
Substation (already approved)	27°12'14.18"S	26°18'25.58"E

5.4 Study Area Description

According to the South African National Land Cover dataset (GeoTerra Image 2018), much of the assessment area is characterised by natural vegetation which is dominated by natural grassland. There are however significant patches of land classified as 'cultivated land' throughout the study area, although much of this land appears to be fallow grasslands. Hence livestock farming is the dominant agricultural activity in the study area, although livestock densities appear to be relatively low.

Farm properties in the study area tend to be relatively large resulting in a low density of rural settlement. Built form is largely characterised by scattered farmsteads and ancillary farm buildings, gravel access roads, telephone lines, fences and the remnants of disused workers' dwellings. Other human influence is visible in the area in the form of road, rail and electricity infrastructure. This includes the R502 regional road adjacent to the site (along the southern boundary of the application site) and the R504 regional road which traverses the south-western. In addition, an operational railway line runs directly adjacent to the R502 and several high voltage power lines feed into the Leeubosh TR 132kV Traction Substation situated on the boundary of the application site. The tall steel structures of the Traction Substation, as well as the tall steel towers of the power lines are visible in the landscape.

A summary of the specialist findings and recommendations is attached in **Appendix D**.

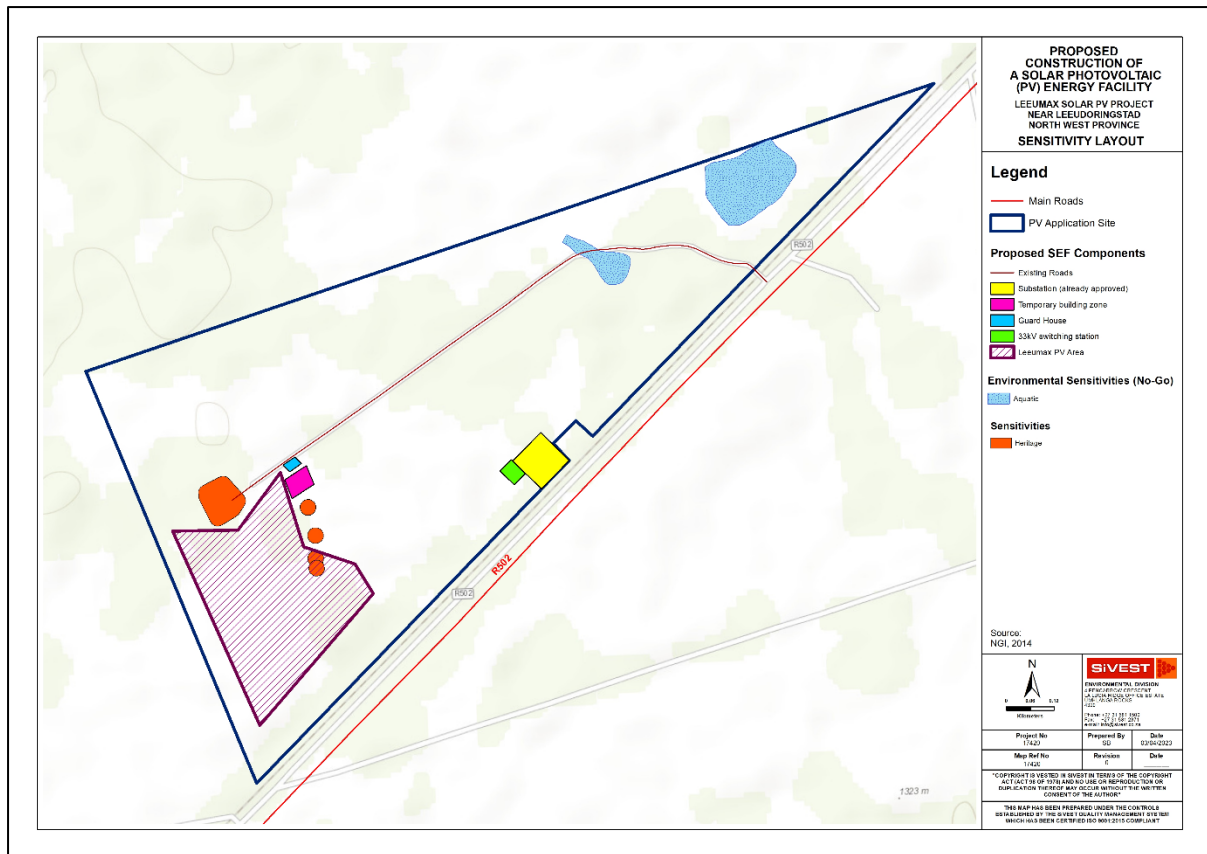


Figure 4: Proposed Layout with Sensitivity Overlay

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Prepared by:



6. ENVIRONMENTAL MANAGEMENT PROGRAMME

6.1 Introduction

The Environmental Management Programme (EMPr) has been prepared in order to comply with the requirements as stipulated in the National Environmental Management Act (No. 107 of 1998).

This EMPr includes:

- Details and expertise of the EAP who prepared the EMPr including curriculum vitae;
- Project Description;
- Facility Illustration Plans;
- Mitigation measures as contained in the Impact Assessment Report;
- Recommendations and conclusions emanating from the specialist studies;
- Impact Management Objectives and Actions; and
- A copy of the EA (if granted).

6.2 Aim and Objectives of the EMPr

The aim of the EMPr is to:

- Identify those construction activities identified for the proposed development that may have a negative impact on the environment;
- Outline the mitigation measures that will need to be taken and the steps necessary for their implementation;
- Describe the reporting system to be undertaken during construction.

The objectives of the EMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential adverse impacts to minimal or insignificant levels.
- Provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site.
- Provide management structures that address the comments raised by I&APs pertaining to the development.
- Ensure that the environmental specifications are identified, effective and contractually binding so as to enable compliance on site.

6.3 Layout of the EMPr

The EMPr identifies the four phases of development as:

- Preconstruction Planning Phase Activities (Section 9.1)
- Construction Phase Activities (Section 9.2)
- Operation Phase Activities (Section 9.3)
- Decommissioning Phase Activities (Section 9.4)

The generic and specific provisions are included together under each phase for each environmental consideration. The generic provisions are the general environmental issues, procedures and controls that can be applied to the project and site as a whole. The specific provisions are those environmental issues, procedures and controls that are relevant to a particular section of the site. It should be understood that the EMP is considered an evolving document and may be amended at any time by the relevant authorities (DEDECT, DWS etc.).

7. LEGAL AND OTHER REQUIREMENTS

7.1 Compliance with Applicable Laws

The supreme law of the land is “The Constitution of the Republic of South Africa”, which states: “*Every person shall have the right to an environment which is not detrimental to his or her health or wellbeing*”. Laws applicable to the protection of the environment in terms of Environmental Management (and relating to construction activities) include but are not restricted to:

- Animals Protection Act, Act No. 71 of 1962
- Astronomy Geographic Advantage (Act No. 21 of 2007)
- Civil Aviation Act (Act No.13 of 2009)
- Conservation of Agricultural Resources Act, Act No. 43 of 1983
- Development Facilitation Act No. 67 of 1995
- Environment Conservation Act, Act No. 73 of 1989
- Environmental Planning Act, Act No. 88 of 1967
- Hazardous Substances Act, Act No. 15 of 1973
- Land Survey Act, Act No. 9 of 1921
- Minerals Act, Act No. 50 of 1991
- National Environmental Management: Air Quality Act, Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act, Act No. 10 of 2004, as amended)
- National Environmental Management Act, Act No.107 of 1998
- NEMA EIA Regulations, 2014 (as amended)
- National Environmental Management: Protected Areas Act (NEM: PAA) (Act No. 57 of 2003, as amended)
- National Environmental Management: Waste Act, Act No. 59 of 2008
- National Forests Act (NFA) (Act No. 84 of 1998)
- The National Heritage Resources Act, Act No. 25 of 1999
- National Water Act, Act No. 36 of 1998
- National Dust Control Regulations (GN No. R. 827 of 1 November 2013)
- National Road Traffic (Act No. 93 of 1996, as amended)
- Occupational Health and Safety Act, Act No. 85 of 1993
- Provincial and Local Government Ordinances and Bylaws
- Soil Conservation Act, Act No. 76 of 1969
- Subdivision of Agricultural Land (Act No. 70 of 1970, as amended)
- Water Services Act, Act No. 108 of 1997

Several regulations will be applicable to the construction phase of the project. These guidelines are mentioned in the EMPr tables. The EMPr forms part of the Contract Documentation and is thus a legally binding document.

7.2 Compliance with the Environmental Management Programme

A copy of the EMPr must be kept on site during the construction period at all times. The EMPr will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance with the Environmental Authorisation (EA) issued by DEDECT.

It should be noted that in terms of Section 28 of the National Environmental Management Act (NEMA) Act No. 107 of 1998, those responsible for Environmental Damage must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).

In terms of the EA, non-compliance of the EA may result in invalidation of the EA, criminal prosecution or other actions provided for in the NEMA (as amended) and associated regulations. Any non-compliance must result in an immediate stop to works being issued. The contractor and developer will be held liable for any damage and consequent rehabilitation to environmentally sensitive areas outside the site boundary. In the event of any dispute concerning the significance of a particular impact, the opinion of DEDECT in respect of its significance will prevail.

National government, provincial government, local authorities or committees appointed in terms of the conditions of the EA or any other public authority shall not be held responsible for any damages or losses suffered by the authorisation holder or successor in title in any instance where construction or operation subsequent to construction is temporarily or permanently stopped for reasons of non-compliance by the authorisation holder with the conditions of authorisation as set out in this document or any subsequent document emanating from these conditions of authorisation.

7.3 Specific Conditions Pertaining to Authorisations

Should the North West Department of Economic Development , Environment, Conservation and Tourism (DEDECT) issue an Environmental Authorisation (EA), this EMPr will be updated to include any additional pre-construction, construction, operation and decommissioning conditions stipulated in the EA not already included below.

A water use license will be applied for and may become applicable to the proposed project at a later stage.

Specific conditions pertaining to regulatory processes, or Licensee / Holder of the Authorisation requirements, have not been included within the EMPr and will only be included on finalization of the EMPr (pending decision). These conditions are to be undertaken by the Licensee / Holder of the Authorisation prior to the commencement of construction.

8. PROJECT RESPONSIBILITIES

8.1 Responsible Parties and associated roles

As described above, **Table 10** below provides a summary of the responsible parties and the auditing process to be carried out.

Table 10: Responsible Parties and Auditing Process

TITLE	PARTY	ROLE DURING CONSTRUCTION	ROLE DURING OPERATION
Project Developer (Proponent)	Upgrade Energy (Pty) Ltd	Assume ultimate responsibility	Assume ultimate responsibility
Project Manager	To be appointed by proponent	Project management	N/A
Contractor's Project Manager	Balance of Plant Contractor	Construction management	N/A
Main Contractor/s	There will be multiple contracts placed for the construction phase. These will cover civil earthworks and concrete, structural mechanical and electrical / instrumentation. There could also be the construction camp management contract. These may be managed by the Contractor's Project Manager (or other).	Main Contractor will undertake day to day construction activities covering aspects such as civil earthworks and concrete, structural mechanical and electrical / instrumentation.	N/A
Environmental Officer	To be appointed by Main Contractors	Day to day environmental responsibility, point of contact for ECO	N/A
Environmental Control Officer	To be appointed by Project developer	Monthly audits	Annual audits
Competent Authority	North West Department of Economic Development , Environment, Conservation and Tourism (DEDECT)	Conduct site visits when necessary.	Conduct site visits when necessary

The above may be updated based on the outcome of the Environmental process should additional responsibilities be identified.

9. IMPACT MANAGEMENT ACTIONS AND OUTCOMES

9.1 Pre-construction Phase

9.1.1 Site preparation

This section deals with the issues relative to site preparation during the pre-construction phase.

Table 11: Site preparation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Appointment of ECO	<ul style="list-style-type: none"> Appoint an Environmental Control Officer. 	Holder of the EA	Undertake regular audits	Avoid construction delays. Ensure the EMPr is adhered to.	Continuous
Preparation of Plans	<ul style="list-style-type: none"> Prior to commencement of construction, compile a Rehabilitation Plan including monitoring specifications, to be included into the EMPr during final approval. Prior to commencement of construction, compile an Alien Plant Management Plan, to be included into the EMPr during final approval. Prior to commencement of construction, compile and implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control, including monitoring specifications. Prior to commencement of construction, compile and implement a stormwater management plan including monitoring specifications. 	Holder of the EA	Undertake regular audits	Prevent unauthorized impact on the environment. Sensitive areas identified and avoided Erosion management plan implemented and hydrological measures in place.	Preconstruction

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Site demarcation	<ul style="list-style-type: none"> Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 	Contractor	Undertake regular audits	<p>Prevent unauthorized impact on the environment.</p> <p>Ensure safety of the workers, public and prevent loss/ damage to equipment</p> <p>Ensure the conditions of the EA are adhered to</p> <p>Compliance to all legislative requirements</p>	Continuous
Site clearing	<ul style="list-style-type: none"> Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 	Holder of the EA/Contractor	Undertake regular audits	<p>Site establishment undertaken responsibly</p> <p>Sensitive areas identified and avoided</p> <p>Erosion management plan implemented and hydrological measures in place.</p> <p>Appropriate stormwater structures as informed by the</p>	Once off

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ul style="list-style-type: none"> Storm water must be managed in such a manner as to disperse runoff and to prevent the concentration of storm water flow. 			Storm Water Management Plan (Refer to Appendix D)	
Construction Camp	<ul style="list-style-type: none"> Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. All construction equipment must be stored within the construction camp. All associated oil changes etc. (no servicing) must take place within the camp over a sealed surface such as a concrete slab. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. The Contractor must provide sufficient ablution facilities, in the form of portable / VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 100 meters of any surface water body or 1:100-year flood line. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 	Contractor	Undertake regular audits	<p>Prevent unauthorized impact on the environment.</p> <p>Ensure safety of the public and prevent loss/ damage equipment</p> <p>Ensure EMP is adhered to</p> <p>Compliance to all legislative requirements</p>	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ul style="list-style-type: none"> No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required safety measures are in place. The Contractor shall take specific measures to prevent the spread of fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter. 				
Training of site staff	<ul style="list-style-type: none"> Environmental awareness training for construction staff, concerning at a minimum the general environmental awareness, conservation of fauna and flora, the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artefacts. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. Staff must be trained in the hazards and required precautionary measures for dealing with these substances 	Contractor	Undertake regular audits	<p>All staff members are aware of the EMP requirements relevant to them</p> <p>All waste managed according to approved the Method Statement compiled by the contractor and approved by the engineer and reviewed by ECO</p>	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ul style="list-style-type: none"> Spillage packs must be available at construction areas. 				

9.1.2 Consultation

This section deals with the issues relative to consultation during the pre-construction phase.

Table 12: Consultation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT OUTCOMES	MANAGEMENT	TIMEFRAMES
Consultation	<ul style="list-style-type: none"> Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. Identify relevant stakeholders and engage them at applicable stages of the process. Inform the public about the proposed construction process. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. Work on site to be restricted to work hours. An agreement/contract should be formalised between the landowner and the applicant, that will ensure that the rehabilitation does not leave any liability to future landowners. 	Holder of the EA/ Contractor	Clear communication channels established		Continuous

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9.1.3 Socio-economic

This section deals with the issues relative to Socio-economic during the pre-construction phase.

Table 13: Socio-economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Socio-economic: Availability of sufficient local construction materials for the PV Plant	<ul style="list-style-type: none">Source unavailable materials from abroad (import)	Project developer	Holder of the EA	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

9.2 Construction Phase

9.2.1 Construction Camp

This section deals with the issues relative to the construction camp during the construction phase.

Table 14: Construction Camp

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
Construction Camp: Site of construction camp	<ul style="list-style-type: none"> The size of the construction camp must be aligned to the approved laydown area. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. No construction should occur in an area of high or unique agricultural value, or in an area under cultivation. 	Holder of the EA/Contractor	<p>Ensure the conditions of the EA are adhered to.</p> <p>Compliance to all legislative requirements.</p> <p>Impacts avoided or managed as per specialist recommendations.</p>	Once-off
Construction Camp: Storage of materials (including hazardous materials)	<ul style="list-style-type: none"> Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. Storage areas must be designated, demarcated and fenced if necessary. Storage areas should be secure so as to minimize the risk of crime. They should also be safe from access by unauthorised persons i.e. children / animals etc. Fire prevention facilities must be present at all storage facilities. 	Holder of the EA/Contractor	<p>Choice of storage areas carefully considered to avoid impact to environment</p> <p>Correct handling, storage and/or disposal and/or cleanup of all</p>	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
	<ul style="list-style-type: none"> Storage areas containing chemical substances / materials must be clearly sign posted. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be sited away from drainage lines in a site with the approval of the Project Manager. The bund wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas and that will not infiltrate into the ground in order to ensure that accidental spillage does not pollute local soil or water resources. All fuel storage areas must be roofed to avoid creation of dirty stormwater Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals to be used on site. Where possible the available, MSDS's must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures. An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical. The contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective 		<p>materials to prevent impact to environment</p> <p>All hazardous substances managed according to approved Method Statement.</p>	

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAME
	<p>clothing/equipment in case of spillages or accidents and have received the necessary training.</p> <ul style="list-style-type: none"> • All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. • All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the MC and ECO for information. Emergency response procedures to be followed and implemented. 			
Construction Camp: Drainage of construction camp	<ul style="list-style-type: none"> • Surface drainage measures must be established in the Construction Camps so as to prevent <ul style="list-style-type: none"> – Ponding of water; – Erosion as a result of accelerated runoff; and, – Uncontrolled discharge of polluted runoff. 	Holder of the EA/Contractor	<p>Appropriate stormwater structures as informed by the Storm Water Management Plan (Refer to Appendix D)</p> <p>Storm Water Management Plan implemented</p> <p>Erosion plan implemented and hydrological measures in place.</p>	Continuous

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9.2.2 Environmental Education and Training

This section deals with the issues relative to environmental education and training during the construction phase.

Table 15: Environmental Education and Training

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Environmental Education and Training: Environmental Training	<ul style="list-style-type: none">• Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Translators are to be used where necessary. Topics covered should include:<ul style="list-style-type: none">– What is meant by “Environment”– Why the environment needs to be protected and conserved– How construction activities can impact on the environment– What can be done to mitigate against such impacts– Awareness of emergency and spills response provisions– Social responsibility during construction e.g. being considerate to local residents• It is the Contractor’s responsibility to provide the site foreman with adequate environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff.• Training should be provided to the staff members in the use of the appropriate fire-fighting equipment.• The need for a “clean site” policy also needs to be explained to the workers.• Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks.	Contractor	Thorough induction to site.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Environmental Education and Training: Monitoring of environmental training	<ul style="list-style-type: none"> The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended. 	Contractor	Thorough induction to site.	Continuous

9.2.3 Waste Management

This section deals with the issues relative to waste management during the construction phase.

Table 16: Waste Management

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Waste Management: Litter management/general waste	<ul style="list-style-type: none"> The Contractor shall provide a method statement with regard to waste management. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. The Contractor shall supply waste collection bins and all solid waste collected shall be disposed of at registered/licensed landfill. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 	<p>Contractor</p> <p>The ECO shall monitor the neatness of the work sites as well as the Contractor campsite.</p>	All waste managed according to approved Method Statement	Continuous

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IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<ul style="list-style-type: none"> Where vegetation is cleared and is suitable, chipping and/or mulching can be considered. Littering by the employees of the Contractor shall not be allowed under any circumstances. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. Storm water must be managed in such a manner as to disperse runoff and to prevent the concentration of storm water flow. Under no circumstances may solid waste be burnt on site. 			
Waste Management: Hazardous waste	<ul style="list-style-type: none"> All waste hazardous materials, if present, must be carefully and appropriately stored, and then disposed of off-site at a licensed landfill site, where practical. Contaminants to be stored safely to avoid spillage. Machinery must be properly maintained to keep oil leaks in check All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated. 	Contractor	All waste managed according to approved Method Statement	Continuous
Waste Management: Sanitation	<ul style="list-style-type: none"> The Contractor shall install mobile chemical toilets on the site. The construction of "Long Drop" toilets are forbidden. Rather, portable toilets are to be used. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. Ablution facilities shall be within proximity from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be 	Contractor	Staff members aware of EMP requirements and ablutions used and maintained accordingly	Continuous

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IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	<p>enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible.</p> <ul style="list-style-type: none"> Toilets shall be serviced regularly (with proof) Potable water must be provided for all construction staff. 			
Waste Management: Remedial Actions	<ul style="list-style-type: none"> In the event of an accidental spill or leakage of hazardous substances, such incident(s) must be reported to all relevant authorities, including the Directorate: Pollution and Chemicals Management, in accordance with section 30(5) of the NEMA, 1998 pertaining to the control of incidents. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. The precise method of treatment for polluted soil must be identified by a suitable specialist. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal. 	Contractor	All waste managed according to approved Method Statement	Continuous

9.2.4 Heritage

This section deals with the issues relative to heritage during the construction phase.

Table 17: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Heritage: Site clearance and vegetation stripping	<ul style="list-style-type: none"> Implement a chance finds procedures handle any heritage resources discovered during construction. 	Construction Manager or Contractor	Monitoring of surface clearance relative to approved layout	Minimise landscape scarring	Ongoing basis
		ECO			Whenever on site (at least weekly)

9.2.5 Agriculture and Soils

This section deals with the issues relative to Agriculture and Soils during the construction phase.

Table 18: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Loss of agricultural land and	<ul style="list-style-type: none"> Avoid any cultivated and especially irrigated areas, if possible. 	<ul style="list-style-type: none"> Project management EPC Engineer/Contractor 	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site. That vegetation clearing does not pose a high erosion risk.	Ongoing basis
Soil erosion (wind or water) caused by surface disturbance	<ul style="list-style-type: none"> Avoid extensive vegetation removal; re-vegetate as soon as possible and maintain cover (irrigate if necessary) 				

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9.2.6 Socio-Economic

This section deals with the issues relative to socio-economic during the construction phase.

Table 19: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Socio-economic: Increase in production of the national and local economies due to project capital expenditure.	Procure inputs from local and domestic suppliers Employ local contractors where possible	Holder of EA Contractor ECO	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous
Socio-economic: The creation of new direct and indirect opportunities related to the construction and operation of the proposed solar plant and facilities	<ul style="list-style-type: none"> • Employ labour-intensive methods • Employ local residents and communities • Sub-contract to local construction companies • Utilise local suppliers 	Holder of EA Contractor ECO	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

9.2.7 Geotechnical

This section deals with the issues relative to geotechnical during the construction phase.

Table 20: Geotechnical

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
Geotechnical: Displacement of natural earth material and overlying vegetation. <ul style="list-style-type: none"> • Increase in soil and wind erosion due to clearing of vegetation. • Construction and earthmoving vehicles may displace soil during operations. • Creation of drainage paths along access tracks. • Potential oil spillages from heavy plant. • Excessive dust. 	<ul style="list-style-type: none"> • Identify protected areas prior to construction. • Construction of temporary berms and drainage channels to divert surface water. • Minimize earthworks and fills. • Use existing road network and access tracks. • Rehabilitation of affected areas (such as regrassing, mechanical stabilization). • Correct engineering design and construction of gravel roads and water crossings. • Correct construction methods for foundation installations. • Control stormwater flow • Dust suppression 	Holder of EA Contractor ECO	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

9.2.8 Aquatic/ Freshwater

This section deals with the issues relative to aquatic during the construction phase.

Table 21: Aquatic/ Freshwater

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aquatic: Loss of wetland areas through direct impact or indirect impacts of erosion or sedimentation).	<p>During site clearing the vegetation and topsoil is removed, increasing the runoff and erosion potential of flowing water. to mitigate these impacts the following measures must be followed:</p> <ul style="list-style-type: none"> Minimise the area of soil disturbance to reduce the impact of sedimentation into waterbodies. Clearing and grading must occur only where necessary to build and provide access to structures and infrastructure. Clearing must be done immediately before construction, rather than leaving soils exposed for months or years. Where possible, plants should be cut down to ground level instead of being removed completely to stabilise the soil during land-clearing operations. The proposed limits of land disturbance must be physically marked off to ensure that only the land area required for the development is cleared. 	<p>Holder of EA</p> <p>Contractor</p> <p>ECO</p>	<p>Construction monitoring and audit reports</p>	<p>Impacts avoided or managed.</p> <p>Ensure the conditions of the EA are adhered to.</p>	<p>Continuous</p>

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<ul style="list-style-type: none"> When excavated areas are backfilled the surface must be level with the surrounding land surface, to minimise soil erosion from the areas when the excavation is complete. The most efficient approach to control erosion is to minimise the area of land disturbed as well as the duration for which it is exposed. Once surfaces have been exposed, they must immediately be protected from erosion, so limiting the source of the sediment. During the excavation of pits, roads, construction sites etc. the removed topsoil must be stored and appropriately protected so that it does not wash into waterbodies, causing sedimentation and nutrient loading. This is then used to backfill the area so that it can be effectively rehabilitated. Topsoil that is removed during excavation must NEVER be buried or rendered unusable in any way (such as mixing it with spoils or being compacted by machinery). During excavation soil must be excavated one layer at a time and stored in separate stockpiles so they can be returned in their natural order when the area is backfilled. 				

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	<p>This improves soil functions and improves the template for plant growth.</p> <ul style="list-style-type: none"> To ensure that it reaches most people signs must be written in the languages of the area (NOT just English). This ensures that non-English speakers can understand and will hopefully cooperate in reducing water pollution by the measures indicated on the sign. Within a construction site, vehicle access must be strictly controlled (i.e., there must be set parking, turning areas, set routes and no access to undisturbed areas.) This minimises soil disturbance and compaction and pollution from fluids leaking onto the ground as well as the disturbance of aquatic organisms. 				
<p>Aquatic: Hydrocarbon spills and compaction within wetland zones.</p> <p>Aquatic: Sewerage spills within wetlands or drainage lines feeding wetlands</p>	<ul style="list-style-type: none"> Areas (away from surface water bodies and outside of the riparian zone) must be designated for the storage of materials and mixing of materials (such as concrete or chemicals). This reduces contamination of water resources from these materials/ activities. Portable toilets must be provided where work is being done and must be located a 	Holder of EA	Construction monitoring and audit reports	<p>Impacts avoided or managed.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aquatic: Spills of stored hazardous material into wetlands or drainage lines feeding wetlands	<p>considerable distance away from water resources and riparian areas.</p> <ul style="list-style-type: none"> • If soil contamination occurs (such as due to a spill) the soil must be removed from the site and disposed of appropriately. • Prevention of spills eliminates or minimizes the discharge of pollutants to water bodies. • Handle hazardous and non-hazardous materials, such as concrete, solvents, asphalt, sealants, and fuels, as infrequently as possible and observe all national and local regulations when using, handling, or disposing of these materials. • An effective response plan must be in place and personnel must be ready to mobilise in the event of a spillage to reduce the environmental effects of an oil or chemical spill. • Spill control devices such as absorbent snakes and mats must be placed around chemical storage areas, and they can be used in an emergency to contain a spill. • Implement preventative maintenance system to ensure that work vehicles are maintained in an acceptable condition. This would involve routinely checking vehicles for leaks before construction begins; and not allowing vehicles with significant leaks to operate or be repaired within the 				

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<p>construction site. Ideally, vehicle maintenance and washing occurs in garages and wash facilities, not on active construction sites.</p> <ul style="list-style-type: none"> • Before an operation occurs near a waterbody, vehicles must be checked for leaks, to reduce soil and water contamination from vehicle fluids. • Old engine oil must NOT be thrown on the ground or down a stormwater drains but rather collected in containers and recycled. • Ensure that appropriate solid waste disposal facilities are provided, and adequate signage is provided for all solid, liquid, and hazardous waste types. These must contain waste products in a weatherproof manner and to prevent any airborne litter, access to scavengers or loss of food residues that may be washed into surface or ground waters. Collected waste needs to be disposed of at a registered landfill site/hazardous waste facility. • Re-fuelling areas for vehicles must be bunded and located away from water resources and sensitive environments to prevent any accidental spillage contaminating soil or seeping into groundwater aquifers. All servicing area run-off must be directed towards a fully 				

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	<p>contained collection sump for recovery and appropriate disposal.</p> <ul style="list-style-type: none"> There must be no standing water at a stockpile site, to reduce erosion as well as the contamination of the water by nutrients/toxics. Water resources must be well fenced and sign-posted, to keep machinery, people, and livestock away from the water body as well as vegetated areas to reduce the soil disturbance, soil compaction and vegetation destruction, which thus reduces the amount of erosion and habitat loss. 				
<p>Aquatic: The introduction of alien vegetation into disturbed areas disrupting natural wetland vegetation composition or alteration of water transpiration from soils.</p>	<ul style="list-style-type: none"> Alien and invasive vegetation have several detrimental effects on water quality, from nutrient enrichment to increased erosion and excessive water use, which is especially relevant in dry areas or in important catchments. Invasive species are highly likely to colonise disturbed areas, even after rehabilitation and follow-up clearing must be done until healthy vegetation returns to the site 	Holder of EA Contractor ECO	Construction monitoring and audit reports	Impacts avoided or managed. Ensure the conditions of the EA are adhered to.	Continuous
<p>Aquatic: The change in flow dynamics to and through wetlands potentially altering wetland types or potentially causing</p>	<ul style="list-style-type: none"> Runoff from disturbed areas (such as landing/depot areas, extraction routes, gravel pits, temporary and unpaved roads) must be directed to silt traps (silt fences, sandbags, etc) to remove sediment and 				

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erosion from increased surface runoff.	<p>reduce the sedimentation of the water bodies.</p> <ul style="list-style-type: none"> Check dams are small, temporary dams constructed across a swale or channel. They can be constructed using gravel, rock, gabions, or straw bales. They are used to reduce the velocity of concentrated flow and, therefore, to reduce erosion in a swale or channel. 				

9.2.9 Avifaunal

This section deals with the issues relative to avifaunal during the construction phase.

Table 22: Avifaunal

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FR EQUENCY
Avifauna: Displacement of priority species due to disturbance associated with construction of the PV plant and associated infrastructure	<ul style="list-style-type: none"> Construction activity should be restricted to the immediate footprint of the infrastructure Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. Measures to control noise and dust should be applied according to current best practice in the industry. 	Contractor and ECO	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections.	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management	Monthly

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FR EQUENCY
	<ul style="list-style-type: none"> Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum. A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: <ul style="list-style-type: none"> No off-road driving Maximum use of existing roads, where possible; Measures to control noise and dust according to latest best practice; Restricted access to the rest of the property; Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint. 		<p>Report and record any non-compliance.</p> <ol style="list-style-type: none"> Ensure that construction personnel are made aware of the impacts relating to off-road driving. Construction access roads must be demarcated clearly. Undertake site inspections to verify. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. Ensure that the construction area is demarcated 	Programme (CEMPr.)	

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FR EQUENCY
			clearly and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.		
Avifauna: Mortality of priority species due to collisions with the medium voltage internal reticulation network	<ul style="list-style-type: none"> Eskom approved bird flight diverters should be installed on the full span length of all 33kV overhead lines according to the applicable Eskom Engineering Instruction. These devices must be installed as soon as the conductors are strung. 	Contractor and ECO	6. Bird Flight Diverters must be installed as soon as the conductors are strung.	Prevention of powerline collision mortality	Once-off Once a year As and when required

9.2.10 Terrestrial Biodiversity

This section deals with the issues relative to biodiversity during the construction phase.

Table 23: Terrestrial Biodiversity

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss, degradation or fragmentation of vegetation through direct clearing	<ul style="list-style-type: none"> • Use existing road infrastructure for access roads. • Avoid construction of infrastructure within sensitive habitats. Minimise vegetation clearing and disturbance to footprint areas only. • Compile a rehabilitation programme and rehabilitate disturbed areas. • Compile and implement Alien Invasive Management Plan. Limit access to sensitive areas during construction. • Undertake monitoring to evaluate whether further measures are required. 	Holder of EA Contractor ECO	Construction monitoring and audit reports	Impacts avoided or managed. Ensure the conditions of the EA are adhered to.	Continuous

9.2.11 Visual

This section deals with the issues relative to visual during the construction phase.

Table 24: Visual

IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/ MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
<p>Visual:</p> <p>Large construction vehicles and equipment will alter the natural character of the study area and expose visual receptors to impacts associated with construction.</p> <ul style="list-style-type: none"> Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. Dust emissions and dust 	<ul style="list-style-type: none"> Carefully plan to minimise the construction period and avoid construction delays. Inform receptors within 500m of the site of the construction programme and schedules. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. Vegetation clearing should take place in a phased manner. Where possible, re-vegetate all reinstated cable trenches with the same vegetation that existed prior to the cable being laid. Establish erosion control measures on areas which will be exposed for long periods of time. This is to reduce the potential impact heavy rains may have on the bare soil. 	Project management and EPC	As defined by the rehabilitation specialist.	<ul style="list-style-type: none"> The surrounding landscape remains rural and agricultural in landscape and land use Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads. 	<ul style="list-style-type: none"> Commencement of construction

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IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/ MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
<p>plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers.</p> <ul style="list-style-type: none"> • Surface disturbance during construction would expose bare soil (scarring) which could visually contrast with the surrounding environment. • Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing 	<ul style="list-style-type: none"> • Suitable buffers of intact natural vegetation should be provided along the perimeter of the development area. • Maintain a neat construction site by removing rubble and waste materials regularly. • Make use of existing gravel access roads where possible. • Limit the number of vehicles and trucks travelling to and from the construction site, where possible. • Ensure that dust suppression techniques are implemented: <ul style="list-style-type: none"> • on all access roads; • in all areas where vegetation clearing has taken place; • on all soil stockpiles. • Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. 				

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over these disturbed areas could result in dust which would have a visual impact.					

9.3 Operation Phase

9.3.1 Construction Site Decommissioning

This section deals with the issues relative to construction site decommissioning during the operation phase.

Table 25: Construction Site Decommissioning

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Site Decommissioning: Removal of equipment	<ul style="list-style-type: none"> All structures comprising the construction camp are to be removed from site. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these shall be cleaned up. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document. 	Holder of EA/Contractor	<p>Compliance to all legislative requirements.</p> <p>Ensure the EMPr is adhered to.</p>	Following construction

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Site Decommissioning: Temporary services	<ul style="list-style-type: none"> The Contractor must arrange the cancellation of all temporary services. Temporary roads must be closed and access across these, blocked. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. 	Holder of EA/Contractor	<p>Compliance to all legislative requirements.</p> <p>Ensure the EMPr is adhered to.</p>	Following construction
Construction Site Decommissioning: Associated infrastructure	<ul style="list-style-type: none"> Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited. The site is to be cleared of all litter. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. All leftover building materials must be returned to the depot or removed from the site. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management. 	Holder of EA/Contractor	All waste managed according to approved Method Statement	Following construction

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction Site Decommissioning: Rehabilitation plan	<ul style="list-style-type: none"> Rehabilitate and re-vegetate cleared areas with indigenous plant species. 	Holder of EA/Contractor	Alien Plant Management Plan Plant Rehabilitation implemented	Following construction

9.3.2 Operation and Maintenance

This section deals with the issues relative to operation and maintenance during the operation phase.

Table 26: Operation and Maintenance

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Operation and Maintenance: Maintenance	<ul style="list-style-type: none"> All applicable standards, legislation, policies and procedures must be adhered to during operation. Regular ground inspection of the plants must take place to monitor their status. Provide for suitable emergency and safety signage on site, and demarcation of any areas which may pose a safety risk (including hazardous substances). Emergency numbers for the local police, fire department and Eskom must be placed in a prominent clearly visible area on-site 	Holder of the EA	Ensure the conditions of the EA are adhered to. Compliance to all legislative requirements	During operation
Operation and Maintenance: Public awareness	<ul style="list-style-type: none"> The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise. 	Holder of the EA	Adhere to Emergency Evacuation Plan	During operation

9.3.3 Waste Management

This section deals with the issues relative to waste management during the operation phase.

Table 27: Waste Management

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIME FRAME
Waste Management: Sanitation	<ul style="list-style-type: none"> The Operator shall install mobile chemical toilets on the site. The construction of “Long Drop” toilets are forbidden. Rather, portable toilets are to be used. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. Ablution facilities shall be within proximity from workplaces and not closer than 100m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1: 15 workers). Male and females must be accommodated separately where possible. Toilets shall be serviced regularly (with proof) Potable water must be provided for all staff. 	Holder of EA	Staff members aware of EMP requirements and ablutions used and maintained accordingly	Continuous
Waste Management: Recycling and litter management	<ul style="list-style-type: none"> The site should be kept clear of litter at all times. Solid waste separation and recycling should take place for the duration of the operational phase for the development at the administration block. Where vegetation is cleared and is suitable, chipping and/or mulching can be considered. 	Holder of EA	All waste managed according to approved Method Statement Compliance to all legislative requirements.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIME FRAME
	<ul style="list-style-type: none"> Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. Solid waste should be collected on a regular basis Waste needs to be collected and disposed of at a registered municipal site during and after construction, and written agreement should be provided to the Northern Cape region Department of Water and Sanitation. 			

9.3.4 Socio-Economic

This section deals with the issues relative to socio-economic during the operation phase.

Table 28: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Socio-economic: The plant will increase the size of the local utility sector and stimulate economic production through multiplier effects.	<ul style="list-style-type: none"> Procure goods and services required for the operation of the plant from the local economy. 	Holder of the EA	Clear communication channels maintained	Continuous
Socio-economic: Creation of jobs to support	<ul style="list-style-type: none"> Aim to fill all the positions with labour from the local community 	Holder of the EA	Clear communication channels maintained	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
the operation and maintenance of the plant				
Socio-economic: The generated electricity will improve the security of electricity in the local municipality and increase the government's revenue and service delivery	<ul style="list-style-type: none"> No mitigation measures proposed 	N/A	N/A	N/A

9.3.5 Geotechnical

This section deals with the issues relative to geotechnical during the operation phase.

Table 29: Geotechnical

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
Geotechnical: Displacement of natural earth material. <ul style="list-style-type: none"> Increase in soil erosion due to concentrated flow received off hardstand areas. Potential oil spillages from 	<ul style="list-style-type: none"> Use of existing roads and tracks. Rehabilitation of affected areas (such as erosion control mats). Correct engineering design and construction of roads, water crossings and hardstand areas. Vehicle repairs to be undertaken in designated areas Design of and maintenance of stormwater system. 	Holder of EA	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
maintenance vehicles. • Sedimentation of non-perennial features caused by soil erosion.				

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9.3.6 Aquatic/ Freshwater

This section deals with the issues relative to aquatic freshwater during the operation phase.

Table 30: Aquatic/ Freshwater

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aquatic: The change in flow dynamics to and through wetlands potentially altering wetland types or potentially causing erosion from increased surface runoff.	<ul style="list-style-type: none"> Runoff from disturbed areas (such as landing/depot areas, extraction routes, gravel pits, temporary and unpaved roads) must be directed to silt traps (silt fences, sandbags, etc) to remove sediment and reduce the sedimentation of the water bodies. Check dams are small, temporary dams constructed across a swale or channel. They can be constructed using gravel, rock, gabions, or straw bales. They are used to reduce the velocity of concentrated flow and, therefore, to reduce erosion in a swale or channel. 	Holder of EA	All staff members are aware of the EMPr. Ensure EMPr is adhered to.	Continuous
Aquatic: Hydrocarbon spills and compaction within wetland zones.	<ul style="list-style-type: none"> Areas (away from surface water bodies and outside of the riparian zone) must be designated for the storage of materials and mixing of materials (such as concrete or chemicals). This reduces contamination of water resources from these materials/ activities. Portable toilets must be provided where work is being done and must be located a considerable distance away from water resources and riparian areas. If soil contamination occurs (such as due to a spill) the soil must be removed from the site and disposed of appropriately. 	Holder of EA	All staff members are aware of the EMPr. Ensure EMPr is adhered to.	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<ul style="list-style-type: none"> • Prevention of spills eliminates or minimizes the discharge of pollutants to water bodies. • Handle hazardous and non-hazardous materials, such as concrete, solvents, asphalt, sealants, and fuels, as infrequently as possible and observe all national and local regulations when using, handling, or disposing of these materials. • An effective response plan must be in place and personnel must be ready to mobilise in the event of a spillage to reduce the environmental effects of an oil or chemical spill. • Spill control devices such as absorbent snakes and mats must be placed around chemical storage areas, and they can be used in an emergency to contain a spill. • Implement preventative maintenance system to ensure that work vehicles are maintained in an acceptable condition. This would involve routinely checking vehicles for leaks before construction begins; and not allowing vehicles with significant leaks to operate or be repaired within the construction site. Ideally, vehicle maintenance and washing occurs in garages and wash facilities, not on active construction sites. • Before an operation occurs near a waterbody, vehicles must be checked for leaks, to reduce soil and water contamination from vehicle fluids. 			

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<ul style="list-style-type: none"> • Old engine oil must NOT be thrown on the ground or down a stormwater drains but rather collected in containers and recycled. • Ensure that appropriate solid waste disposal facilities are provided, and adequate signage is provided for all solid, liquid, and hazardous waste types. These must contain waste products in a weatherproof manner and to prevent any airborne litter, access to scavengers or loss of food residues that may be washed into surface or ground waters. Collected waste needs to be disposed of at a registered landfill site/hazardous waste facility. • Re-fuelling areas for vehicles must be bunded and located away from water resources and sensitive environments to prevent any accidental spillage contaminating soil or seeping into groundwater aquifers. All servicing area run-off must be directed towards a fully contained collection sump for recovery and appropriate disposal. • There must be no standing water at a stockpile site, to reduce erosion as well as the contamination of the water by nutrients/ toxics. Water resources must be well fenced and sign-posted, to keep machinery, people, and livestock away from the water body as well as vegetated areas to reduce the soil disturbance, soil compaction and vegetation destruction, which thus reduces the amount of erosion and habitat loss. 			

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
<p>Aquatic: Loss of wetland areas through direct impact or indirect impacts of erosion or sedimentation.</p>	<p>During site clearing the vegetation and topsoil is removed, increasing the runoff and erosion potential of flowing water. to mitigate these impacts the following measures must be followed:</p> <ul style="list-style-type: none"> • Minimise the area of soil disturbance to reduce the impact of sedimentation into waterbodies. • Clearing and grading must occur only where necessary to build and provide access to structures and infrastructure. Clearing must be done immediately before construction, rather than leaving soils exposed for months or years. • Where possible, plants should be cut down to ground level instead of being removed completely to stabilise the soil during land-clearing operations. • The proposed limits of land disturbance must be physically marked off to ensure that only the land area required for the development is cleared. • When excavated areas are backfilled the surface must be level with the surrounding land surface, to minimise soil erosion from the areas when the excavation is complete. • The most efficient approach to control erosion is to minimise the area of land disturbed as well as the duration for which it is exposed. • Once surfaces have been exposed, they must immediately be protected from erosion, so limiting the source of the sediment. 	Holder of EA	<p>All staff members are aware of the EMPr.</p> <p>Ensure EMPr is adhered to.</p>	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<ul style="list-style-type: none"> During the excavation of pits, roads, construction sites etc. the removed topsoil must be stored and appropriately protected so that it does not wash into waterbodies, causing sedimentation and nutrient loading. This is then used to backfill the area so that it can be effectively rehabilitated. Topsoil that is removed during excavation must NEVER be buried or rendered unusable in any way (such as mixing it with spoils or being compacted by machinery). During excavation soil must be excavated one layer at a time and stored in separate stockpiles so they can be returned in their natural order when the area is backfilled. This improves soil functions and improves the template for plant growth. To ensure that it reaches most people signs must be written in the languages of the area (NOT just English). This ensures that non-English speakers can understand and will hopefully cooperate in reducing water pollution by the measures indicated on the sign. Within a construction site, vehicle access must be strictly controlled (i.e., there must be set parking, turning areas, set routes and no access to undisturbed areas.) This minimises soil disturbance and compaction and pollution from fluids leaking onto the ground as well as the disturbance of aquatic organisms. 			

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9.3.7 Avifaunal

This section deals with the issues relative to avifaunal during the operation phase.

Table 31: Avifaunal

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Displacement of priority species due to habitat transformation associated with construction of the PV plant and associated infrastructure	<ul style="list-style-type: none"> Construction activity should be restricted to the immediate footprint of the infrastructure. Access to the remainder of the site should be strictly controlled to prevent unnecessary degradation of habitat. Maximum use should be made of existing access roads and the construction of new roads should be kept to a minimum. The mitigation measures proposed by the vegetation specialist must be strictly enforced. 	1. Project Developer 2. Facility Environmental Manager 3. Project Developer and Facility Operational Manager	1. Appointment of rehabilitation specialist to develop HRP. 2. Site inspections to monitor progress of HRP. 3. Adaptive management to ensure HRP goals are met.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	1. Once-off 2. Once a year 3. As and when required
Avifauna: Entrapment of large-bodied birds in the double perimeter fence	<ul style="list-style-type: none"> It is recommended that a single perimeter fence is used 				

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	<ul style="list-style-type: none"> Develop a Habitat Restoration Plan (HRP). Monitor rehabilitation via site audits and site inspections to ensure compliance. Record and report any non-compliance. 	1. Project Developer 2. Facility Environmental Manager 3. Project Developer and Facility Operational Manager	1. Appointment of rehabilitation specialist to develop HRP. 2. Site inspections to monitor progress of HRP. 3. Adaptive management to ensure HRP goals are met.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented by an appropriately qualified rehabilitation specialist, according to the recommendations of the botanical specialist study.	1. Once-off 2. Once a year 3. As and when required

9.3.8 Terrestrial Biodiversity

This section deals with the issues relative to biodiversity during the operational phase.

Table 32: Terrestrial Biodiversity

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Establishment and spread of alien invasive plant species due to the presence of migration corridors	<ul style="list-style-type: none"> Compile and implement Alien Invasive Management and Rehabilitation Plan. Rehabilitate disturbed areas. 	Holder of EA Operator	Operational monitoring and audit reports	Impacts avoided or managed. Ensure the conditions of the EA are adhered to.	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
and disturbance vectors					

9.3.9 Agriculture and Soils

This section deals with the issues relative to Agriculture and Soils during the operation phase.

Table 33: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Agriculture and Soils: Loss of agricultural land	Avoid any cultivated and especially irrigated areas, if possible.	Facility Environmental Manager	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That existence of hard surfaces causes no erosion on or downstream of the site. That denuded areas are re-vegetated to stabilise soil against erosion	Ongoing basis
Agriculture and Soils: Soil erosion (wind or water) caused by surface disturbance	Avoid extensive vegetation removal; re-vegetate as soon as possible and maintain cover (irrigate if necessary)				

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.		

9.3.10 Visual

This section deals with the issues relative to visual during the operation phase.

Table 34: Visual

IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
Visual: <ul style="list-style-type: none"> The PV arrays may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. The proposed solar PV facility will alter the visual character of the 	<ul style="list-style-type: none"> Restrict vegetation clearance on the site to that which is required for the correct operation of the facility. Ensure that the PV arrays are not located within 500m of any farmhouses in order to minimise visual impacts on these dwellings. As far as possible, limit the number of maintenance vehicles which are allowed to access the site. 	Project management and EPC	<ul style="list-style-type: none"> Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations. A review of the security lights at night is undertaken by the EPC to check that 	<ul style="list-style-type: none"> Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads. Lights contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer. 	On completion of construction phase. On-going

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IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
<p>surrounding area and expose potentially sensitive visual receptor locations to visual impacts.</p> <ul style="list-style-type: none"> Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. The night time visual environment will be altered as a result of operational and security lighting at the proposed PV facility. 	<ul style="list-style-type: none"> Ensure that dust suppression techniques are implemented on all gravel access roads. Only clear vegetation on site and adjacent to the site which is required to be cleared for the correct operation of the facility. As far as possible, limit the amount of security and operational lighting present on site. Light fittings for security at night should reflect the light toward the ground and prevent light spill. If possible, light sources should be shielded by physical barriers (walls, vegetation, or the structure itself); Lighting fixtures should make use of minimum lumen or wattage. Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used. 		<p>undue light spillage is not taking place without loss of security.</p>		

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IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
	<ul style="list-style-type: none"> If economically and technically feasible, make use of motion detectors on security lighting. Care should be taken with the layout of the security lights to prevent motorists on the R502 from being blinded by lights. 				

9.4 Decommissioning Phase

9.4.1 On-going Stakeholder involvement

This is the process that is recommended when the proposed Facility is decommissioned.

Table 35: On-going Stakeholder involvement

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
Ongoing Stakeholder Involvement	<ul style="list-style-type: none"> Community to be notified, as culturally appropriate, timeously of the planned decommissioning, e.g.: <ul style="list-style-type: none"> Proposed decommissioning start date; and Process to be followed. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: 	Holder of the EA	Clear communication channels maintained	During decommissioning

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
	<ul style="list-style-type: none"> – What activities will take place during the decommissioning phase. – How these activities will impact upon the communities and/or their properties. – Regarding the timeframes of scheduled activities • Regular interaction between the client and community leader(s) during the decommissioning phase. • A reporting office/ channel to be established should community members experience problems with contractors/ sub-contractors during the decommissioning phase. • A register to be kept of problems reported by community members and the steps taken to address / resolve it. 			

9.4.2 Waste Management

This section deals with the issues relative to waste management during the decommissioning phase.

Table 36: Waste Management

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
Waste Management	<ul style="list-style-type: none"> • All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. • Any putrescible waste must be stored in containers that can keep out scavengers such as baboons and birds to prevent the spread of litter. 	Holder of the EA	All waste managed according to approved Method Statement	During decommissioning

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT ACTIONS	TIME FRAME
	<ul style="list-style-type: none"> PV installations must be returned to the manufacturer or relevant recycling agent to be recycled. 			

9.4.3 Socio-Economic

This section deals with the issues relative to socio-economic during the decommissioning phase.

Table 37: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Socio-economic: Land demarcated for the solar PV plant will be sterilized and all current activities taking place on said land will be discontinued.	Rehabilitation of land should take place at the end of the project's life to allow for the land to be used for commercial livestock farming after the project's closure.	Holder of EA /Contractor	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

9.4.4 Avifaunal

This section deals with the issues relative to avifaunal during the decommissioning phase.

Table 38: Avifaunal

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Displacement of priority species due to disturbance associated with decommissioning of the PV plant and associated infrastructure	<ul style="list-style-type: none"> De-commissioning activity should be restricted to the immediate footprint of the infrastructure. Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. Measures to control noise and dust should be applied according to current best practice in the industry. Maximum used should be made of existing access roads and the construction of new roads should be kept to a minimum. The mitigation measures proposed by the vegetation specialist must be strictly enforced 	Holder of EA	Construction monitoring and audit reports	<p>Impacts avoided or managed.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous
Avifauna: Entrapment of large-bodied birds in the double perimeter fence	<ul style="list-style-type: none"> It is recommended that a single perimeter fence is used 	Holder of EA	Construction monitoring and audit reports	<p>Impacts avoided or managed.</p> <p>Ensure the conditions of the EA are adhered to.</p>	Continuous

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9.4.5 Terrestrial Biodiversity

This section deals with the issues relative to biodiversity during the decommissioning phase.

Table 39: Terrestrial Biodiversity

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss and disturbance of natural vegetation due to the removal of infrastructure and need for working sites	<ul style="list-style-type: none"> No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities. If any additional infrastructure needs to be constructed, for example overhead powerlines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts. No driving of vehicles off-road. Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. Access to sensitive areas outside of development footprint should not be permitted during operation. Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible 	Holder of EA Contractor ECO	Construction monitoring and audit reports	Impacts avoided or managed. Ensure the conditions of the EA are adhered to.	Continuous
Continued establishment and spread of alien invasive plant species due to the presence of	<ul style="list-style-type: none"> Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. 	Holder of EA Contractor ECO	Construction monitoring and audit reports	Impacts avoided or managed.	Continuous

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ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
migration corridors and disturbance vectors	<ul style="list-style-type: none"> Undertake regular monitoring to detect alien invasions early so that they can be controlled. Post-decommissioning monitoring should continue for an appropriate length of time to ensure that future problems are avoided. Do NOT use any alien plants during any rehabilitation that may be required. 			Ensure the conditions of the EA are adhered to.	

9.4.6 Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the decommissioning phase.

Table 40: Agriculture and Soils

IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
Agriculture and Soils: Loss of agricultural land	<ul style="list-style-type: none"> Avoid any cultivated and especially irrigated areas, if possible 	Engineer /Contractor	<ul style="list-style-type: none"> Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the 	<ul style="list-style-type: none"> That disturbance and existence of hard surfaces causes no erosion on or downstream of the site. That vegetation clearing does not pose a high erosion risk. 	Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.
Agriculture and Soils: Soil erosion (wind or water) caused by surface disturbance	<ul style="list-style-type: none"> Avoid extensive vegetation removal; re-vegetate as soon as possible and maintain cover (irrigate if necessary) 				

			run-off control system in the event of any erosion occurring. <ul style="list-style-type: none"> Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation. 		
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9.4.7 Visual

This section deals with the issues relative to visual during the decommissioning phase.

Table 41: Visual

IMPACT/ ASPECT	MITIGATION/MANAGEMENT ACTIONS	RESPONSIBILITY	METHODOLOGY	MITIGATION/MANAGEMENT OBJECTIVES AND OUTCOMES	FREQUENCY
Visual: Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. <ul style="list-style-type: none"> Decommissioning activities may be perceived as an unwelcome visual intrusion. Dust emissions and dust plumes from increased traffic on the 	<ul style="list-style-type: none"> All infrastructure that is not required for post-decommissioning use should be removed. Carefully plan to minimize the decommissioning period and avoid delays. Maintain a neat decommissioning site by removing rubble and waste materials regularly. Ensure that dust suppression procedures are maintained on all 	Project management and EPC with inputs from rehabilitation specialist.	As defined by the rehabilitation specialist.	Soil sterilization does not take place and large degraded areas do not occur, with overall landscape integrity maintained.	Within 1 year of closure.

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<p>gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers.</p> <ul style="list-style-type: none"> • Surface disturbance during decommissioning would expose bare soil (scarring) which could visually surrounding environment. • Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. 	<p>gravel access roads throughout the decommissioning phase.</p> <ul style="list-style-type: none"> • All cleared areas should be rehabilitated as soon as possible. Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required. 				
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9.4.8 Geotechnical

This section deals with the issues relative to Geotechnical during the decommissioning phase.

Table 42: Geotechnical

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
Geotech: Decommissioning of the structure will disturb the geological environmental. 1) Increase in soil and wind erosion due to clearance of structures 2) Construction and earthmoving vehicles will displace the soil. 3) Creation of drainage paths 4) Potential oil spillages from vehicles 5) Excessive sediments in non-perennial features	<ul style="list-style-type: none"> • Use of existing roads and tracks. • Use of temporary berms and drainage channels to divert surface water during flooding. • Minimize earthworks and demolish footprints. • Use of existing roads and tracks. • Rehabilitation of affected areas (such as regrassing). • Develop a chemical spill response plan. • Develop dust and demolition fly suppression plan. • Reinstate channelized drainage features. 	Holder of EA	Clear communication channels. Compliance to all legislative requirements. Ensure the EMPr is adhered to.	Continuous

10. AMENDMENTS TO THE EMPR

The Environmental Control Officer (ECO) has the right to request (in writing) a method statement to be compiled by the contractor in cases where the Construction EMPr may not adequately address the issue or nature of the activity/site warrants the need thereof. The method statement must be approved in writing by the ECO prior to carrying out the activity.

Any major issues not covered in the EMPr as submitted as well as any layout changes, will be addressed as an addendum to the EMPr and must be submitted for approval prior to implementation.

Authorised officials of the Department reserve the right to review the approved EMPr during the construction and operational phases of the above-mentioned activity and amend/add any condition as it is deemed necessary. Authorised officials also reserve the right to inspect the project during both construction and operational phase of development.

11. ENVIRONMENTAL AWARENESS PLAN

Appendix 4 of GN R326 EIA Regulations 2014 (as amended) requires that and Environmental Awareness Plan describes the manner in which *“the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment”*. In recognition of the need to protect our environment, environmental management should not only be seen as a legal obligation but also as a moral obligation.

This Environmental Awareness Plan is intended to create the required awareness and culture with personnel and contractor's / service providers on environmental safety and health issues associated with the development activities.

11.1 Policy on Environmental Awareness

This Environmental Awareness Plan must serve as the basis for the induction of all new employees (as well as contractors depending on the nature of their work on site) on matters as described herein and read in conjunction with the EMPr. The Plan will also be used to hone awareness of all employees on a continuous basis.

Specific environmental awareness performance criteria will also form part of the job descriptions of employees, to ensure diligence and full responsibility at all levels of the organisational work force.

11.2 Implementation of Environmental Awareness

General environmental awareness will be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout the project's duration. This will ensure that environmental accidents are minimised and environmental compliance maximised.

Environmental awareness will be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site;

- Refresher courses as and when required;
- Daily toolbox talks with all workers on the site at the start of each day, where workers can be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working; and
- Displaying of information posters and other environmental awareness material at the general assembly points.

11.3 Training and awareness

The main contractor is to take responsibility for the management of their staff and subcontractors on the project site during the construction phase and supervise them closely at all times. The onus is on the contractor to make sure that all their staff and subcontractors fully comprehend the contents of the EMPr. The contractor must organise environmental awareness training programmes, which should be targeted at the two levels of employee: management and labour.

11.4 Training of construction workers

All construction staff must receive basic training in environmental awareness, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must be informed of how to recognise historical / archaeological artefacts that may be uncovered. They must also be apprised of the EMPr's requirements. Environmental awareness training programmes need to be formulated for these employee levels and must comprise:

- A record of all names, positions and duties of staff to be trained;
- A framework for the training programmes;
- A summarised version of the training course(s); and
- An agenda for the delivery of the training courses.

Such programmes will set out the training requirements, which need to be conducted prior to any construction works occurring and will include:

- Acceptable behaviour with regard to flora and fauna;
- Management and minimising of waste, including waste separation;
- Maintenance of equipment to prevent the accidental discharge or spill of fuel, oil, lubricants, cement, mortar and other chemicals;
- Responsible handling of chemicals and spills;
- Environmental emergency procedures and incident reporting; and
- General code of conduct towards I&APs.

12. CONCLUSION

The environmental and social impacts of the project were identified through the four project phases (pre-construction, construction, operation and decommissioning). The following section briefly describes some of the major impacts and proposed mitigation measures within each of the project phases.

12.1 Pre-Construction Phase

The first site activities before mobilization of equipment will be a survey, required for final design of foundations. There will be negative impacts on land associated with the construction of camps (temporary loss) and storage of construction materials, and foundations for the buildings (permanent loss) and PV installations. Expectations of improvement in livelihood among locals should be addressed through public participation. Construction contracts will include environmental monitoring and management procedures and requirements. These must be in place prior to the commencement of any construction activities. Once the layouts plans have been finalised a detailed geotechnical investigation should be undertaken.

12.2 Construction Phase

This phase of the activity will have both positive and negative impacts. The positive impacts are employment opportunities offered to the construction workers and any other labourer who will be hired to provide their services during the construction phase. The negative impacts would include wastes generated, accidents, air, dust and noise pollution, vegetation clearance, soil erosion, socio-environmental issues, loss of vegetation, and compaction of soil. Most of the negative impacts are minor and temporary and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP. The contractor shall ensure that all staff have adequate protective clothing and are adequately trained.

12.3 Operational Phase

The proposed project will have minimal negative effects which mainly relates to loss of aesthetic value and habitat. Most of the negative impacts are minor and the significance of the impacts can be greatly reduced by the implementation of mitigation measures, which are outlined in this EMP.

12.4 Decommissioning Phase

As with any project, the facilities used in this project will have a lifetime after which they may no longer be cost effective to continue with operation. At that time, the project would be decommissioned, and the existing equipment removed.

Potential environmental impacts caused during decommissioning are those, which will be mitigated as provided by the Environmental Management Programme. These include: noise and emissions to the surrounding environment, removal of hazardous waste and substances, fire, oil spills, wastes and public safety.

The disposal of materials from the decommissioned plant is not viewed as high risk. Much of the material would be recyclable (steel structures and turbine engines etc.) or inert (concrete foundations, etc.). These materials would however, need to be disposed of at a formal waste disposal or recycling centre.

Based on the above information, it is unlikely that the Project will have significant adverse social and environmental impacts. Most impacts will be of a temporary nature during the construction phase and can be managed to acceptable levels with implementation of the recommended mitigation measures for the Project such that the overall benefits from the Project will greatly outweigh the few negative impacts.

All the negative impacts could be easily mitigated and will either be moderate or less in rating. Generally, the proposed PV facility and associated infrastructure will result in appreciable benefits to the people in the project area of influence and bring opportunities for development to the country.



Appendix A:

Curriculum Vitae



Appendix B:

Environmental Incidents

LOG Environmental Incident Log

[illegible]



Appendix C:

Complaints Record Sheet

Complaints Record Sheet

COMPLAINTS RECORD SHEET	File Ref:	DATE:
	Page of
COMPLAINT RAISED BY:		
CAPACITY OF COMPLAINANT:		
COMPLAINT RECORDED BY:		
COMPLAINT:		
PROPOSED REMEDIAL ACTION:		
EO: _____ Date: _____		
NOTES BY ECO:		
EO: _____ Date: _____ Site Manager: _____ Date: _____		



Appendix D:

Summary of Specialist Findings and Recommendations

SUMMARY OF SPECIALIST FINDINGS AND RECOMMENDATIONS

Specialist Study	Findings	Recommendations
Agricultural and Soils	<p>Soil information was obtained for the solar PV plant and associated infrastructure proposed on Portion 37 of the Farm Leeuwbosch No. 44 near the town of Leeudoringstad in the North West Province. The data source was existing 1:250 000 scale land type information and indicates that the soils are mostly shallow, with much rock.</p> <p>The construction of the solar PV plant and associated infrastructure at the chosen site will have minimal impact on the loss of agricultural land, due to the small percentage of high potential agricultural land indicated by the Land Type survey information.</p> <p>The potential impact on the loss of agricultural land will be low, and there is not expected to be any significant soil erosion hazard, if standard mitigation measures are followed. Cumulative soil-related impacts are also expected to be low.</p>	<p>As far as the soils are concerned, as long as the proposed mitigation measures are adhered to, there should not be any significant cumulative impacts occurring, as any impact on agricultural potential will be contained to the specific site itself.</p>
Geotechnical	<p>The study area is underlain by the Allanridge Formation part of the Ventersdorp Supergroup, which comprises amygaloidal lava.</p> <p>The Ventersdorp Supergroup is predominantly an accumulation of andesitic to basaltic lavas with related pyroclastic rocks.. The desktop study indicates no fatal flaws from a preliminary and geological and geotechnical assessment. The impact of the development from a geotechnical perspective will be restricted to the removal and displacement of soil, boulders and bedrock.</p>	<p>No fatal flaws from a geotechnical perspective were identified. The impact of the Solar PV Facility was found to be “Negative low impact”. The anticipated impact will have negligible negative effects and will require little to no mitigation. The site from a desktop level geotechnical study is considered suitable for the proposed PV Plant.</p> <p>It recommended that a detailed geotechnical investigation be undertaken during the detailed design phase of the project. The detailed geotechnical investigation must entail the following:</p> <ul style="list-style-type: none"> • Profiling and sampling exploratory trial pits to determine founding conditions for the PV modules, substation and

Specialist Study	Findings	Recommendations
		<p>pylons. Also to determine the subgrade conditions for internal roads and a materials investigation (if required);</p> <ul style="list-style-type: none"> • Thermal resistivity and electrical resistivity geophysical testing for electrical design and ground earthing requirements. • Groundwater sampling of existing boreholes to establish a baseline of the groundwater quality for construction purposes; • Dynamic Probe Super Heavy (DPSH) tests and rotary core drilling may be required depending on the soil profiles and imposed loads of the structures.
Avifaunal	<p>The proposed SEF will have several potential impacts on priority avifauna. These impacts are the following:</p> <ul style="list-style-type: none"> • Displacement of priority species due to disturbance associated with the construction and de-commissioning of the PV plant and associated infrastructure. • Displacement of priority species due to habitat transformation associated with the PV plant and associated infrastructure. • Mortality of priority species due to electrocution on the medium voltage internal reticulation network. • Entrapment of large-bodied birds in the double perimeter fence. • Displacement of priority species due to disturbance associated with de-commissioning of the PV plant and associated infrastructure. • Cumulative impact of displacement due to construction and habitat transformation, collisions with solar panels and entrapment in fences 	<p>The proposed Leeumax Solar PV Plant will have a medium pre-mitigation negative impact on priority avifauna, which in most instances, can be reduced to low with appropriate mitigation. The development is supported provided the mitigation measures listed in this report is strictly implemented. No fatal flaws were discovered in the course of the investigations.</p> <p>The cumulative impact of the facility on priority avifauna within a 35km radius around the proposed development (considering all current impacts on avifauna) is assessed to be low post mitigation, mainly due to the small size of the proposed development.</p>
Heritage Archaeological	<p>– The overall impact of the Leeumax facility, on the heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and</p>	<p>The following is recommended:</p> <ul style="list-style-type: none"> • For sites LD07, LD09, LD10, LD11 LD12:

Specialist Study	Findings	Recommendations
	therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.	<ul style="list-style-type: none"> ○ It is recommended that further consultation with local communities on the previous inhabitants of these areas be initiated to determine the possibility of infant burials. In the event that such burial is confirmed a grave relocation process must be initiated. • It is further recommended that an archaeologist monitor the earth moving activities during construction. • Site LD13 if any changes to the structures for the establishment of the watering point is envisaged permission under section 34 of the NHRA from the Provincial Heritage Authority must be obtained. This application for alteration or destruction must be accompanied by site sketches and photographs as compiled by a heritage specialist. <p>In the event that heritage resources are discovered during site clearance, construction activities must stop in the vicinity, and a qualified archaeologist must be appointed to evaluate and make recommendations on mitigation measures.</p> <p>The overall impact of the Leeumax facility, on the heritage resources identified during this report, is seen as acceptably low after the recommendations have been implemented and therefore, impacts can be mitigated to acceptable levels allowing for the development to be authorised.</p>
Heritage Paleontological –	The proposed development is underlain by the Allanridge Formation (Ventersdorp Supergroup). According to the PalaeoMap on the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Allanridge Formation is LOW (Almond and Pether 2008, SAHRIS website).	If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the Environmental Control Officer (ECO) in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that

Specialist Study	Findings	Recommendations
	<p>It is therefore considered that the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological heritage of the area. Hence, the construction of the development may be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources</p>	<p>correct mitigation (recording and collection) can be carry out by a paleontologist.</p> <p>No mitigation measures are required.</p>
Social	<p>The proposed construction of the Leeumax PV will be associated with multiple capital expenditures. Such expenses typically include the transportation and construction of PV modules, the connection of electricity and grids, foundations, civil engineering, and the construction of supporting structures. If goods and services are procured locally, that is, within South Africa, this will increase the production of the respective industries. This will in turn have a positive impact on the national economy and the economies of the municipalities where inputs are procured. It is anticipated that the proposed development will include an approximate R130 million in investments. Some of this is expected to be spent in South Africa, which will resultantly stimulate the national economy, although for a temporary period of about twelve months during the construction of the Solar PV.</p> <p>The construction of the proposed solar PV plant and associated infrastructure will require the temporary employment of construction workers, foremen, and engineers on site. It is anticipated that approximately 25 employment opportunities will be created during the construction phase. Considering the current skills profile of the local municipality, a good portion of these jobs are likely to be filled by people from the local communities. This project will thus contribute to increasing employment opportunities in the local municipality for a temporary period. Employment of the individuals, albeit</p>	<p>Regarding the impacts which will arise from the proposed development, it is anticipated that there will be no major direct or indirect concerns. The proposed solar PV plant will sterilise approximately 20ha of agricultural land currently used for commercial livestock farming,. Due to the nature of the activities taking place on the farms adjacent to the planned development, it is not expected to cause major disruptions during both construction and operational phase on the farms and their respective farmhouses. Furthermore, all potential impacts considered had no fatal flaws identified across all potential impacts considered.</p>

Specialist Study	Findings	Recommendations
	<p>temporary, will increase their household income, improve their standard of living, and benefit their families.</p> <p>The nature of the activities taking place on the farms adjacent to the proposed facilities is also not expected to be sensitive to the proposed project's construction or operation. Therefore, the visual or noise effects that may result from the development of the PV system are not expected to adversely affect the farming activities and their respective farmhouses observed in the region.</p>	
Wetland	<p>The Leeumax site project does not show wetlands within the boundary of the proposed footprint; however, one (1) wetland (HGM 3) was found within the 500m regulated area. The wetland was located south of the project area approximately 185m away. The wetland is also buffered by the main road. The impact assessment concluded that the wetland will not be impacted by the proposed project and that the impact was rated as Low or no perceived impact.</p>	<p>It is recommended that an alien invasive management programme is implemented</p> <p>It is the opinion of the Specialist that the proposed development may proceed and that a GA will be sufficient, this is based on the above findings and recommendations.</p>
Visual	<p>No visually sensitive receptors were identified within the study area. This is most likely due to the fact that the study area is not typically valued or utilised for its tourism significance. Additionally, the R502 and R504 regional roads, which traverse the visual assessment zone, are used almost exclusively as local access roads and do not form part of any scenic tourist routes and are not specifically valued or utilised for their scenic or tourism potential.</p> <p>A total of thirty-two (32) potentially sensitive receptors were however identified, all of which appear to be existing farmsteads. These farmsteads are regarded as potentially sensitive visual receptors as they are located within a mostly rural setting and the proposed development will likely alter natural vistas experienced from these locations, although the</p>	<p>It is the specialist's opinion that the visual impacts associated with the proposed Leeumax SEF and associated infrastructure are of moderate significance. Given the relative absence of sensitive receptors and the significant degree of human transformation and landscape degradation in areas close to the Leeuwbosch 3 SPEF application site, the project is deemed acceptable from a visual impact perspective and the EA should be granted for the BA application. The specialist is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases of the project can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.</p>

Specialist Study	Findings	Recommendations
	<p>residents' sentiments toward the proposed development are unknown. The receptor impact rating conducted in respect of these potentially sensitive receptors found that none of these potentially sensitive receptors are expected to experience high levels of visual impact from the proposed SPEFs. Twenty-six (26) receptors are however expected to experience moderate levels of visual impact, while the remaining six (6) receptors are only expected to experience low levels of impact from the proposed SPEF.</p> <p>The overall impact rating revealed that the Leeuwbosch 3 SPEF is expected to have a (negative) low visual impact rating during both construction and decommissioning phases.</p> <p>From a visual perspective therefore, the proposed Leeuwbosch 3 SPEF is deemed acceptable and the Environmental Authorization (EA) should be granted. SLR is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented</p>	
Terrestrial	<p>In general, the site is considered to have potentially high sensitivity or biodiversity value, based on the location of the site within a listed ecosystem as well as being within an Ecological Support Area.</p> <p>The project study area consists of natural grassland habitat, and degraded areas associated with previous cultivation. The site is within an area where the remaining natural habitat has been assessed as having high conservation value. Existing impacts on natural habitat are related to possible previous cultivation on site. The extent of previous cultivation can be determined from</p>	<p>Use existing road infrastructure for access roads. Avoid construction of infrastructure within sensitive habitats. Minimise vegetation clearing and disturbance to footprint areas only. Compile a rehabilitation programme and rehabilitate disturbed areas. Compile and implement Alien Invasive Management Plan. Limit access to sensitive areas during construction. Undertake monitoring to evaluate whether further measures are required.</p> <p>No additional clearing of vegetation should take place without a proper assessment of the environmental impacts and authorization from relevant authorities. If any additional infrastructure needs to</p>

Specialist Study	Findings	Recommendations
	<p>the combination of local species composition and patterns from aerial imagery. The proposed project will therefore have some effects on areas of natural habitat that may possibly have important biodiversity value.</p> <p>The vegetation on site is part of a threatened ecosystem and has been assessed as being of high conservation value due to rates of transformation. The regional vegetation type that occurs on site, Vaal-Vet Sandy Grassland, is listed as Endangered in the National Ecosystem List, is part of an area earmarked for future National Park expansion and is part of a Provincial Ecological Support Area. Any remaining natural habitat on site therefore has high terrestrial biodiversity value.</p> <p>The most significant impact associated with the project is due to clearing of indigenous natural vegetation. This impact was evaluated as having a significance of MEDIUM after mitigation. All other assessed impacts had a significance of LOW after mitigation. One potential impact with the most significant risk in the absence of any management is due to the potential spread and growth of alien invasive plant species, which is facilitated by disturbance.</p> <p>On the basis of the relatively limited extent that will be disturbed, and the general absence of any species of concern, the proposed development can be authorised.</p>	<p>be constructed, for example overhead powerlines, communication cables, etc., then these must be located next to existing infrastructure, and clustered to avoid dispersed impacts. No driving of vehicles off-road. Implement Alien Plant Management Plan, including monitoring, to ensure minimal impacts on surrounding areas. Access to sensitive areas outside of development footprint should not be permitted during operation. Surface runoff and erosion must be properly controlled and any issues addressed as quickly as possible.</p> <p>Implement an alien management plan, which highlights control priorities and areas and provides a programme for long-term control. Undertake regular monitoring to detect alien invasions early so that they can be controlled. Post-decommissioning monitoring should continue for an appropriate length of time to ensure that future problems are avoided. Do NOT use any alien plants during any rehabilitation that may be required.</p>



Appendix E:

Stormwater Management Plan



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