

## ***Environmental Impact Assessment Process***

# **PHOTOVOLTAIC (SOLAR) ENERGY FACILITY ON REMAINDER OF FARM DU PLESSIS DAM NO. 179 NEAR DE AAR, NORTHERN CAPE**

(DEA REF NO.: 12/12/20/2498; NEAS REF NO.: DEAT/EIA/0000609/2011)

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## ***Environmental Management Programme***

**UPDATED AS OF MARCH 2016**



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# PROJECT DETAILS

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<b>CLIENT REPRESENTATIVE</b>	Warren Morse
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- APPENDIX 1** - Final Site Layout Plan
- APPENDIX 2** - Alien Invasive Management Plan
- APPENDIX 3** - Plant Rescue and Protection Plan
- APPENDIX 4** - Re-Vegetation and Habitat Rehabilitation Plan
- APPENDIX 5** - Traffic Management Plan
- APPENDIX 6** - Stormwater Management Plan
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- APPENDIX 8** - Environmental Sensitivity Map
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- APPENDIX 14** - Method Statement Template

## ABBREVIATIONS AND DEFINITIONS

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<b>DEA</b>	Department of Environmental Affairs
<b>DEA&amp;DP</b>	Department of Environmental Affairs and Development Planning
<b>DWA</b>	Department of Water Affairs
<b>EA</b>	Environmental Authorisation
<b>ECA</b>	Environmental Conservation Act (No. 73 of 1989)
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIR</b>	Environmental Impact Report
<b>EMPr</b>	Environmental Management Plan
<b>MSDS</b>	Material Safety Data Sheet
<b>NEMA</b>	National Environmental Management Act (No. 107 of 1998)
<b>PPE</b>	Personal Protective Equipment
<b>PV</b>	Photovoltaic
<b>SAHRA</b>	South African Heritage Resource Agency - the statutory national body responsible for heritage resource management.

**Alien vegetation** means all undesirable invasive vegetation, defined as but not limited to, all declared category 1 and category 2 plants in terms of the Conservation of Agricultural Resources Act (43 of 1983) (CARA) amended regulations 15 and 16 as promulgated in March 2001.

**Applicant/Developer/Employer** The person or legal entity that has made application to the competent authority for environmental authorizations and who will have the overall responsibility to adhere to the relevant legislation and comply with the environmental authorization.

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**Construction area(s):** refers to all areas used by the Contractor in order to carry out the required construction activities. This includes all offices, accommodation facilities, storage & stockpiling areas, spoiling areas, access roads, etc.

**Environmental Impact:** refers to any change to the environment, whether desirable or undesirable, that would result directly or indirectly from any construction, operational or decommissioning activity.

**Owner/s:** This could remain the applicant/developer/employer/operator, or where the property/facility has been sold the new legal entity or person/s that have taken ownership as well as the responsibility of the EMPr and environmental authorization. The owner is normally referred to during the operational phase.

**Contractor:** The principal persons /company undertaking the construction of the development.

- The main contractor as engaged by the Developer;
- Selected subcontractors; and
- Any other contractor from time to time engaged by the Developer directly in connection with the construction, operation or decommissioning of the Works.

**Construction camp:** Means the area designated for all temporary site offices, storage sheds and areas, parking areas, maintenance workshops, staff welfare facilities, accommodation, etc.

#### **Construction Environmental**

**Management Plan (CEMP):** The construction phase Environmental Management Plan, containing the Environmental Specifications for Civil and Building Works, also forming part of the civils and building contract documentation.

**Employers Representative:** A person representing the Developer on site and who is responsible for the technical and contractual implementation of the works to be undertaken.

**Environment:** Means the surroundings within which humans exist and that are made up of the land, water and atmosphere of the earth;

- micro-organisms, plant and animal life;
- any part or combination of the above and the interrelationships among and between them; and
- the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

#### **Environmental Education Programme:**

An environmental education course for the Contractor's management staff and labour force, which informs them of the requirements of the CEMP. The ECO will present and co-ordinate courses.

#### **Environmental Control Officer (ECO):**

The individual or company appointed by the developer to ensure the implementation of the CEMP and suitable environmental management practices on site for the duration of the construction phase of the project.

#### **Method Statement:**

A written submission by the Contractor to the Employers Representative and ECO in response to the Specifications or a request by the Employers Representative, setting

out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Employers Representative when requesting the Method Statement, in such detail that the Employers Representative is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

The Method Statement shall cover applicable details with regard to:

- construction procedures,
- materials and plant to be used,
- getting the plant to and from site,
- how the plant/ material will be moved while on site,
- how and where material will be stored,
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- timing and location of activities,
- compliance/ non-compliance with the Specifications,
- any other information deemed necessary by the Employers Representative.

**No Go Areas:** Areas identified as being environmentally sensitive in some manner and delineated on plan, and on the site with pegs or fencing and which are out of bounds to unauthorised persons. Authorisation must be obtained prior to entry.

**Potentially hazardous substance:** Is a substance which, in the reasonable opinion of the Employers Representative, can have a deleterious effect on the environment.

**Reasonable:** Means, unless the context indicates otherwise, reasonable in the opinion of the Employers Representative after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in the National Environmental Management Act (No 107,1998)).

**Site:** The boundary and extent of development works and infrastructure, including any areas off the main site on which works are to be carried out in order to allow the development to proceed successfully.

**Solid waste:** Means all solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

**Specification:** A technical description of the standards of materials and workmanship that the Contractor is to use in the Works to be executed, the performance of the Works when completed and the manner in which payment is to be made.

**Works:** The construction operations and all related and incidental works, such as site works, earthworks, installation of services, rehabilitation etc, in connection with the execution and carrying to completion of the development.

**Top material:** This refers to any surface material in the construction area, whether it be soil, fine material or stones including vegetation.

**Topsoil:** Means the top 300mm of soil and may include vegetation and rocks.

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# 1 UPDATES AS OF MARCH 2016

In the course of the update process, the EMPr, which originally consisted of separate CEMP and OEMP documents, has been integrated into a single document, that now covers the full project lifecycle (including the pre-construction phase). The Final EMPr of March 2016 has been updated to comply with Conditions 12 and 13 of the Environmental Authorisation (EA) dated 28 September 2012. The EMPr has also been updated to bring it into line with established Best Practice, as well requirements laid out within the 2014 EIA Regulations (Refer to Table 3 for a compliance checklist in this regard). Additionally, the EMPr has been amended to include the content requirements specified within Condition 18 of the EA, as set out within the Table 1 below.

**Table1:** EMPr compliance with Condition 18 of the Environmental Authorization

Condition		CEMPr
18.1	All recommendations and mitigation measures recorded in the Amended BAR dated August 2012.	Sections 2 - 7
18.2	The requirements and conditions of the authorisation.	Sections 2 - 7 (EA Included as Appendix 10)
18.3	The final site layout plan.	Appendix 1
18.4	An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	Appendix 2
18.5	A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site in consultation with the ECO and be implemented to commencement of the construction phase.	Appendix 3
18.6	A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.	Appendix 4
18.7	A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.	Appendix 5



18.8	A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.	Appendix 6
18.9	An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.	Appendix 7
18.10	An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	Section 5.6
18.11	Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	Section 5.6
18.12	An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.	Appendix 8
18.13	A map combining the final layout plan superimposed on the environmental sensitivity map.	Appendix 9

## 2 OVERVIEW

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This document presents the Environmental Management Programme (EMPr) for the proposed photovoltaic (solar) energy facility on the Remainder of Farm Du Plessis Dam No. 179, situated near De Aar, Northern Cape.

This project was granted Environmental Authorisation (EA) from the Department of Environmental Affairs (DEA) on 28 September 2012 (see Appendix 9 for a copy of the EA).

### 2.1 PURPOSE OF THE EMPR

The EMPr was compiled during the Environmental Impact Assessment (EIA) process during 2011/12 (and subsequently updated to take account of relevant EA conditions) to provide a link between the mitigation measures identified for the assessed project impacts and the actual environmental management on the ground during project implementation and operation.

In other words, the purpose of this document is to provide for environmental management throughout the following life-cycle stages of the proposed development:

- Planning and design,
- Pre-construction and construction,
- Operation, and
- Decommissioning.

Furthermore, this EMPr aims for alignment and optimisation of environmental management processes with conditions of authorisation, thereby ensuring that identified environmental considerations are efficiently and adequately taken into account during all stages of development.

### 2.2 SITE LOCATION AND PROJECT DESCRIPTION

Du Plessis Solar PV4 (PTY) LTD proposes to construct a solar energy facility which would utilize photovoltaic (PV) technology on the Remainder of Farm Du Plessis Dam No. 179, near De Aar in the Northern Cape. The project is referred to as Du Plessis Solar PV4. The Final Site Layout Plan is attached as Appendix 1.

The proposed PV facility will consist of a photovoltaic component comprising of numerous arrays of PV panels and associated support infrastructure to generate up to 19.9 MW through the photovoltaic effect. The proposed facility would occupy approximately 64 ha of low arable agricultural land, which is currently used as unimproved grazing land for cattle production.

Associated infrastructure for the PV facility includes:

- **Powerline:** A 22 kV line (4 km in length) to be connected to the De Aar Taaibos 22kV line.
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- **Storm water:** Storm water infrastructure such as concrete channels to manage the on-site runoff and to direct the flow of storm water.
  - **Access roads:** Access road of 5 km in length which will connect the site to R48.
  - **Internal access:** Internal access routes to link key inverter houses and the solar arrays with roads of between 2m and 4m in width.
  - **Substation:** The distribution substation which is approximately 50m x 50m in size.
  - **Buildings:** Connection centre building: 2.5m x 2.55m; Control centre: 6m x 10m x 2.55m (HxWxL); Guard cabin / offices; and an electrical sub-station.
- Solar resource measuring station:** Resource measuring stations providing remote monitoring and feedback of the plant performance.
- **Fencing:** An electrified fence of  $\pm 2.9$ m height.

## 2.3 LEGAL REQUIREMENTS OF ENVIRONMENTAL MANAGEMENT PROGRAMMES

The National Environmental Management Act (Act 107 of 1998) (NEMA) establishes the principles for decision-making on matters affecting the environment. Section 28(1) states that: *“every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring”*. If such pollution cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution.

Du Plessis Solar PV4 (Pty) Ltd therefore has the responsibility to ensure that the proposed activity as well as the EIA process conforms to the principles of NEMA. In developing the EIA process, Aurecon has been cognisant of this need, and accordingly the EIA process has been undertaken in terms of NEMA.

The content of the EMPr must meet the requirements outlined in Section 24N (2) and (3) of National Environmental Management Act (No. 107 of 1998) (NEMA) (as amended) and Section 33 of the 2010 EIA Regulations (Government Notice Regulations [GN R.] 543). Note that the EMPr requirements of the 2014 EIA Regulations are contained within Appendix 4 of GN R 982. The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life-cycle including an assessment of the effectiveness of monitoring and management arrangements after implementation.

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## 2.4 STRUCTURE OF THE EMPR

As discussed above, the EMPr aims to address environmental management throughout the project life-cycle, from planning and design, through construction, to operation and potential decommissioning. This EMPr consists of the following components:

**Table 2:** Components of the EMPr

<b>Section 1:</b> Update	Provides background information regarding the March 2016 Update of the EMPr
<b>Section 2:</b> Introduction	Provides background information regarding the site, the proposed development and the EMPr
<b>Section3:</b> Implementation of EMPr	Provides details of the communication and organisational structures within which the EMPr will be implemented, responsibilities of key role players, and provides the terms of reference for the ECO.
<b>Section 4:</b> Environmental Management Specifications for the Pre-construction Phase	Provides environmental specifications for preconstruction phase
<b>Section5:</b> Environmental Management Specifications for the Construction Phase	Provides all construction phase environmental management requirements applicable to the principal construction contractors, and their subcontractors.
<b>Section 6:</b> Environmental Management Specifications for the Operational & Decommissioning Phase	Provides all operational phase environmental management requirements applicable to applicant and any sub-contractors.

Although sections 4, 5 and 6 of this EMPr are implemented at different stages of the project, these sections of this EMPr cannot be read in isolation to one another. The document must therefore always be distributed and viewed as a whole and in its entirety (including all associated EMPr Plans and additional requirements, contained within the Appendices to this EMPr document).

## 2.5 EXPERTISE OF ENVIRONMENTAL ASSESSMENT PRACTITIONERS

Section 33 of GN R. 543 and Section 24N (2) and (3) of the NEMA, as well as Appendix 4 of GN R982 requires that an EMPr must include the details of the person(s) who prepared the EMPR, and the expertise of that person to prepare an EMPR. In this regard, the *Curriculum Vitae* of the Environmental Assessment Practitioners who compiled the EMPr are included in Appendix 11.

**Ms Karen Versfeld** is an Environmental Practitioner in the Cape Town Office. She has a Master of Science Degree in Water Resource Management from the University of Pretoria. Karen has over 7 years' experience the Environmental Management and Water Resource

Management fields and has compiled and managed numerous Environmental Impact Assessments, Environmental Management Plans, and Environmental Management Programmes on various projects.

**Mrs Karen de Bruyn** has been working in the environmental sector for two years and has gained experience in solid waste management and renewable energy. She holds degrees in BSc Conservation Ecology and an MPhil in Environmental Management both from the University of Stellenbosch.

The EMPr was updated by the following Environmental Assessment Practitioner (EAP):

**Mr Ross Holland** is the founder of Holland & Associates Environmental Consultants. Ross has a Master of Science Degree in Environmental Science from the University of Cape Town and over 13 years' experience working as an Environmental Practitioner, managing Environmental Impact Assessment processes including renewable energy projects.

## 2.6 CHECKLIST OF COMPLIANCE WITH APPENDIX 4 OF THE GN R982

**Table 3:** Checklist of compliance with Appendix 4 of GN R982

Aspect	Applicable Section
1. (1) An EMPr must comply with section 24N of the Act and include— (a) details of— (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr;	Section 2.5 and Appendix 11
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2.2

<p>(c) a description of the impact management objectives, including management statements, identifying the impacts that need to be avoided, managed and/or mitigated as identified through the environmental impact assessment process for all phases of the development including—</p> <p>(i) planning and design;</p> <p>(ii) pre-construction activities;</p> <p>(iii) construction activities;</p> <p>(iii) where relevant operation activities; and</p> <p>(iv) rehabilitation of the environment after construction and where applicable post closure;</p>	<p>Sections 3, 4, 5 and 6</p>
<p>(d) a description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (c);</p>	<p>Sections 4, 5 and 6</p>
<p>(e) a description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved, and may include actions to —</p> <p>(i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</p> <p>(ii) remedy the cause of pollution or degradation and migration of pollutants;</p> <p>(iii) comply with any prescribed environmental management standards or practices;</p> <p>(iv) comply with any applicable provisions of the Act regarding closure, where applicable;</p> <p>(v) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;</p>	<p>Sections 3, 4, 5 and 6</p>
<p>(f) the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);</p>	<p>Section 3, 4, 5 and 6</p>

(g) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 5 and 6
(h) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3 - 6
(i) the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;	Section 3 - 6
(j) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);	Section 3.2.4, 5.7 and 6.8
(k) a program for reporting on compliance, taking into account the requirements as prescribed by these Regulations;	Section 3.2.4, 5.7 and 6.8
(l) 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.	Sections 3.3.2, 5.6.1 and Appendix 12

## **3 IMPLEMENTATION OF THE EMPr**

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### **3.1 INTRODUCTION**

This document describes mitigation measures in detail, and is partly prescriptive, identifying specific people or organisations to undertake specific tasks in order to ensure that impacts on the environment are minimised during the lifecycle of this project. The EMPr is applicable to all works comprising the pre-construction, construction and operation of the Du Plessis PV4 development. It is an open-ended document implying that information gained during pre-construction, construction and operational activities and/or monitoring of procedures on site could lead to changes in the EMPr.

The appointed ECO (Environmental Control Officer) will monitor compliance with the EMPr and other Conditions of Approval as they relate to environmental matters. This EMPr gives direction and guidance to all responsible parties. The responsible parties are expected to co-operate closely to minimise or avoid unnecessary environmental impacts.

Non-compliance penalties are described in this EMPr and are thus to be included into the official contract documentation. The Contractor is obliged to inform the ECO immediately of events that may cause serious environmental damage or breach the requirements of the EMPr. The ECO in turn will immediately inform the project Engineer and Developer and, if necessary the Local, Provincial and or National Authority, of such events.

### **3.2 RESPONSIBLE PERSONS**

Effective environmental management will be dependent on a number of project personnel. The purpose of this section is to define roles for personnel and to detail their respective responsibilities in the execution of the EMPr.

#### **3.2.1 The Developer**

For the purpose of this document the 'Developer' and its appointed facilitators, refers to those whom permission has been granted to proceed with the Du Plessis Solar PV4 development and who is thus ultimately responsible for compliance with all conditions of approval of the development or any aspect thereof by any authority.

With respect to the pre-construction phase of the development, the developer is to:

- Implement the requirements outlined in the pre-construction EMPr;
- Appoint all the required specialists to make input into the pre-construction/design phase; and
- Implement as many recommendations as possible that will lessen the total environmental impact of the proposed development from the design stage, through to construction and ultimately the operational and decommissioning phase.

With respect to the construction phase of the Development, the Developer is to:

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- Ensure that all relevant approvals and permits have been obtained prior to the start of construction activities on site;
- Ensure that the EMPr has been approved by DEA prior to the start of construction activities on site;
- Ensure that DEA has been notified of the date on which construction activities will be starting, prior to commencement of the activity;
- Ensure that all conditions of approval have been complied with;
- Appoint a suitably qualified or experienced environmental control officer prior to the start of construction activities on site, and for the duration of the construction phase.

With respect to the operational phase of the development, the developer is to:

- Ensure that operation of the PV facility is undertaken in line with the requirements of the operational phase EMPr; and
- Continuously seek to improve any negative environmental impacts which result from the operational phase.

### 3.2.2 The Engineer

For the purposes of this document, “The Engineer” refers to the engineer for the development, or any other person authorised by the Developer, to be responsible for the technical and contractual implementation of the works to be undertaken (including the Project Manager, if relevant).

The responsibilities of the Engineer are to:

- Ensure that the requirements as set out in this EMPr and by the relevant Authorities are adhered to and implemented;
- Assist the ECO in ensuring that the conditions of the EMPr are being adhered to and promptly issuing instructions requested by the ECO, to the Contractor. All site instructions relating to environmental matters issued by the Engineer are to be copied to the ECO;
- Assist the ECO in making decisions and finding solutions to environmental problems that may arise during the construction phase;
- Review and approve construction method statements with input from the ECO;
- Order the removal of person(s) and/or equipment not complying with the specifications (as required by the ECO or otherwise);
- Issue of penalties for transgressions of Environmental Specifications; and
- Provide input into the ECO’s ongoing internal review of the EMPr.

### 3.2.3 The Contractor

For the purposes of this document “The Contractor” refers to any directly appointed (by the Developer) company or individual undertaking the implementation of the works.

The Contractor is to:

- Ensure implementation of all applicable Environmental Specifications, including all additional requirements related with approved method statements, during all works on
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site, failing which penalties, as outlined in the Environmental Specifications may be imposed by the ECO via the Engineer;

- Ensure that all of its sub-contractors', employees, suppliers, agents or servants etc. are fully aware of the environmental requirements detailed in the Environmental Specifications;
- Liaise closely with the Engineer and the ECO and ensure that the works on site are conducted in an environmentally sensitive manner;
- Inform the Engineer as well as the ECO should environmental issues on site go wrong, e.g. dumping, pollution, littering and damage to vegetation; and
- Carry out instructions issued by the Engineer, on request of the ECO, required to fulfil his/her compliance with the CEMP.

### **3.2.4 The Environmental Control Officer (ECO)**

During the construction phase of the project, the ECO is to:

- Ensure that the Contractor has a copy of the EMPr and all agreed method statements;
- Undertake weekly site inspections (frequency may change as required) to audit compliance of all parties with the requirements of the EMPr;
- Advise/recommend on actions or issues impacting on the environment to the Engineer, who shall issue any required Site Instructions to the Contractor;
- Environmentally educate and raise the awareness of the Contractor and his staff as to the sensitivity of the Site and to facilitate the spread of the correct attitude during works on Site;
- Review and approve construction/landscape method statements together with the Engineer/Landscape Architect;
- Assist the Contractor in finding environmentally responsible solutions to problems;
- Recommend to the Engineer the issuing of a penalty for any environmental damage caused on site, or non-compliance with the Environmental Specifications;
- Recommend to the Engineer the removal of person(s) and/or equipment not complying with the Specifications;
- Undertake photographic monitoring of the construction site;
- Keep records of all activities/ incidents on Site in a Site Diary concerning the environment;
- Complete temporary and permanent site closure checklists;
- Take immediate action on Site to stop works where significant and irreparable damage is being inflicted on the environment, and to inform the Engineer immediately of the occurrence and action taken; and
- Undertake a continual internal review of the EMPr and make recommendations to the Engineer and Developer.

The ECO has the authority to recommend to the DEA that works be stopped, if in his/her opinion serious harm to, or impact on the environment is imminent, is likely to occur or has

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occurred and such actual or potential harm or impact is in contravention of the EMPr, and which is, or may be, caused by construction, or related works.

Upon failure by the Contractor or contractor's employee to show adequate consideration to the environmental aspects of this contract, the ECO may recommend to the Engineer and the project management team to have the Contractor's representative or any employee(s) removed from the site or work suspended until the matter is remedied. No extension of time will be considered in the case of such suspensions and all costs will be borne by the Contractor.

The ECO shall keep a site diary in which events and concerns of environmental significance are to be recorded. The ECO will compile a monthly report of such events, concerns and general compliance of the Contractor with the construction phase of the EMPr. This report will be submitted to the Engineer and if required, to the DEA, the Department of Environment and Nature Conservation and the Pixley Ka Seme District Municipality. The ECO is also required to attend regular site meetings of the project management team to report on environmental issues and minute requirements.

The ECO will be responsible for the compilation of a final completion checklist for the project, completed when all construction works related to the project have been completed and the site has been cleared of all construction related debris, materials or equipment not forming part of the permanent works. This checklist will audit the Contractor's compliance with the construction phase of the EMPr throughout the duration of the construction phase and this checklist, together with a final written report will be submitted to the DEA, the Department of Environment and Nature Conservation and the Pixley Ka Seme District Municipality in order to achieve "environmental closure" for the construction phase of the project. The final Construction Phase Audit by the ECO shall be compliant with Condition 24 and 25 of the Environmental Authorization for the project (refer to Appendix 10).

## **3.3 COMMUNICATION STRUCTURES ON SITE**

### **3.3.1 Site Meetings During Construction Phase**

The ECO is required to attend regular site meetings of the project management team to facilitate the transfer of information and to update all parties on the environmental compliance of the project as a whole, and minute requirements.

The ECO will present a summary report outlining the main construction activities that relate to the environment, at this meeting.

The minutes of these meetings will form part of the construction phase of the EMPr records. These minutes will reflect environmental queries, agreed actions and dates of eventual compliance by the Contractor.

The following people should attend these meetings:

- Developer's Representative;
  - Engineer;
  - Landscape Architect (when applicable)
  - The ECO;
  - Contractor(s) representative
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### 3.3.2 Environmental Education and Awareness

The Contractor in consultation with the ECO shall arrange for a presentation to site staff to familiarise them with the environmental aspects of the construction phase of the EMPr within seven days from the commencement date of construction. This presentation should take cognizance of the level of education, designation and language preferences of the staff. General site staff would commonly receive a basic environmental awareness course highlighting general environmental “do’s and don’ts” and how they relate to the site. Management on site e.g. site agents and foremen, who require more detailed knowledge about the environmental sensitivities on site and the contents and application of the construction phase of the EMPr document itself, will benefit from a separate presentation dealing with these issues. The ECO may call upon the services of a specialist environmental education translator should this be required. Please note that Appendix 12 of this EMPr contains a template Environmental Awareness Poster as well as a course outline for the Environmental Education Program.

The manner in which the environmental awareness is undertaken with site staff may vary depending on the sensitivity of the site, scale of the project and availability of an environmental site officer (ESO) appointed by the contractor, do conduct the awareness training during site inductions.

### 3.3.3 Method Statements

The Contractor shall provide Method Statements for approval by the ECO and the Engineer prior to work commencing on aspects of the project deemed or identified to be of greater risk to the environment and/or which may not be covered in sufficient detail in the construction phase of the EMPr, when called upon to do so by the Engineer or ECO.

A Method Statement is a “live document” in that modifications are negotiated between the Contractor and the ECO/project management team, as circumstances unfold. All Method Statements will form part of the construction phase of the EMPr documentation and are subject to all terms and conditions contained within the construction phase of the EMPr.

Note that a Method Statement is a ‘starting point’ for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

Changes to, and adaptations of Method Statements can be implemented with the prior consent of all parties.

A Method Statement describes the scope of the intended work in a step-by-step description in order for the ECO and the Engineer to understand the Contractors intentions. This will enable them to assist in devising any mitigation measures, which would minimize environmental impact during these tasks.

For each instance where it is requested that the Contractor submit a Method Statement to the satisfaction of the Engineer and ECO, the format should clearly indicate the following:

- What - a brief description of the work to be undertaken;
  - How - a detailed description of the process of work, methods and materials;
  - Where - a description/sketch map of the locality of work (if applicable); and
  - When - the sequencing of actions with due commencement dates and completion date estimates.
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- Who – The person responsible for undertaking the works described in the Method Statement;
- Why – a description of why the activity is required.

All Method Statements are to be to the satisfaction of the ECO, Engineer and, where practical and deemed necessary, should be endorsed as being acceptable by the environmental representative of the Relevant Authority.

A list of some of the Method Statements that the Contractor may need to submit during the course of the construction contract has been provided in Section 5, along with an indication of those which the ECO may require the Contractor to provide prior to the start of works on site (see Appendix 14 for a Method Statement Template).

### **3.3.4 ECO Site Diary Entries**

The ECO will maintain a site diary that relates to environmental issues as they occur on site for record keeping purposes. Comments from this diary will form part of reports presented at site meetings by the ECO.

### **3.3.5 Site Memo Entries**

Site memo's, stipulating recommended actions required to improve compliance with the construction phase of the EMPr by the contractor, will be issued by the ECO to the Engineer, who in turn will ensure that the Contractor is informed of the said instruction.

Comments made by the ECO in the Site Memo book are advisory and all Site Instructions required may only be issued by the Engineer. Site Memo's will also be used for the issuing of stop work orders for the purposes of immediately halting any particular activity(ies) of the Contractor deemed to pose immediate and serious risk of unnecessary damage to the environment.

## **3.4 LEGISLATIVE FRAMEWORK**

Obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation (i.e. the Environmental Authorization in terms of the National Environmental Management Act #107 of 1998, as amended) and in terms of amendments to the Particular Conditions of Contract that pertain to this project.

The requirements of this EMPr do not release the Developer from the requirements of any legislation that may be applicable to the project.

A list of Legislation applicable to the project (although not limited to those listed) has been provided below for guidance:

- Constitution of the Republic of South Africa, 1996 (#108 of 1996);
  - National Environmental Management Act (#107 of 1998);
  - National Heritage Resources Act (#25 of 1999);
  - National Water Act (#36 of 1998);
  - Occupational Health and Safety Act (#385 of 1993);
  - Hazardous Substances Act (#15 of 1973);
  - Conservation of Agricultural Resources Act, 1983 (#43 of 1983);
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- The Environment Conservation Act, 1989 (#73 of 1989),
- The National Noise Control Regulations: GN R154 of 1992;
- Western Cape Provincial Noise Control Regulations: PN 200 of 2013;
- National Environmental Management: Air Quality Act (#39 of 2004);
- National Environmental Management: Biodiversity Act (#10 of 2004) – Threatened or Protected Species List;
- National Environmental Management: Waste Act (#59 of 2008) and its regulations;
- National Roads Act (#7 of 1998);
- Mineral and Petroleum Resources Development Act (#28 of 2002);
- National Forests Act (# 84 of 1998);
- National Environmental Management: Protected Areas Act (#57 of 2003) and its Regulations; and
- All outdoor advertising i.e. signage boards associated with this proposed activity must be below the thresholds stipulated in the NEMA EIA Regulations if it was not applied for as an activity for authorization during the Environmental Authorization process. Should the holder of the Environmental Authorisation wish to exceed these thresholds they must submit an application for authorization to the Competent Authority. Further, all outdoor advertising associated with this project, whether on or off the property concerned, must comply with the applicable Local Authority By-Law for the control of Outdoor Advertising or in the absence of local legislative controls, must comply with the South African Manual for Outdoor Advertising Control (SAMOAC).

Kindly note that South African Legislation is subject to regular change, and the list above should therefore be treated as indicative, and checked against the latest prevailing legal requirements at the time of project implementation.

### **3.5 DISPUTE RESOLUTION**

Any disputes or disagreements between role players on Site (with regard to environmental management) will firstly be referred to the Engineer during the construction phase, or to a DEA environmental officer during the operational phase.

Where a dispute still persists this shall be referred for arbitration to a panel of persons consists of one specialist environmental consultant, one qualified engineer, one official of the DEA and one legal practitioner of no less than four years of experience in environmental issues whose decision by simple majority will be final and binding on the parties. This arbitration will be informal (“the informal arbitration”) and will be finalised within a period of 48 hours from the date of the declaration of a dispute, the purpose being to ensure that disagreements are rapidly resolved and thereby to limit any prejudice to the contractor or the other parties to this agreement in the construction process or during the operation of the development. In the event of a deadlock in the aforesaid panel, the legal practitioner forming part of the panel will have a casting vote.

### **3.6 SOCIAL RESPONSIBILITY**

The Developer and Contractors shall encourage and implement wherever possible the procurement of locally based labour, skills and materials.

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### 3.7 COMMUNITY RELATIONS

The Developers shall be responsible for responding to third party or public queries and/or complaints relating to any project phase. In addition, the Developers shall be responsible for dissemination of information to the community and the media (press releases, notice boards, etc).

The Contractor shall notify the ECO and the Employers Representative of any complaints lodged during the construction phase. The Contractor shall be responsible for maintaining a Complaints Register to record complaints received and action taken. This register will be made available to the ECO, the Employers Representative and the relevant Authority.

### 3.8 RECYCLING

Wherever possible, materials used or generated by construction and operation shall be recycled. Containers for glass, paper and metals shall be provided separate to general waste bins. During construction, office and camp areas are particularly suited to this form of recycling process. Where possible and practical, such as at stores and offices, waste shall be sorted for recycling purposes. Recycling protocols shall sort materials into the following categories:

- Paper / cardboard
- Any packaging materials suitable for re-use
- Plastics
- Aluminium
- Metals (other than aluminium)
- Wood
- Organic waste
- Glass
- Clean Building Rubble

**Recycling ensures that we do not waste valuable resources.**

**Recycling can also create employment opportunities.**

### 3.9 EMPR UPDATE

It must be noted that the EMPr should be regarded as a living document and changes should be made to the EMPr as required by project evolution, while retaining the underlying principles and objectives on which the document is based. Any proposed modifications to the EMPr shall take account of Condition 15 of the Environmental Authorization as well as the requirements of Regulations 35 - 37 of GN R982, which in the case of any amendments to the "impact management outcomes or objectives" requires an approval process from the Competent Authority, prior to the implementation of any EMPr amendments.

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## **4 PLANNING AND DESIGN (PRE-CONSTRUCTION)**

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The design for the approved PV facility should respond to the identified environmental constraints and opportunities. The following mitigation measures related to the design for the proposed development have been recommended to reduce the assessed environmental impacts.

### **4.1 IMPACT MANAGEMENT OUTCOMES FOR THE PRE-CONSTRUCTION PHASE**

The pre-construction EMPr is a list of recommendations and requirements to be considered and implemented by the developer, planning and design team, prior to the commencement of the construction phase of the project.

The impact management outcomes for the pre-construction phase are to ensure that the final detailed design of the project takes account of all relevant mitigation measures put forward through the EIA process, or stipulated in Authority Requirements. The Pre-Construction EMPr also helps to ensure that all Conditions of Authorization relevant to the pre-construction and design phase of the project, are complied with. Compliance with the Pre-Construction EMPr will ensure that the final detailed design of the project avoids impacts on the environment, as far as possible, and where such impacts cannot be avoided, that they are minimized to within acceptable levels, via the final project design.

### **4.2 REQUIREMENTS & MITIGATION MEASURES ARISING FROM SPECIALIST STUDIES**

#### **4.2.1 Ecology**

- Unnecessary impacts on surrounding natural vegetation must be avoided. The construction impacts must be contained to the footprint of the solar array and other associated infrastructure.
  - Where disturbance is unavoidable, disturbed areas should be rehabilitated as quickly as possible.
  - Areas outside the construction footprint should be fenced and access to these areas should be limited as much as possible.
  - If possible, place infrastructure a minimum of 50 m from watercourses.
  - Ground surfaces within the solar array must be properly maintained to avoid erosion impacts. This would require ensuring that ground surfaces do not remain bare, either by planting a cover crop, rehabilitating vegetation or by covering with a suitable grade of gravel.
  - Any alien plants within the control zone of the company must be immediately controlled to avoid establishment of a soil seed bank. Control measures must follow established norms and legal limitations in terms of the method to be used and the chemical substances used.
  - An on-going monitoring programme should be implemented to detect and quantify any aliens that may become established and provide information for the management of aliens.
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- A comprehensive storm-water management plan must be compiled for the solar array.

In relation to the above, please refer to Appendix 1,2,3,4 and 6, which contain the Final Site Layout Plan, the Alien Invasive Management Plan, the Plant Rescue and Protection Plan, the Re-vegetation and Habitat Rehabilitation Plan, as well as the Stormwater Management Plan.

## 4.2.2 Fresh Water Ecology

- Construction activities should as far as possible be limited to the delineated site for the proposed development and the identified access routes. A buffer of 30m should be maintained adjacent to the identified freshwater features. It is important that any of the cleared areas that are not hardened surfaces are rehabilitated after construction is completed by revegetating the areas disturbed by the construction activities with suitable indigenous plants. Invasive alien plants that currently exist within the immediate area of the construction activities should also be removed and the sites.
- Run-off over the exposed areas should be mitigated to reduce the rate and volume of run-off and prevent erosion occurring on the site and within the freshwater features and drainage lines. Contaminated runoff from the construction site(s) should be prevented from entering the rivers. All materials on the construction sites should be properly stored and contained. Disposal of waste from the sites should also be properly managed. Construction workers should be given ablution facilities at the construction sites that are located at least 100m away from the river system and regularly serviced.
- Operational activities should as far as possible be limited to the delineated site for the proposed development and the identified access routes. Invasive alien plant growth should be monitored on an ongoing basis to ensure that these disturbed areas do not become infested with invasive alien plants.
- Storm water run-off infrastructure must be maintained to mitigate both the flow and water quality impacts of any storm water leaving the PV facilities site.
- Where transmission lines need to be constructed over/through the drainage channel, disturbance of the channel should be limited. All crossings over drainage channels or stream beds after the construction phase should be rehabilitated such that the flow within the drainage channel is not impeded.
- Where access routes need to be constructed through ephemeral streams, disturbance of the channel should be limited. All crossings over drainage channels or stream beds should be such that the flow within the drainage channel is not impeded. Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.

## 4.2.3 Avifauna

- Minimise the footprint of the development to the bare minimum;
  - Demarcation of 'no-go' areas to minimise disturbance impacts associated with the construction of the facility;
  - Reducing and maintaining noise disturbance to a minimum.
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- In the event that any breeding sites of priority species (refer to Appendix 3 of the Avifaunal Report contained within Annexure D of the Amended Final BAR) are identified on the site during the course of any pre-construction monitoring, mitigation measures would need to be assessed based on the particular species breeding, location of the nest site and the knowledge and experience of the avifaunal specialist, these could include (a) at the very least demarcating the nest site with a buffer of at least 150 m to make construction workers aware of the breeding activity and to minimise disturbance caused by construction activities, and/or (b) postponing construction until breeding has finished (i.e. the chick or chicks have fledged and all birds have vacated the area); it will be important that the buffer zone allocation and postponement of construction (if required) be done in consultation with the avifaunal specialist, the EAP and the client. If no priority species are found to be breeding then construction can proceed without further mitigation<sup>1</sup>.
- From an avifaunal perspective, complete concrete bases would be preferred as this would reduce vegetation making it less attractive for invertebrates and therefore less attractive to birds to forage in and around the PV panels.
- Minimizing the disturbance associated with the operation of the facility, by scheduling maintenance activities to avoid and/or reduce disturbance;
- Excluding/restricting development from any sensitive areas, including nest sites of raptors and/or red-listed species, proximity to wetlands and any significant flight paths through the development areas. Such areas will be identified through comprehensive pre-construction monitoring programme;
- Wetland species are usually concentrated around wetlands themselves, but flight routes into and away from the wetland may also be affected by the placement of powerlines and/or PV panels.

Hence, 'no-go'- zones would include:

- Areas within 1 km of major wetlands to reduce disturbance and collision risk for waterbirds, and possibly Blue Cranes that may utilise the wetlands in the area.
  - Areas within 1 km of any raptor nests or breeding sites for red-listed large terrestrial birds, specifically Ludwig's Bustard and Blue Crane.
- Minimising the length of any new powerlines installed, and ensuring that all new lines are marked with bird flight diverters along their entire length. It is imperative that all new powerline infrastructure is adequately insulated and bird friendly when configured. Powerlines rather than the actual PV panels, probably represent the greatest threat to birds in PVEF projects. Thus, ideally powerlines should be buried underground to avoid any likelihood of birds colliding with them.
  - Specific powerline mitigation measures would include the following:
    - It is strongly recommended that should the development be approved and lines cannot be buried, the preferred transmission line and not the alternative line should be used. This is closest to the De Aar substation therefore limiting the length of the line which would help in reducing impacts on birds.
    - Carefully monitoring the local avifauna through additional site surveys and/or pre and post-construction monitoring programme, and implementing appropriate additional mitigation as and when significant changes are recorded in the number, distribution or

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<sup>1</sup> Refer to Addendum to the Original Specialist within Appendix 13 of this EMPr.

breeding behaviour of any of the priority species listed in this report, or when collision or electrocution mortalities are recorded for any of the priority species listed in this report.

- Additional mitigation arising from the results of additional surveys and/or preconstruction monitoring might include adjusting the siting of PV panels positioned in areas subsequently identified as important for disturbance and/or displacement of sensitive species and scheduling construction or maintenance activities on site to periods outside of the breeding season.

#### 4.2.4 Heritage

- Clearing of vegetation must be kept to a minimum in order to preserve as much of the typical local landscape character as possible.
- All workmen and equipment must operate within the footprint area to be developed so as to avoid any unnecessary disturbance of heritage resources.
- The development should avoid the undulating and higher lying land in the western part of the study area.
- The area around the historical farm werf (See GPS co-ordinates in Table 4, below) should be cordoned off, protected from all harm and treated as an outright no-go area. This is important since the site is more tangible than Stone Age sites and thus more prone to vandalism and theft.

**Table 4:** List of co-ordinates to be considered a no-go zone on the Farm Du Plessis Dam No 179.

Co-ordinate
S30 38 11.1 E24 03 47.1
S30 38 15.1 E24 03 46.1
S30 38 20.0 E24 03 54.8
S30 38 18.1 E24 04 02.9
S30 38 14.8 E24 04 05.7
S30 38 07.6 E24 03 58.2

#### 4.2.5 Visual

- New structures should be placed where they are least visible to the greatest numbers of people, i.e. in places where the topography can offer shielding (where possible).
- Site offices, if required, shall be limited to a single storey and shall be sited carefully using temporary screen fencing to screen from the wider landscape.
- Buildings should as far as possible, be clad and roofed in materials that will blend in with the local landscape.
- Finishing materials for the infrastructure (including support structures) should be of colours that are non-reflective and in dark matte colours such as dark grey or charcoal.

### **4.3 TENDER DOCUMENTATION**

- The Developer (Du Plessis Solar PV4 (Pty) Ltd) shall ensure that this EMPr is included within the tender documents for all contractors tendering to undertake any aspects of the construction phase of the project.
- In the adjudication of any tenders to undertake any aspect of the construction or operation of the proposed project, Du Plessis Solar PV4 (Pty) Ltd (or Du Plessis Solar PV4 (Pty) Ltd s' agent in this regard) must ensure that the costs of compliance with the Environmental Management Program have been adequately allowed for within the winning tender.

### **4.4 ADDITIONAL PRE-CONSTRUCTION REQUIREMENTS**

- Notify all registered I&APs and key stakeholders of the Environmental Authorisation opportunity and appeal procedure.
  - Notify DEA prior to commencement of construction.
  - Comply with any further pre-construction requirements as outlined within the Environmental Authorization (Appendix 10)
  - The roads authorities shall be contacted prior to construction to ensure that the necessary road upgrades, permits, traffic escorts, etc. are scheduled (if relevant).
  - A health and safety plan must be developed prior to the commencement of construction to identify and avoid work related accidents.
  - The Developer should establish a recruitment and procurement policy which sets reasonable targets for the employment of South African and local residents /suppliers. All contractors should be required to procure and recruit in terms of the Du Plessis Solar PV 4 recruitment and procurement policy.
  - A Code of Conduct must be developed for all workers and contractors directly related to the project. The objective of the code of conduct is to limit, where possible, social ills brought about by the construction and operation of the renewable energy facility.
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## **5 CONSTRUCTION PHASE**

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### **5.1 SCOPE**

This Specification covers the requirements for controlling the impact on the environment of all construction activities for the Du Plessis Solar PV4 project. All construction activities shall observe the requirements of this specification as well as any relevant environmental legislation and in so doing shall be undertaken in such a manner as to minimize impacts on the natural and social environment.

### **5.2 APPLICATION**

This Specification contains clauses that are generally applicable to the undertaking of civil engineering works in areas where it is necessary to impose pro-active controls on the extent to which the construction activities impact on the environment. The roles and responsibilities in terms of the application and implementation of this Specification have been outlined in Section 3 above.

### **5.3 METHOD STATEMENTS**

Any Method Statement required by the Engineer or the Environmental Specification shall be produced within such reasonable time as the Engineer shall specify or as required by the Specification. The Contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow a period of two weeks for approval of the Method Statement by the Engineer. Such approval shall not unreasonably be withheld.

The Engineer or ECO may request a Method Statement for any activity they believe may impact on the environment. The Engineer in consultation with the ECO may also require changes to a Method Statement if the proposal does not comply with the Specification or, if in the reasonable opinion of the Engineer, the proposal may result in, or carry a greater than reasonable risk of damage to the environment in excess of that permitted by the Specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

The following Method Statements shall be provided by the Contractor and submitted to the Engineer and ECO at least seven working days before site establishment:

#### **5.3.1 Site establishment**

The location, layout and method of establishment of the construction camp (including all buildings, offices, lay down yards, vehicle wash areas, fuel storage areas, batching areas and other infrastructure required for the running of the project).

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### **5.3.2 Vegetation clearing**

Method of vegetation clearing during site establishment and disposal procedure for cleared material.

### **5.3.3 Topsoil/Sub soil stockpiling**

Method of clearing topsoil/sub soil and location of topsoil/sub soil stockpiles including erosion protection.

### **5.3.4 Storm water management**

Storm water is to be managed during the construction phase of the project. This should include erosion and sedimentation control measures. A storm water management plan should be submitted.

### **5.3.5 Solid Waste management**

Expected solid waste types, quantities, methods of recycling to be employed, monitoring and record keeping procedures, staff responsible for the oversight of waste management and recycling and frequency of collection and disposal of the non-recycled component, as well as location of disposal sites.

### **5.3.6 Concrete mixing and batch plant**

Location, layout and preparation of cement/ concrete mixing areas including, the methods employed for the mixing of concrete and particularly the containment of runoff water from such areas and the method of transportation of concrete.

### **5.3.7 Access and haul roads**

Details, including a drawing, showing where and how the access points and routes will be located and managed, including traffic safety measures.

### **5.3.8 Hazardous substance (including fuel and oil)**

Details of any hazardous substances / materials to be used, together with the transport, storage, handling and disposal procedures for the substances.

### **5.3.9 Contaminated water**

Methods of minimizing, controlling, collecting and disposing of contaminated water.

### **5.3.10 Environmental incident reporting**

Method and process to be followed in the event of an environmental incident on site.

### **5.3.11 Emergency response plan (to include fire prevention and response)**

Emergency procedures for fire and accidental leaks and spillages of hazardous substances (including fuel and oil). Include details of risk reduction measures to be

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implemented, such as fire fighting equipment, fire prevention procedures and spill kits (materials and compounds used to reduce the extent of spills and to breakdown or encapsulate hydrocarbons).

### **5.3.12 Other method statements**

Other Method Statements required by the Engineer and ECO during the course of construction are to be provided by the Contractor a minimum of fourteen working days prior to commencement of the works or activities to which they apply (these activities may not commence on site before these Method Statements have been approved except in the case of emergency activities).

## 5.4 STRUCTURE OF THE CONSTRUCTION PHASE EMPr

Each activity identified in the EIA process comprises various aspects, which have associated impacts. These, along with the mitigation measures and performance indicators, are outlined in the table below.

ACTIVITY- <i>component of the project for which the impact has been identified</i>					
ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE
<i>A distinct feature or element of the activity.</i>	<i>Environmental impact associated with the aspect.</i>	<p><b>OBJECTIVE:</b> <i>To reduce the significance of the environmental impact and/ or eliminate it where possible.</i></p> <p><b>MITIGATION MECHANISMS:</b> <i>Measures identified for implementation to reduce, rectify or contain the identified environmental impact.</i></p>	<i>Outcomes that will indicate achievement of objective/s.</i>	<i>Party or parties identified who will be responsible for implementation of mitigation measure/s.</i>	<i>Timeframe in which identified mitigation measures needs to be implemented.</i>

The construction phase will entail the construction of photovoltaic (PV) panels, transmission lines, storm water infrastructure, access roads, and water supply infrastructure. The construction will be undertaken by a series of contractors and their respective sub-contractors over a period of approximately 12 months. It is estimated that a maximum of 200 construction workers will be involved during the construction phase (amounting to a total of approximately 900 Person Months\*\*\* employment created over the construction period).

\*\* Kindly note that the specifications and requirements outlined within this portion of the EMPr, must be read in conjunction with the relevant specific management plans included as Appendices to this EMPr document.

\*\*\* "Person Months" means the total number of Employees in each of the Contract Months, within the Construction Measurement Period and the Operating Measurement Period, as applicable, which are adjusted for the actual working time, compared to normal working time;



## 5.5 IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

Potential environmental impacts associated with this proposed project were identified and assessed in the Basic Assessment Report. The following specialist studies were undertaken to assess potential impacts:

- Visual Impact Assessment
- Ecological Impact Assessment
- Heritage Impact Assessment
- Hydrological Impact Assessment
- Agricultural Impact Assessment
- Avifaunal Impact Assessment
- Paleontological Impact Assessment
- Aquatic Impact Assessment

Specialist studies are included as annexures in the Basic Assessment Report (**Annexure D**). Construction and Operational Phase Impacts have been assessed and discussed in the Basic Assessment Report.

The construction phase impacts are those impacts on the biophysical and socio-economic environment that would occur during the construction phase (approximately 12 – 30 months) of the proposed project. They are inherently temporary in duration, but may have longer lasting effects.

The construction phase impacts could potentially include:

- General construction phase impacts, including amongst others:
  - Impact on municipal services;
  - Litter / waste pollution and disposal; and
  - Storage and utilisation of hazardous substances on site.
- Impact of dust on air quality;
- Impact of noise during construction (construction vehicles, etc.);
- Impact of increased vehicular traffic and heavy load transport;
- Social impacts (employment opportunities, influx of workers, etc.);
- Visual impacts;
- Impact on Agricultural land;
- Impact on the economy (local shops, restaurants, and Guest Houses, etc.);
- Disturbance of flora, avifauna, and fauna
- Surface water runoff, including sedimentation and erosion, and pollution of surface water resources;
- Impact on archaeological, cultural and historic sites; and
- Impact on palaeontological significant geological units.

Refer to the Basic Assessment Report for further details on the impacts.

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## 5.6 CONSTRUCTION PHASE OBJECTIVES, ACTIONS AND OUTCOMES

5.6.1 General					
ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE
<b>Communication</b>	<p><i>Inability to communicate the environmental obligations effectively to responsible parties can result in unnecessary environmental degradation.</i></p> <p><i>It can also compromise the health and safety of employees.</i></p>	<p><b>OBJECTIVE:</b> <i>To ensure that the construction activities do not result in avoidable impacts on the environment by anticipating and managing the impacts.</i></p> <p><b>MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>The contact details of the key construction team must be available to all relevant parties.</i></li> <li>2) <i>All site instructions pertaining to environmental matters issued by the Engineer are to be copied to the ECO.</i></li> <li>3) <i>All sub-contractors, employees, suppliers, agents or servants etc. must be fully aware of the environmental management requirements detailed in this EMPr.</i></li> <li>4) <i>The Engineer and ECO must be informed immediately should environmental issues arise.</i></li> <li>5) <i>A copy of the Basic Assessment Report, EMPr and EA must be present at the construction site for easy reference to specialist recommendations.</i></li> </ol>	<p><i>No avoidable environmental impacts occurring due to miscommunication.</i></p> <p><i>The ECO is aware of decisions taken by the engineer and contractors.</i></p>	<i>ECO, Engineer and Contractor.</i>	<i>During the construction phase (from site establishment to contract completion).</i>

<p><b>Training of workers</b></p>	<p>Without proper training the health and safety of workers will be at risk and preventable environmental impacts could occur.</p>	<p><b>OBJECTIVE:</b> <i>To provide health and safety training to construction workers to ensure a safe working construction site and to ensure that each employee are aware of the environmental impacts that could occur.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>Temporary and permanent construction workers must undergo environmental awareness training and health and safety training as part of the induction training. Training Materials are provided within Appendix 11 of this EMPr document.</i></li> <li>2) <i>The following aspects need to be covered as a minimum:</i> <ul style="list-style-type: none"> <li>• <i>The prevention of accidental spillage of hazardous chemicals and oil;</i></li> <li>• <i>Disposal of waste;</i></li> <li>• <i>The No-Go areas;</i></li> <li>• <i>Litter control;</i></li> <li>• <i>Identification of archaeological artefacts and whom to report it to;</i></li> <li>• <i>The use of fire fighting equipment and Personal Protective Equipment (PPE); and</i></li> <li>• <i>HIV/AIDS awareness.</i></li> </ul> </li> <li>3) <i>Environmental posters and/ or translators can be used for training purposes.</i></li> <li>4) <i>Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.</i></li> <li>5) <i>Follow-up training courses must be attended</i></li> </ol>	<p><i>All employees adhere to the mitigation measures provided in this document.</i></p> <p><i>All operators of mechanical equipment are trained properly by the contractor.</i></p> <p><i>All workers have attended Environmental awareness training and health and safety training.</i></p>	<p><i>Contractor and ECO</i></p> <p><i>The Contractor shall supply the ECO with a monthly report indicating the number of employees that will be present on site during the following month.</i></p>	<p><i>During the construction phase (from site establishment to contract completion).</i></p>
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		<p><i>throughout the construction period as deemed necessary by the ECO.</i></p> <p>6) <i>All new employees that spend more than one day a week on site are to attend the environmental education program within one week of commencement of work.</i></p>			
<b>Energy use</b>	<p><i>Over utilisation of energy will result in unnecessary energy cost</i></p>	<p>OBJECTIVE: <i>To promote responsible energy consumption whilst reducing unnecessary costs.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>Energy saving lighting must be implemented.</i></li> <li>2) <i>Water saving measures must be implemented across the facility to ensure little wastage.</i></li> <li>3) <i>Minimal lighting must be kept on during the night.</i></li> <li>4) <i>Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.</i></li> <li>5) <i>Delivery of equipment and materials must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities.</i></li> </ol>	<p><i>Unnecessary appliances and equipment are switched off when not being used.</i></p>	<p><i>ECO, Contractor and Engineer</i></p>	<p><i>During the construction phase (from site establishment to contract completion)</i></p>
<b>Traffic</b>	<p><i>Increased volume of traffic both on and off site</i></p>	<p>OBJECTIVE: <i>To ensure that increased traffic volume is managed efficiently to minimise associated impacts.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>Ensure that all drivers are aware of the “No-Go” areas, permissible roads, and where the offloading area is.</i></li> <li>2) <i>Impose speed limits on the construction site.</i></li> </ol>	<p><i>Traffic is orderly, free flowing and controlled.</i></p>	<p><i>Contractor and Engineer</i></p>	<p><i>During the construction phase (from site establishment to contract completion)</i></p>

		<ol style="list-style-type: none"> <li>3) <i>Manage site access to prevent congestion of vehicles and trucks.</i></li> <li>4) <i>Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</i></li> <li>5) <i>Roads not to be used shall be marked with a "NO ENTRY for construction vehicles" sign.</i></li> <li>6) <i>Access roads are to be kept litter free.</i></li> <li>7) <i>Transportation of materials must be done by the least amount of trips to prevent the construction vehicles from congesting the main roads leading to De Aar.</i></li> <li>8) <i>The contractor must ensure that there is ample space to off load the materials to prevent truck being delayed and interrupting the traffic flow.</i></li> </ol>			
<b>Dust</b>	<i>Dust generated from the stripped surfaces, construction demolition, excavations and stockpiled materials can become a nuisance to neighbouring landowners.</i>	<p><b>OBJECTIVE:</b> <i>To avoid nuisance impacts caused by dust as far as possible.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the ECO and Engineer.</i></li> <li>2) <i>Minimise the time that stripped areas are exposed.</i></li> <li>3) <i>Protect open soils against wind erosion.</i></li> <li>4) <i>Put in place procedures for effective cleaning of vehicles and inspection.</i></li> <li>5) <i>Material loads must be covered properly</i></li> </ol>	<i>No complaints received from public and or site staff.</i>	<i>Contractor and ECO</i>	<i>During the construction phase (from site establishment to contract completion).</i>

		<i>during transport and storage thereof.</i>			
<b>Noise</b>	<i>The increase in traffic and operation of equipment may result in noise becoming a nuisance.</i>	<p><b>OBJECTIVE:</b> <i>To ensure that the construction phase are compliant to noise regulations.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>Limit construction to within standard working hours in order to reduce disturbance to nearby landowners.</i></li> <li>2) <i>Inform local farmers and residents of the operating hours for the construction phase.</i></li> <li>3) <i>Noisy operations should be combined so that they occur where possible at the same time.</i></li> <li>4) <i>Construction workers to wear necessary ear protection gear.</i></li> <li>5) <i>Construction equipment must be kept in good working order and where appropriate fitted with a silencer.</i></li> <li>6) <i>The contractor must take measures to discourage labourers from loitering in the area (construction site) after working hours as this may cause noise disturbance.</i></li> </ol>	<i>No complaints received from public and or site staff.</i>	<i>Contractor and ECO</i>	<i>During the construction phase (from site establishment to contract completion).</i>
<b>Impact on municipal services</b>	<i>The proposed activity will require municipal services in terms of sewage, waste removal, and provision of water.</i>	<p><b>OBJECTIVE:</b> <i>To ensure that the Emthanjeni Municipality will be able to accommodate the proposed activity without jeopardising the security of services provided.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>Ensure that service level agreements are in place prior to the commencement of the construction phase.</i></li> </ol>	<i>Services can be provided for the proposed activity.</i>	<i>The Developer and Engineer</i>	<i>Prior to the commencement of the construction phase.</i>
<b>Social</b>	<i>The influx of</i>	<b>OBJECTIVE:</b> <i>Limit the impact on the social status</i>	<i>No unauthorised</i>	<i>Contractor and</i>	<i>During the</i>

	<p>temporary construction workers may impact the local community.</p> <p>The proposed activity will generate employment opportunities which will have a positive impact on the local community.</p>	<p>quo of De Aar and surrounding areas.</p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) Prevent unauthorised individuals from entering the construction site.</li> <li>2) Health, safety and skills training including HIV/AIDS awareness programme must be compulsory for all construction workers.</li> <li>3) Implement a policy of “no employment at the gate”.</li> <li>4) Maximise local employment thereby limiting influx of construction workers to De Aar.</li> </ol>	<p>individuals on site.</p> <p>Employ local individuals as far as possible.</p>	ECO	construction phase.
<p><b>Impact on Tourism / Hospitality industry</b></p>	<p>The activity might impact on the economy (local shops, restaurants, and Guest Houses, etc.)</p>	<p>OBJECTIVE: To ensure on-going sustainability of the local tourism / hospitality industry.</p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) Manage all potential nuisance factors, such as traffic, dust, and noise.</li> </ol>	<p>Tourism / hospitality market not unjustifiably affected.</p>	Contractor, ECO, Engineer	<p>During the construction phase (from site establishment to contract completion).</p>
<p><b>Impact on archaeological, cultural and historic sites</b></p>	<p>Heritage resources can be impacted on during the site clearance, earthworks and the constructing of the PV panels.</p>	<p>OBJECTIVE: To ensure that no heritage resources as identified in the Heritage Impact Assessment report are disturbed and or destroyed.</p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) The ECO must be informed if archaeological resources are found on the surface or exposed by fresh excavations during construction activities.</li> <li>2) Should substantial fossil remains be discovered during construction, these should be safeguarded (preferably in situ) and the</li> </ol>	<p>No heritage resources are disturbed and SAHRA was contacted in the event of uncovering an archaeological artefact.</p>	ECO and contractor	<p>During the construction phase (from site establishment to contract completion).</p>

		<p><i>ECO should alert SAHRA so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.</i></p> <p><i>3) No-Go areas identified by the Heritage Specialist must be demarcated and all site personal must be informed thereof.</i></p>			
<b>Solid waste management</b>	<p><i>The incorrect management of solid waste can result in the pollution of soil, groundwater and the general environment. Windblown litter can also contribute to a negative visual impact. Windblown litter consumed by grazing animals can result in fatality.</i></p>	<p><b>OBJECTIVE:</b> <i>To avoid soil and water contamination as well as windblown litter.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <p><b>General waste</b></p> <ol style="list-style-type: none"> <li><i>1) Provide adequate waste bins.</i></li> <li><i>2) Set up system for regular waste removal to an approved facility.</i></li> <li><i>3) Minimise waste by sorting wastes into recyclable and non-recyclable wastes (an independent contractor can be appointed to conduct this recycling if practical).</i></li> <li><i>4) No waste may be buried or burned under any circumstances.</i></li> <li><i>5) An approved waste disposal contractor must be employed to remove and recycle waste oil, if practical.</i></li> <li><i>6) A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site.</i></li> <li><i>7) Littering by the employees shall not be allowed under any circumstances.</i></li> <li><i>8) The ECO shall monitor the neatness of the work sites as well as the Contractor campsite.</i></li> <li><i>9) Skip waste containers should be maintained</i></li> </ol>	<p><i>No complaints from public.</i></p> <p><i>No windblown litter.</i></p> <p><i>No contamination of soil and or water.</i></p> <p><i>No deceased animals due to windblown litter consumed.</i></p> <p><i>Certificate of disposal at approved waste site are available.</i></p> <p><i>MSDS are available for all hazardous substances stored on site.</i></p> <p><i>Appropriate hazardous waste spill kits are available on site.</i></p>	<p><i>Contractor, ECO</i></p>	<p><i>During the construction phase (from site establishment to contract completion).</i></p>



		<p><i>on site. These should be kept covered and arrangements made for them to be collected regularly to prevent vermin and odours.</i></p> <p><i>10) A certificate of disposal by shall be obtained the Contractor and kept on file, if relevant.</i></p> <p><b>Hazardous waste</b></p> <p><i>11) Hazardous wastes, e.g. mixed cement, shall only be disposed at landfill sites registered for hazardous wastes.</i></p> <p><i>12) All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of at a licensed landfill site.</i></p> <p><i>13) All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction.</i></p> <p><i>14) No hazardous waste may be buried or burned under any circumstances.</i></p> <p><i>15) The Material Safety Data Sheet (MSDS) for any hazardous materials must be kept on site at all times.</i></p> <p><i>16) The contractor must ensure that the employees are informed on how to responsibly dispose of any containers containing hazardous substances.</i></p> <p><i>17) All major spills of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated.</i></p> <p><i>18) Preventative measures must be identified and submitted to the ECO.</i></p>			
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		<p>19) <i>An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage shall be implemented. This shall include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems. Measures should include</i></p> <ul style="list-style-type: none"> <li><i>o Daily vehicle inspection to detect any leakages or spillages</i></li> <li><i>o Weekly visual inspection of plant and standing equipment</i></li> <li><i>o Weekly visual inspection of fuel tanks</i></li> <li><i>o A record of these inspections needs to be kept to demonstrate compliance</i></li> <li><i>o The contractor needs to provide a method statement for “emergency procedures to deal with leakage and spillage of hazardous substances”</i></li> <li><i>o Spill remediation kits shall be kept on site and all staff members shall be informed of where it is located.</i></li> </ul>			
<p><b>Protection of fauna and flora</b></p>	<p><i>Constructing a PV facility may have impacts on the vegetation. The site will be cleared of all vegetation</i></p>	<p>OBJECTIVE: <i>To prevent unnecessary disturbance to natural vegetation.</i></p> <p>MITIGATION MECHANISMS:</p> <p>1) <i>The construction site must be demarcated and all construction employees must be</i></p>	<p><i>No animals are injured.</i></p> <p><i>No employees enter the no-go areas.</i></p>	<p><i>ECO, Contractor</i></p>	<p><i>During the construction phase (from site establishment to contract</i></p>

	<p>and this area could become prone to alien species.</p>	<p>informed that they may not go outside of the site boundaries.</p> <p>2) Any invasive alien plants within the facility must be immediately controlled to avoid establishment of a soil seed bank. Control measures must follow established norms and legal limitations in terms of the method to be used and the chemical substances used.</p> <p>3) An on-going monitoring programme should be implemented to detect and quantify any invasive alien plants that may become established and provide information for the management of aliens.</p> <p>4) Catching of wild animals (including reptiles, amphibians, birds and invertebrates, etc.) by any means, including setting of snares, poisoning, shooting and trapping is illegal and this should not be allowed.</p> <p>5) The contractor is to report any problem animals (e.g. a snake that will not move off site on its own) to the ECO who will organise for their relocation.</p>	<p>No alien vegetation establishment.</p> <p>Invasive alien vegetation monitoring programme implemented.</p>		<p>completion).</p>
<p><b>Visual impact</b></p>	<p>The proposed site is visible to the public and a construction site might have a negative visual impact on the sense of place, which is characterised by vast open plains.</p>	<p>OBJECTIVE: To protect the sense of place of De Aar.</p> <p>MITIGATION MECHANISMS:</p> <p>1) All PV panels must be treated with an antireflective coating to reduce the glare and reflectiveness of the panels.</p> <p>2) Careful consideration should be given to the visual implications of the siting of the construction camp.</p>	<p>No complaints from the public.</p>	<p>ECO, Engineer and Contractor</p>	<p>During the construction phase (from site establishment to contract completion).</p>

		<p>3) <i>Site offices, if required, should be limited to single storey and they should be sited carefully using temporary screen fencing to screen from the wider landscape.</i></p> <p>4) <i>The construction camp shall be kept neat and clean at all times.</i></p> <p>5) <i>Site equipment and materials will be kept away from property entrances.</i></p> <p>6) <i>The contractor shall select materials for site infrastructure that limit reflection and blend in with the environment where possible.</i></p>			
<p><b>Safety</b></p>	<p><i>Construction activities can compromise the safety of adjacent landowners, site staff and general public.</i></p>	<p><b>OBJECTIVE:</b> <i>To secure the site against unauthorised entry and to ensure the safety of members of the public, adjacent landowners and site staff.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <p>1) <i>Secure the site through fencing (temporary or permanent).</i></p> <p>2) <i>Ensure that all visitor and trucks sign-in to control access.</i></p> <p>3) <i>Appoint security personnel to enforce safety and security on and around site.</i></p> <p>4) <i>Material and equipment storage areas must be designated, demarcated and fenced if necessary to minimise the risk of crime.</i></p> <p>5) <i>Provide adequate warning to landowners/ public regarding potential hazards and ensure</i></p>	<p><i>Site is secure and there is no unauthorised entry.</i></p> <p><i>No members of the public/ landowners injured.</i></p> <p><i>No incidents / accidents occur on site.</i></p> <p><i>Signboards put up (on site and off site) before construction commences.</i></p>	<p><i>Contractor, ECO, Engineer</i></p>	<p><i>During the construction phase (from site establishment to contract completion)</i></p>

		<p><i>safe access where required.</i></p> <p>6) <i>Implement requisite construction traffic safety measures at abutting roads.</i></p> <p>7) <i>Workers should be thoroughly trained in using potentially dangerous equipment.</i></p> <p>8) <i>Contractors must ensure that all equipment is maintained in a safe operating condition.</i></p> <p>9) <i>A safety officer must be appointed.</i></p> <p>10) <i>A record of health and safety incidents must be kept on site.</i></p> <p>11) <i>Any health and safety incidents must be reported to the Project Manager, Safety Officer and ECO immediately.</i></p> <p>12) <i>First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. A record of medical treatment provided, including time, date, and procedure/ treatment administered.</i></p> <p>13) <i>Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers / local residents.</i></p> <p>14) <i>Establish alcohol and other drugs policy for the operation.</i></p> <p>15) <i>Use of contrast colouring on equipment/ machinery including the provision of reflective markings to enhance visibility.</i></p> <p>16) <i>Use of moving equipment/machinery</i></p>	<p><i>Provision of safe access routes which are clearly demarcated and visible.</i></p>		
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		<p><i>equipped with improved operator sight lines.</i></p> <p>17) <i>Issuing workers with high visibility clothing.</i></p> <p>18) <i>Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory.</i></p> <p>19) <i>Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents.</i></p> <p>20) <i>Fire fighting equipment must be placed in prominent positions onsite where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.</i></p> <p>21) <i>All speed limits must be adhered to.</i></p> <p>22) <i>Only pre-approved staff must be permitted to stay within the staff accommodation which will be provided.</i></p> <p>23) <i>No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel).</i></p> <p>24) <i>Sign boards, alerting pedestrians and road users to the potential dangers presented by the construction activities, shall be put in place.</i></p>			
<p><b>Stormwater runoff, erosion, and pollution of surface water and groundwater</b></p>	<p><i>Contamination of stormwater runoff can impact on the surface and groundwater resources of</i></p>	<p>OBJECTIVE: <i>Prevent stormwater from eroding the land and becoming contaminated.</i></p> <p>MITIGATION MECHANISMS:</p> <p>1) <i>Identify stockpile areas for construction</i></p>	<p><i>Stormwater not contaminated by construction activities.</i></p>	<p><i>ECO and contractor</i></p> <p><i>ECO to inspect</i></p>	<p><i>After site clearing has taken place up to the end of the construction phase.</i></p>

<p><b>resources.</b></p>	<p><i>De Aar. The mismanagement of stormwater can furthermore result in erosion.</i></p>	<p><i>materials and excavated material outside any drainage lines.</i></p> <ol style="list-style-type: none"> <li>2) <i>Dispose of waste excavated material at appropriate waste disposal sites.</i></li> <li>3) <i>Ensure that substances that pose a risk of water contamination are appropriately stored and disposed of.</i></li> <li>4) <i>Contaminated runoff from the construction site should be prevented from entering freshwater systems.</i></li> <li>5) <i>Construction workers should be provided with ablution facilities at the construction site which are located away from freshwater systems and are regularly services.</i></li> <li>6) <i>Where construction activities occur within drainage channel, the disturbance to the ecosystems must be limited and flow within the drainage channel should not be impeded.</i></li> <li>7) <i>Identify sensitive areas prior to construction in order to implement the necessary precautions.</i></li> <li>8) <i>All erosion control mechanisms need to be regularly maintained.</i></li> <li>9) <i>The Contractor shall, as an on-going exercise, implement erosion and sedimentation control measures to the satisfaction of the ECO and Engineer.</i></li> <li>10) <i>Any erosion channels developed during the construction period shall be restored to a proper condition.</i></li> <li>11) <i>Stabilisation of cleared areas to prevent and</i></li> </ol>	<p><i>Stormwater control measures are effective at regulating runoff from the site and erosion channels do not develop.</i></p> <p><i>Freshwater ecosystems are not unduly disturbed by construction activities within the drainage channels.</i></p>	<p><i>soils for erosion at regular intervals.</i></p>	
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		<p><i>control erosion and/or sedimentation shall be actively managed. The method of stabilisation shall be determined in consultation with the ECO.</i></p> <p><i>12) Water must be re-used, recycled or treated where possible.</i></p> <p><i>13) Promote a water saving mind set with construction workers.</i></p> <p><i>14) Where pollution of a water body may potentially occur, the contractor shall ensure adequate measures (e.g. containment, drainage diversion systems, attenuation, settlement dams, oil absorbent products) are in place to prevent pollution.</i></p> <p><i>15) Any spillages of pollutants, irrespective of size, shall be contained and cleaned immediately.</i></p> <p><i>16) Areas where cement is mixed and containers washed shall be confined to a minimum sized area, which is bunded, so that contaminated runoff is contained.</i></p> <p><i>17) Vehicles and equipment shall be serviced regularly to avoid contamination of soil and water from oil and or hydraulic fluid leaks.</i></p> <p><i>18) Servicing must be done in dedicated service areas on site or else off site if no such area exists.</i></p> <p><i>19) Oil changes must take place on a concrete platform and over a drip tray to avoid</i></p>			
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		<p><i>pollution.</i></p> <p>20) <i>The Contractor shall ensure that drinking water is available for all staff on site.</i></p>			
<b>Fire</b>	<p><i>During the construction phase there will be an increased fire risk.</i></p>	<p>OBJECTIVE: <i>To prevent fires from impacting on the remainder of the farm and nearby properties.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>Provide adequate safe cooking and heating facilities for staff.</i></li> <li>2) <i>Develop emergency protocols for fires.</i></li> <li>3) <i>Ensure adequate fire-fighting equipment is available on site, particularly near "hot" works.</i></li> <li>4) <i>There shall be adequate fire fighting equipment at the fuel storage and dispensing area(s).</i></li> <li>5) <i>No open fires shall be allowed on site under any circumstance.</i></li> <li>6) <i>No smoking shall be allowed in the vicinity of the stores.</i></li> <li>7) <i>Cigarette butts must be disposed in the allocated bins.</i></li> </ol>	<p><i>No occurrence of fires on site or on surrounding areas.</i></p>	<p><i>Contractor, Engineer and ECO</i></p>	<p><i>During Construction Phase (from site establishment to Contract Completion).</i></p>

<b>5.6.2 Establishment of the construction camp</b>					
<b>ASPECT</b>	<b>IMPACT</b>	<b>MITIGATION MEASURE: (objective and mechanism)</b>	<b>PERFORMANCE INDICATOR</b>	<b>RESPONSIBILITY</b>	<b>SCHEDULE</b>
<b>Demarcate the construction camp</b>	<i>Without properly demarcating the site, the surrounding vegetation might be impacted on through trampling, compaction of the soil etc. Windblown litter might also become problematic</i>	<p>OBJECTIVE: <i>Prevent construction activities from impacting on surrounding vegetation.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>The ECO and Engineer shall be advised of the area that the Contractor intends using for the Construction Camp.</i></li> <li>2) <i>All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented.</i></li> <li>3) <i>Any windblown litter must be removed on a regular basis.</i></li> <li>4) <i>Signage shall be placed at all access points in compliance with all applicable occupational health and safety requirements</i></li> </ol>	<i>Temporary or permanent fencing in place.</i>	<i>Contractor</i>	<i>Prior to the commencement of site clearance.</i>
<b>Stockpiling of equipment and materials</b>	<i>Storing materials wrongly can result in water and soil contamination, dust and or erosion.</i>	<p>OBJECTIVE: <i>Ensure that all materials and equipment stored do not cause environmental degradation.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>The Engineer shall be advised of the areas that the Contractor intends to use for the stockpiling of materials.</i></li> <li>2) <i>All construction equipment must be stored within this construction camp.</i></li> </ol>	<i>No public complaints</i>	<i>Contractor and ECO</i>	<i>During Construction Phase (from site establishment to Contract Completion).</i>

		<p>3) <i>Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.</i></p> <p>4) <i>Impervious surfaces must be provided where necessary.</i></p>			
<p><b>Storage and handling of materials</b></p>	<p><i>The incorrect storage and handling of materials pose a risk of environmental contamination and could jeopardise the safety of public/site staff.</i></p>	<p>OBJECTIVE: <i>To ensure that materials are handled and stored in a manner that environmental contamination and safety hazards are limited.</i></p> <p>MITIGATION MECHANISMS:</p> <p>1) <i>Educate employees regarding specification requirements of the materials they handle.</i></p> <p>2) <i>Secure materials during transport.</i></p> <p>3) <i>Identify appropriate storage areas for stockpiling of materials, storage of hydrocarbons and storage of hazardous substances and ensure that these areas are appropriately prepared for their purpose.</i></p> <p>4) <i>Storage of materials must take into consideration the prevailing wind directions to reduce windblown dust.</i></p> <p>5) <i>Prevent and limit spillage of hazardous substances or substances with the potential to cause contamination of the environment.</i></p> <p>6) <i>Develop emergency protocols for dealing with spillages particularly where these pose a pollution risk or involve hazardous substances.</i></p> <p>7) <i>All oil changes must take place within a designated area on an impervious surface such as a concrete slab.</i></p>	<p><i>Correct handling, use and storage of materials, including hazardous materials.</i></p> <p><i>No incidents of environmental contamination.</i></p> <p><i>No accidents or incidents related to the handling of materials.</i></p> <p><i>No public complaints.</i></p>	<p><i>Contractor monitored by the ECO</i></p>	<p><i>During Construction Phase (from site establishment to Contract Completion).</i></p>

		<p>8) <i>Contaminated runoff from the construction site should be prevented from entering freshwater systems.</i></p> <p>9) <i>Containers that contained toxic or harmful materials shall not be rinsed and re-used. Such containers shall not be stored or disposed on site. These containers shall be destroyed to prevent re-use and disposed in accordance with the manufacturer's instructions at a permitted waste disposal facility.</i></p> <p>10) <i>Proper storage facilities which are bunded for the storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used must be provided to prevent the soil and groundwater contamination.</i></p> <p>11) <i>Wall of the bunded area shall be of earth or concrete, and shall be designed to be liquid tight and to withstand a full hydrostatic head of water. The volumetric capacity of the bunded area will be a minimum of 110% of the volume of the largest tank. Should more than one tank be enclosed in the bunded area, then the capacity should be calculated on the volume of all the tanks stored within the bunded area.</i></p> <p>12) <i>All fuel storage area must be roofed to avoid creation of dirty stormwater.</i></p> <p>13) <i>Storage areas containing hazardous substances / materials must be clearly signposted.</i></p> <p>14) <i>The concrete batching plant must be</i></p>			
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		<p><i>contained within a bunded area.</i></p> <p>15) <i>Concrete mixing must only take place within designated areas.</i></p> <p>16) <i>Ready mixed concrete must be utilised where possible.</i></p> <p>17) <i>No stockpiling shall occur outside of the working area or within drainage channels.</i></p>			
<b>Ablution facility, recess area</b>	<p><i>The lack of adequate ablution facilities and recess areas can compromise the health of site staff and result in environmental degradation.</i></p>	<p>OBJECTIVE: <i>To minimise the potential environmental impacts associated with an influx of site staff.</i></p> <p>MITIGATION MECHANISMS:</p> <p>1) <i>The contractor shall establish a sufficient recess area within the construction camp.</i></p> <p>2) <i>The recess area should include a food preparation area with adequate washing facilities and bins.</i></p> <p>3) <i>The Contractor and Engineer shall ensure that the recess area and ablution facilities are positioned so as to limit visual intrusion on neighbours or the greater environment.</i></p> <p>4) <i>No littering may take place.</i></p> <p>5) <i>A sufficient number of chemical toilets shall be provided by the Contractor in the construction camp area and at appropriate locations approved by the Engineer.</i></p> <p>6) <i>Temporary/ portable toilets shall not be located within 100 m of the drainage channels located on site or along the road reserve.</i></p>	<p><i>Adequate ablution facilities are in place.</i></p>	<p><i>Contractor, Engineer and ECO</i></p>	<p><i>Prior to construction.</i></p>

		<p>7) <i>The ratio of ablution facilities for workers should not be less than that required by the Construction Regulations of 2003 of the Occupational Health and Safety Act.</i></p> <p>8) <i>All temporary/ portable toilets shall be secured to the ground to prevent them from toppling due to wind or any other cause.</i></p>			
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### 5.6.3 Clearing of the site

ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE
<b>Demarcating the site to be cleared</b>	<i>Without properly demarcating the area to be cleared of vegetation might result in unnecessary vegetation removal. The surrounding vegetation might also be impacted on through trampling, compaction of the soil and clearing etc.</i>	<p>OBJECTIVE: <i>To keep the area to be cleared of vegetation to a minimum and avoid unnecessary impacts to surrounding vegetation.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>The site must be clearly demarcated with fencing or orange construction barrier to keep clearing activities to a minimum.</i></li> <li>2) <i>No site staff is to be allowed in the area outside of the demarcated area to prevent trampling of surrounding vegetation.</i></li> </ol>	<i>Only the area required for the construction of the PV site are cleared</i>	<i>Contractor and ECO</i>	<i>Prior to construction</i>
<b>No-Go areas</b> <i>No-Go areas are those areas which have been</i>	<i>Without No-Go areas the free moving of site staff</i>	OBJECTIVE: <i>Manage on site biophysical components to ensure ecological health.</i>	<i>Comprehensive record, including photographic</i>	<i>Engineer and ECO</i>	<i>During Construction Phase (from site establishment to</i>

<p><i>designated by specialists as sensitive environments which need to be conserved.</i></p>	<p><i>could result in impacts to the biophysical environment.</i></p>	<p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>All areas outside of the designated construction footprint shall be declared a “No-Go” area.</i></li> <li>2) <i>No equipment shall be allowed outside the site and defined access routes, or within “no-go” areas, unless expressly permitted by the Engineer.</i></li> <li>3) <i>The ECO and Engineer must establish a penalty system to manage any non-compliance.</i></li> <li>4) <i>The ECO must keep record of any non-compliance.</i></li> </ol>	<p><i>record, of compliance available.</i></p>		<p><i>Contract Completion).</i></p>
<p><b>Removal of vegetation</b></p>	<p><i>By not limiting the removal of vegetation to a minimum can result in the destruction or loss of sensitive areas which could include indigenous vegetation, fauna, aquatic ecosystems or heritage resources.</i></p>	<p><b>OBJECTIVE:</b> <i>To ensure that disturbance to sensitive areas or artefacts is minimised and minimise the extent of areas cleared</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) <i>The entire site shall not be cleared at one time but shall be cleared as required.</i></li> <li>2) <i>The top 300 mm of the soil layer shall be stockpiled for rehabilitation purposes. The topsoil stockpiles need to be protected against erosion, contamination and the establishment of alien vegetation.</i></li> <li>3) <i>Topsoil shall be stored in areas demarcated by the ECO and Engineer and in piles not higher than 2 m.</i></li> <li>4) <i>If heavy rains are expected activities should be put on hold to reduce the risk of erosion.</i></li> <li>5) <i>Wind screening should be undertaken to prevent soil loss from the site.</i></li> </ol>	<p><i>Limited extent of vegetation destroyed during construction activities.</i></p> <p><i>No topsoil contaminated.</i></p>	<p><i>Contractor and ECO</i></p>	<p><i>During the start of the construction period.</i></p>

		<p>6) <i>Rehabilitation of completed sections with appropriate local indigenous vegetation shall start immediately and bare soil shall be covered by straw as protection against wind while vegetation re-establishes (or as required by the rehabilitation specialist).</i></p> <p>7) <i>Soil remaining after construction and rehabilitation activities has been completed, shall be dispersed evenly, as a very thin layer of soil.</i></p> <p>8) <i>Once construction is complete, disturbed areas shall be rehabilitated and maintained with appropriate local indigenous vegetation.</i></p>			
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#### 5.6.4 Construction of the PV panels and associated infrastructures

ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE
<b>Excavations for foundation structures and potential pipeline</b>	<p><i>In order to anchor the PV panels excavations will be required which might impact on the environment.</i></p> <p><i>A pipeline might be required depending on the source of water opted for. In order to construct the pipeline</i></p>	<p><b>OBJECTIVE:</b> <i>To limit the impact to the environment caused by excavations.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <p>1) <i>Any surplus materials from excavations that cannot be used on site during the construction phase must be disposed of in an environmentally sound manner.</i></p> <p>2) <i>Materials may be used in local construction activities.</i></p> <p>3) <i>The ECO must be informed if historical artefacts are found on the surface or exposed</i></p>	<i>No heaps of materials left on site after the construction phase.</i>	<i>Contractor, ECO</i>	<i>During Construction Phase (from site establishment to Contract Completion)</i>



	<i>excavations will be required which might impact on the environment</i>	<i>by excavations. 4) Trenches shall be appropriately demarcated and regularly monitored during operations to ensure that pedestrian (and vehicular) access to these areas is strictly prohibited.</i>			
<b>Construction of transmission lines</b>	<i>Transmission lines might result in negative environmental impacts</i>	<p>OBJECTIVE: <i>To construct the transmission lines whilst limiting environmental impacts</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>Demarcate the area proposed for transmission line construction in order to prevent site staff from damaging nearby vegetation.</i></li> <li>2) <i>Implement a bird monitoring programme.</i></li> <li>3) <i>All new powerlines should be adequately insulated and marked with bird flight diverters along their entire length.</i></li> </ol>	<p><i>No damage to vegetation adjacent to area proposed for transmission line construction.</i></p> <p><i>No significance changes are recorded in the number, distribution or breeding behaviour of priority avifauna species (bird monitoring programme).</i></p>	<i>Contractor</i>	<i>During Construction Phase</i>
<b>Construction of buildings</b>	<i>The development will require the construction of a number of small buildings including a local sub-station and a small security office.</i>	<p>OBJECTIVE: <i>To manage the visual impact of buildings.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>Buildings should as far as possible, be clad and roofed in materials that will blend in with the local landscape.</i></li> <li>2) <i>Use finishing materials that are non-reflective.</i></li> <li>3) <i>New structures should be placed where they</i></li> </ol>	<i>Buildings blend in with the local landscape</i>	<i>Contractor</i>	<i>During Construction Phase</i>

		<i>are least visible to the greatest numbers of people. .</i>			
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### 5.6.5 Removal of construction related debris, materials or equipment

ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	SCHEDULE
<b>Removal of equipment, materials and any temporary structures</b>	<i>If the construction camp are not decommissioned it can result in environmental degradation.</i>	<p>OBJECTIVE: <i>To rehabilitate the impacted area to an acceptable state as close to the original state.</i></p> <p>MITIGATION MECHANISMS:</p> <ol style="list-style-type: none"> <li>1) <i>All construction related structures are to be removed from site.</i></li> <li>2) <i>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.</i></li> <li>3) <i>All hardened surfaces within the construction camp area should be ripped and rehabilitated.</i></li> <li>4) <i>Surfaces are to be checked for waste products from activities such as concreting and cleared in a manner approved by the Engineer.</i></li> <li>5) <i>All rubble is to be removed from the site to an approved disposal site as approved by the Engineer.</i></li> <li>6) <i>Burying of rubble on site is prohibited.</i></li> </ol>	<i>The area impacted by the construction activities are rehabilitated and pose no threats to the environment.</i>	<i>Contractor, Engineer and ECO</i>	<i>After the construction phase, before the operational phase can commence.</i>

		<p>7) <i>Temporary fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.</i></p> <p>8) <i>All residual stockpiles must be removed or spread into a thin even layer over the disturbed area.</i></p> <p>9) <i>The Contractor must repair any damage that the construction works has caused to neighbouring properties.</i></p> <p>10) <i>Rehabilitate and re-vegetate cleared areas with indigenous plant species.</i></p>			
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## **5.7 MONITORING AND AUDITING**

The ECO will be responsible for monitoring compliance to this EMPr to ensure that unavoidable environmental impacts do not occur. The ECO must inspect the site and surrounding areas regularly (minimum weekly) to determine compliance to the EMPr.

### **5.7.1 Recordkeeping**

The ECO must report any non-compliance to the Engineer and contractors by including these incidents in a regular report. The report must be compiled on a regular basis (at least monthly) and must include, as a minimum, the following:

- Keeping records of all activities/ incidents on Site concerning the environment;
- Keeping a register of complaints and report these first to the Engineer/Developer for action / follow-up;
- Reviewing and approving construction method statements together with the Engineer/Developer;
- Recommending the issuing of penalties for transgressions of environmental site specifications to the Engineer/Developer;
- Include a register of all personnel attending the Environmental Education Program;
- Completing start-up, monthly and site closure checklists;
- Keeping a photographic record of progress on Site from an environmental perspective; and
- Document all non-compliance and corrective measure implemented.

The ECO will also be responsible for the compilation of a final site closure checklist for the project when all works related to the project have been completed. This checklist will audit the Contractor's compliance with the EMPr throughout the duration of the construction phase and this checklist, together with a final written report will be submitted to the Department of Environmental Affairs and Development Planning in order to achieve "environmental closure" of the site. The final Construction Phase Audit by the ECO shall be compliant with Condition 24 and 25 of the Environmental Authorization for the project (refer to Appendix 9).

### **5.7.2 Auditing**

The ECO along with the Engineer must develop and implement an environmental auditing system for the construction phase.

### **5.7.3 Penalties**

Where the Contractor inflicts damage upon the environment or fails to comply with any of the Environmental Specifications contained within this EMPr, he shall be liable to pay a penalty for breach of the conditions of the Environmental Specifications which form part of the works contract.

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The Contractor is deemed NOT to have complied with this Specification if:

- There is evidence of contravention of the Specification within the boundaries of the site, site extensions and haul/ access roads;
- Environmental damage ensues due to negligence;
- The Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time; or
- The Contractor fails to respond adequately to complaints from the public.

Penalties shall be issued per incident and per individual for the Contractor's responsibility. The amount of the penalty shall be determined by the Engineer, in consultation with the ECO. The Engineer shall inform the Contractor of the contravention and he shall notify the consulting quantity surveyor to deduct such a penalty from monies due under the Contract prior to the issuing of the monthly payment certificates.

Payment of any penalties in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.

The following penalties (not an exclusive list) shall be issued in addition to any remedial costs incurred as a result of non-compliance with the Environmental Specification and shall be imposed by the Engineer on the Contractor for contraventions of the Environmental Specifications by individuals or operators employed by the Contractor and/or his Sub-contractors. Where there are ranges, the amount shall depend on the severity and extent of the damage done to the environment:

a.	An individual entering a "no-go" area by foot (without Engineer's/ ECO's permission)	R 500
b.	An individual failing to adhere to speed limit	R 500
c.	An individual driving a vehicle in a no-go area	R2000
d.	An individual driving any earthmoving plant in a no-go area	R2000 – R5000
e.	A plant operator ignoring a written warning to have an oil leak from his machinery repaired	R 1000
f.	An individual littering on site	R100 - R 1000
g.	An individual not making use of the ablution facilities	R500
h.	An individual making an illegal fire on site	R500 – R10 000
j.	An individual/contractor causing unnecessary damage to flora and fauna on site	R500 – R5000
j.	An individual/team wasting water	R500 – R5000

For each subsequent similar offence committed by the same individual, the penalty shall be doubled in value to a maximum value of R20 000.

The following penalties are suggested for transgressions where damage has been done to the environment:

a.	Erosion	A penalty equivalent in value to the cost of rehabilitation plus 20%
b.	Oil spills	A penalty equivalent in value to the cost of cleanup operation plus 20%
c.	Damage to sensitive environments	A penalty equivalent in value to the cost of restoration plus 20%.
d.	Damage to archaeological finds	A penalty to a maximum of R 100 000 shall be paid for any damage to any archaeological sites/finds

All monies collected through penalties shall be held in an environmental fund by the Developer and be accounted for. A summary page is to be included with the monthly payment certificates as a record of penalties issued to date. A portion of these funds may be used for token monetary bonuses to individual site staff members that have shown exceptional diligence in

applying good environmental practice on the site. The remaining funds shall be allocated for the purposes of contributing to environmental education efforts in the local community e.g. for environmental books for the library, posters, excursions or trees for the local school or environmental resource material for the local public library.

The Engineer, in consultation with the ECO and possibly the Local Authority, will make a final decision regarding the precise allocation of all penalty funds. Documentation accounting for all penalty funds obtained and how these funds were utilized shall be copied to Pixley Ka Seme District Municipality and the DEA, together with the environmental closure documentation on completion of the project.

## **5.8 CONCLUSION**

The EMPr should be regarded as a living document and changes should be made to the EMPr table as required by project evolution while retaining the underlying principles and objectives on which the document is based (subject to the considerations outlined within section 3.9).

The compilation of the EMPr has incorporated impacts and mitigation measures from the EIA report as well as incorporating principles of best practice in terms of environmental management. By identifying the impacts, mitigation measure, performance indicators, responsibilities, potential schedule, the EMPr has provided a platform on which the operational phase EMPr can be founded.

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## **6 OPERATIONAL & DECOMMISSIONING PHASE**

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### **6.1 OVERVIEW AND SCOPE**

This Section presents the Operational Environmental Management Programme (OEMPr) and the Decommission EMPr for the proposed photovoltaic (solar) energy facility on Remainder of Farm Du Plessis Dam No. 179, situated near De Aar, Northern Cape. This Specification covers the requirements for controlling the impact on the environment of operational and decommissioning activities.

The operational phase is expected to last the full period of the Power Purchase Agreement which is approximately 20 years. To ensure that maximum quantities of sunrays can be captured by the PV panels it is important to manage the facility efficiently.

### **6.2 AIM AND PURPOSE OF THE OEMPR**

The OEMPr and decommission EMPr provides a link between the identified operational and decommissioning phase impacts and the environmental management required during project implementation and closure. The purpose of this document is to provide practical mitigation measures to manage environmental impacts associated with the operational and decommissioning phase.

Furthermore, this document aims to align and optimise the environmental management processes with the conditions of authorisation thereby ensuring that environmental considerations are efficiently and adequately taken into account during the operational and decommissioning phase.

The OEMP is a working document that may be amended to enhance its effectiveness for environmental control. Therefore not all specifications and details are prescribed here but should be discussed and the best possible practicable application made by the responsible parties.

### **6.3 APPLICATION**

The application and implementation of the Operational Environmental Management Plan (OEMP) shall be the responsibility of Du Plessis Solar PV4 (Pty) Ltd. Du Plessis Solar PV4 (Pty) Ltd is to appoint an Environmental Site Manager (ESM) to ensure that relevant requirements of the OEMP document are implemented, and that the site is suitably managed. Du Plessis Solar PV4 (Pty) Ltd may appoint a suitably qualified and experienced person from within the existing staff to fulfil the role of ESM.

Should Du Plessis Solar PV4 (Pty) Ltd sub-contract the running of the PV facility to a third party (i.e a third party Operator), the EMPr must be part of the contract and must be binding.

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The roles and responsibilities of each of the above mentioned environmental management bodies have been detailed below:

### **6.3.1 Du Plessis Solar PV4 (Pty) Ltd**

The implementation of the OEMP, as well as the adherence to any conditions within the Environmental Authorization relating to the operational phase of the development, shall be the responsibility of Du Plessis Solar PV4 (Pty) Ltd. As outlined above, should Du Plessis Solar PV4 (Pty) Ltd sub-contract the running of the PV facility to a third party (i.e a third party Operator), the EMPr must be part of the contract and must be binding.

Du Plessis Solar PV4 (Pty) Ltd will appoint an Environmental Site Manager and various specialists as required to ensure that the specifications of this document as they relate to general site management and maintenance, as well as environmental audits are suitably implemented on site.

### **6.3.2 Environmental Site Manager (ESM)**

A suitably qualified and trained individual appointed by Du Plessis Solar PV4 (Pty) Ltd prior to the operation of the PV Facility, will fulfil the role of the Environmental Site Manager. The primary roles and responsibilities of the ESM will be:

- Oversee the implementation of the OEMP on site;
- to visit the site on a monthly basis and advise on areas of environmental management, or compliance with the OEMP, requiring attention;
- to visit the site more regularly during the first 3 months of operation, during which more frequent monitoring may be required for the establishment of certain programmes or aspects of environmental management;
- to be called to site in the case of any emergency situation which may impact on the local environment;
- to liaise with various specialists and the local authorities if required, regarding issues relating to environmental management;
- to report on compliance with the OEMP specifications to Du Plessis Solar PV4 (Pty) Ltd;
- to facilitate environmental audits and ensure that they are undertaken, as required;
- to keep a comprehensive record of environmental management, and issues of non-compliance for audit purposes; and
- to undertake any other tasks outlined in this document, on the behalf of Du Plessis Solar PV4 (Pty) Ltd.

### **6.3.3 Contractor**

Du Plessis Solar PV4 (Pty) Ltd shall ensure that the Contractor (being any directly appointed company or individual undertaking works during the operational or decommission phase) will be responsible for complying with the OEMP and decommission EMPr at all times. In this regard copies of the EMPr shall be included into

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all tender and contract documentation, and Du Plessis Solar PV4 (Pty) Ltd shall ensure that in the awarding of any tenders, or appointment of any contractors, that adequate provision has been made within the approved tenders/quotations for the cost of compliance with the EMPr.

#### **6.3.4 Independent Environmental Control Officer (ECO)**

Since provision has been made for the ESM to be an internal Du Plessis Solar PV4 (Pty) Ltd appointment, Du Plessis Solar PV4 (Pty) Ltd must employ an independent Environmental Professional with post graduate degree in environmental studies and a minimum of 5 years relevant experience to act as the independent environmental auditor for the site. The ECO is to be employed upon completion of the first year of operation, and once every 3 years thereafter to undertake a formal audit on the management plan, and its implementation by the relevant parties for the duration for the operational phase of the project. Specific audit requirements are contained within section 6.8.2.

### **6.4 FINANCING FOR ENVIRONMENTAL MANAGEMENT**

The budget for the implementation of the OEMP shall come out of Du Plessis Solar PV4 (Pty) Ltd's operational budget. Du Plessis Solar PV4 (Pty) Ltd must review the OEMP and allocate the requisite funds to facilitate compliance. Since many of the items addressed in the OEMP relate to required preventative maintenance, operator legal compliance, and responsible environmental management, this cost should not represent significant additional expenditure.

## 6.5 IDENTIFICATION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

Potential environmental impacts associated with this proposed project were identified and assessed within the Basic Assessment Report. The following specialist studies were undertaken to assess potential impacts:

- Visual Impact Assessment
- Ecological Impact Assessment
- Heritage Impact Assessment
- Hydrological Impact Assessment
- Agricultural Impact Assessment
- Avifaunal Impact Assessment
- Paleontological Impact Assessment
- Aquatic Impact Assessment

Specialist studies are included as annexures in the Basic Assessment Report (**Annexure D**). Construction and Operational Phase Impacts have been assessed and discussed in the Basic Assessment Report.

The operational phase impacts are those impacts on the biophysical and socio-economic environment that would occur during the operational phase (approximately > 20 years) of the proposed project and are inherently long-term in duration. The operational phase impacts could potentially include:

- Impact on flora and fauna;
- Impact that flooding may have on the PV facility;
- Impact on surface water runoff and erosion;
- Visual impacts;
- Impact on energy production;
- Social impacts (employment opportunities, etc.);
- Impact on the economy (local shops, restaurants, and Guest Houses, etc.); and
- Impact on municipal services.

Refer to the Basic Assessment Report report for further details on the impacts.

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## 6.6 STRUCTURE OF THE OEMPR AND DECOMMISSION EMPR

Each activity identified in the EIA process comprises various aspects, which have associated impacts. These, along with the mitigation measures and performance indicators, are outlined in the table below.

<b>ACTIVITY-</b> <i>component of the project for which the impact has been identified</i>					
<b>ASPECT</b>	<b>IMPACT</b>	<b>MITIGATION MEASURE: (objective and mechanism)</b>	<b>PERFORMANCE INDICATOR</b>	<b>RESPONSIBILITY</b>	<b>SCHEDULE</b>
<i>A distinct feature or element of the activity.</i>	<i>Environmental impact associated with the aspect.</i>	<p><b>OBJECTIVE:</b> <i>To reduce the significance of the environmental impact and/ or eliminate it where possible.</i></p> <p><b>MITIGATION MECHANISMS:</b> <i>measures identified for implementation to reduce, rectify or contain the identified environmental impact.</i></p>	<i>Outcomes that will indicate achievement of objective/s.</i>	<i>Party or parties identified who will be responsible for implementation of mitigation measure/s.</i>	<i>Timeframe in which identified mitigation measures needs to be implemented.</i>

\*\* Kindly note that the specifications and requirements outlined within this portion of the EMPr, must be read in conjunction with the relevant specific management plans included as Appendices to this EMPr document.

## 6.7 OPERATIONAL PHASE OBJECTIVES, ACTIONS AND OUTCOMES

Operational Phase						
ASPECT	IMPACT	MITIGATION (objective and mechanism)	MEASURE:	PERFORMANCE INDICATOR	RESPONSIBI LITY	SCHEDULE
<b>Training of workers</b>	Without proper training the health and safety of workers will be at risk and preventable environmental impacts could occur.	<p><b>OBJECTIVE:</b> To provide health and safety training to operational workers to ensure a safe working environment and to ensure that each employee are aware of the environmental impacts that could occur.</p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) All permanent and temporary workers must undergo environmental awareness training and health and safety training as part of the induction training (Refer to Appendix 12 for training materials).</li> <li>2) The following aspects need to be covered as a minimum: <ul style="list-style-type: none"> <li>• Disposal of waste;</li> <li>• The No-Go areas;</li> <li>• Litter control; and</li> <li>• The use of fire fighting equipment and Personal Protective Equipment (PPE).</li> </ul> </li> <li>3) Staff operating the site shall be adequately trained.</li> </ol>		All employees adhere to the mitigation measures provided in this document.	Operator	During the operational phase.
<b>Service (electricity and</b>	Over utilisation of services (electricity	<b>OBJECTIVE:</b> To promote responsible energy consumption whilst reducing unnecessary costs.		Unnecessary appliances and	Operator	During the operational

<b>water) provision and utilisation</b>	and water) will result in wastage and unnecessary costs.	<b>MITIGATION MECHANISMS:</b> <ol style="list-style-type: none"> <li>1) Energy saving lighting must be implemented.</li> <li>2) Minimal lighting must be kept on during the night.</li> <li>3) Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.</li> <li>4) Water conservation and demand measures must be implemented across the facility to ensure little wastage.</li> <li>5) Water must be re-used, recycled or treated where possible.</li> <li>6) Promote water saving mind set with construction workers.</li> </ol>	equipment are switched off when not being used. Water conservation, demand management and recycling programs in place.		phase.
<b>Social</b>	The proposed activity will generate employment opportunities which will have a positive impact on the local community.	<b>OBJECTIVE:</b> Limit the impact on the social status quo of De Aar and surrounding areas. <b>MITIGATION MECHANISMS:</b> <ol style="list-style-type: none"> <li>1) Prevent unauthorised individuals from entering the operational site.</li> <li>2) Give preference to local communities for employment opportunities as far as possible.</li> <li>3) Base recruitment on sound labour practices and with gender equality in mind.</li> </ol>	No unauthorised individuals on site. Employ local individuals as far as possible.	Operator	During the operational phase.
<b>Solid waste management</b>	The incorrect management of solid waste can result in the pollution of soil, groundwater and the general	<b>OBJECTIVE:</b> To avoid soil and water contamination as well as windblown litter. <b>MITIGATION MECHANISMS:</b> <b>General waste</b> <ol style="list-style-type: none"> <li>1) Provide adequate waste bins.</li> <li>2) Set up system for regular waste removal</li> </ol>	No complaints from public. No windblown litter. No contamination of soil and or water.	Operator	During the operational phase.

	<p>environment. Windblown litter can also contribute to a negative visual impact. Windblown litter consumed by grazing animals can result in fatality.</p>	<p>to an approved facility.</p> <ol style="list-style-type: none"> <li>3) Minimise waste by sorting wastes into recyclable and non-recyclable wastes (an independent contractor can be appointed to conduct this recycling if practical).</li> <li>4) No waste may be buried or burned under any circumstances.</li> <li>5) Littering by the employees shall not be allowed under any circumstances.</li> </ol>			
<p><b>Protection of fauna, flora and avifauna</b></p>	<p>The site could become prone to alien species.</p>	<p><b>OBJECTIVE:</b> To prevent the establishment of alien invasive vegetation.</p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) The site must be fenced and all operational activities must take place within the footprint of the site.</li> <li>2) Any invasive alien plants within the facility must be immediately controlled to avoid establishment of a soil seed bank. Control measures must follow established norms and legal limitations in terms of the method to be used and the chemical substances used.</li> <li>3) An on-going monitoring programme should be implemented to detect and quantify any invasive alien plants that may become established and provide information for the management of aliens.</li> <li>4) Catching of wild animals (including reptiles, amphibians, birds and invertebrates, etc.) by any means, including setting of snares, poisoning,</li> </ol>	<p>No animals are injured. No alien vegetation establishment. Invasive alien vegetation monitoring programme implemented.</p>	<p>Operator</p>	<p>During the operational phase.</p>

		<p>shooting and trapping is illegal and this should not be allowed.</p> <p>5) A bird monitoring programme should be implemented (see section 6.9 of this EMPr).</p>			
<b>Visual impact</b>	<p>The potential exists that the proposed PV facility and associated infrastructure would be visible from many kilometres away.</p>	<p><b>OBJECTIVE:</b> To protect the sense of place of De Aar.</p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) Buildings should as far as possible, be clad and roofed in materials that will blend in with the local landscape.</li> <li>2) New structures should be placed where they are least visible to the greatest numbers of people, in places where topography can offer shielding.</li> </ol>	<p>No complaints from the public.</p>	<p>Operator</p>	<p>During the operational phase.</p>
<b>Safety</b>	<p>Operational activities can compromise the safety of adjacent landowners, site staff and general public.</p>	<p><b>OBJECTIVE:</b> To secure the site against unauthorised entry and to ensure the safety of members of the public, adjacent landowners and site staff.</p> <p><b>MITIGATION MECHANISMS:</b></p> <ol style="list-style-type: none"> <li>1) Secure the site through fencing (permanent).</li> <li>2) Appoint security personnel to enforce safety and security on and around site.</li> <li>3) A record of health and safety incidents must be kept on site and must be reported to the Project Manager or Engineer.</li> <li>4) First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures.</li> <li>5) Fire fighting equipment must be placed in</li> </ol>	<p>Site is secure and there is no unauthorised entry.</p> <p>No incidents / accidents occur on site.</p> <p>Signboards put up (on site and off site) before operation commences.</p>	<p>Operator</p>	<p>During the operational phase.</p>

		<p><i>prominent positions onsite where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank.</i></p> <p>6) <i>Sign boards, alerting pedestrians and road users to the potential dangers presented by the site, shall be put in place.</i></p> <p>7) <i>Inspection of the plant's perimeter lighting six-monthly.</i></p> <p>8) <i>Replacement of lighting fixtures, fused tubes and broken electrical equipment.</i></p>			
<p><b>Stormwater runoff, erosion, and pollution of surface water and groundwater resources.</b></p>	<p><i>Contamination of stormwater runoff can impact on the surface and groundwater resources of De Aar. The mismanagement of stormwater can furthermore result in erosion.</i></p>	<p><b>OBJECTIVE:</b> <i>Prevent stormwater from eroding the land and becoming contaminated.</i></p> <p><b>MITIGATION MECHANISMS:</b></p> <p>1) <i>Undertake regular cleaning of the panels as dust, dirt, pollen, and bird excretions can reduce the efficiency of PV panels</i></p> <p>2) <i>Panels would be washed with water and a mild, organic, and non-abrasive detergent.</i></p> <p>3) <i>The photovoltaic modules must be cleaned regularly (bi-monthly depending on how quickly dirt accumulates).</i></p> <p>4) <i>A high-pressure hose may not be used.</i></p> <p>5) <i>The modules must be visually inspected for any degradation.</i></p> <p>6) <i>Contaminated runoff from the site should be prevented from entering freshwater systems.</i></p> <p>7) <i>Workers should be provided with ablution facilities at the office / guard house which are located away from freshwater systems and are regularly services.</i></p> <p>8) <i>All erosion control mechanisms need to be</i></p>	<p><i>Stormwater control measures are effective at regulating runoff from the site and erosion channels do not develop.</i></p> <p><i>Freshwater ecosystems are not unduly disturbed by operational activities.</i></p>	<p><i>Operator</i></p>	<p><i>During the operational phase.</i></p>



		<p><i>regularly maintained.</i></p> <p>9) <i>The Operator shall ensure that drinking water is available for all staff on site.</i></p> <p>10) <i>The condition of access roads and footpaths must be inspected for erosion.</i></p> <p>11) <i>The ECO and Engineer need to develop a system to contain and treat cement contaminated water.</i></p>			
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## 6.8 MONITORING AND AUDITING

### 6.8.1 OEMP Review

A schedule for the review of the OEMP should be established by the Du Plessis Solar PV4 (Pty) Ltd. It is recommended that the effectiveness of the OEMP be reviewed on an annual basis, and possibly bi-annually in the first year of operation.

Any proposed changes to the EMPr, arising from either Review or Audit, are to be submitted by the ESM to the DEA for approval prior to implementation (see condition 15 of the EA).

In addition, proposed modifications to the EMPr shall take account of condition 15 of the EA, as well the requirements of Regulations 35 - 37 of GN R982, which in the case of any amendments to the "impact management outcomes or objectives" requires an approval process from the Competent Authority, prior to the implementation of any EMPr amendments.

Results of environmental audits (see section 6.8.2) are to inform the Du Plessis Solar PV4 (Pty) Ltd of changes required to the EMPr documentation.

### 6.8.2 OEMP Audit

Audits of the OEMP implementation in the development should be undertaken on a regular basis. Internal audits (by the ESM) should be done on a quarterly basis with an external audit conducted by an independent consultant undertaken as specified below.

An independent environmental auditor (ECO) is to be employed after the first year of operation, and once every three years thereafter, to perform a formal audit on the management plan, and its implementation by the relevant parties.

Each audit is to be based on site visits by the auditor as well as a review of any records of environmental management to be kept by the ESM. The audit must also determine whether the OEMP is adequately dealing with the range of environmental impacts on the site, i.e. whether the plan is still appropriate, or whether it needs to be extended.

The audit report is to include recommendations of changes required to the OEMP document, management practices etc to improve environmental management of the site. The results of this audit are to be submitted to the provincial and local environmental authority, and DEA.

## 6.9 BIRD MONITORING PROGRAMME

At the time of writing the original Avifaunal Specialist Report (Harebottle 2012), best practice guidelines for assessing the impacts of solar power developments on birds (see Smit 2013) were not yet published and as such, the specialist made use of the wind energy best practice guidelines that were available (Jenkins *et al.* 2011). Subsequently best practice guidelines have been published for birds and solar energy developments (Smit 2012, Jenkins *et al.* 2015) with detailed recommendations for pre- and post-construction monitoring protocols. These state that pre- and post-construction monitoring for solar developments be based on the size of the development site, the potential impacts of the facility on the avifauna (especially priority

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species), and the sensitivity of the avifauna to potential impacts. They suggest that smaller, low-impact sites may require shorter survey periods (1-2 days) while larger, high-impact sites may require multi-day surveys, where more intensive monitoring takes place. For the latter they recommend four surveys over a period of twelve months in order to capture seasonal variation and for the potential to overlap with good rainfall events.

Jenkins and Du Plessis (2014) carried out pre-construction avifaunal surveys for Du Plessis Dam PV4 between May 2013 and March 2014 during which they conducted three, two-day surveys over a 10-month period to capture seasonal variation in occurrence and abundance of the avifauna within the impact zone. Their study included Martial Eagle, Ludwig's Bustard and Blue Crane as priority species, but also highlighted the need for monitoring after significant rainfall events as these act as stimuli for influxes of certain species (e.g. larks and sparrow-larks). Such episodic events could then assume a worse-case impact scenario and provide a baseline for future climatic and environmental conditions affecting bird populations in the area (Jenkins and Du Plessis 2014). They recommended that post-construction monitoring be carried out at the same frequency and intensity as the pre-construction monitoring.

The February 2012 Avifaunal Specialist Report (Harebottle 2012) describes the overall impact of impacts of Du Plessis Solar PV4 as being of 'Medium' magnitude where there is likely to be some impact on bird populations but with low-medium risk to the general avifaunal community. Based on this, and the size of the PV footprint, any additional pre-construction and post-construction monitoring at Du Plessis PV4 Solar need not cover multi-day surveys. Jenkins and Du Plessis's (2014) report stipulates that post-construction surveys should duplicate their pre-construction monitoring in order to properly assess the 'before and after' scenario and as such this would allow for two-day survey periods.

Given the list of priority species for PV4, the results from Jenkins and du Plessis (2014) and general lack of information on potential impacts of PV solar farms on birds, Harebottle (2016) (see Appendix 13 of this EMPr) suggests the following pre- and post-construction monitoring protocol for Du Plessis PV4 Solar:

- Carry out a survey in May 2016, if possible, to compare with May 2013 results obtained from Jenkins and Du Plessis (2014). This would serve as a final 'ad-hoc' pre-construction survey before commencement of construction of the PV facility.
  - Conduct three post-construction surveys to align with the recommendations in Jenkins and Du Plessis (2014) where surveys take place at the same time of year and carried out by the same observers; this would be the preferred option and would mean that surveys would then be carried out in May 2017, August 2017 and March 2018. However, given the timeframes for construction of the PV4 facility (R. Holland *in litt.*), and impact magnitude, it is suggested to reduce the post-construction monitoring to two surveys, one during winter 2017 (sometime between May-July) followed by a summer survey in 2018 (sometime between January-March). This would still allow comparisons to be made with Jenkins and Du Plessis (2014) and provide sufficient data for an adequate pre- and post-analysis. It is however, strongly suggested that these recommendations be discussed with Andrew Jenkins and Johan Du Plessis before any final decisions are taken since they conducted the pre-construction monitoring and would be more familiar with the site, landscape elements and the avifauna.
  - All surveys, regardless of the frequency, should be carried out/replicated based on field and analytical methods described in Jenkins and Du Plessis (2014).
-

**NOTE:** Should the May 2016 survey be logistically impossible to carry out, then it is further recommended that the preferred option of three post-construction surveys be adopted to align with the recommendations of Jenkins and Du Plessis (2014).

Aspects to consider in the monitoring programme should cover the following (taken from the Avifauna Specialist Report - Annexure D of the Final BAR):

- (i) Bird population and breeding surveys;
- (ii) Collision assessments/surveys; and
- (iii) Behavioural/avoidance observations.

For the bird populations surveys the following monitoring should take place:

- Avian densities before and after construction and operation using transect counts;
- Bird activity monitoring, counting priority species flying over or past the PV impact zone, and opportunistic surveys of raptors and cranes and bustards;
- Passage rates of priority bird species using specific vantage points to count individuals or flocks of priority species, all raptors and any additional stipulated species flying within 100 m of the actual periphery of the PV Plant and in particular to the envisaged or actual solar arrays.
- Documenting and quantifying attempts by certain species (particularly sparrows, starlings, pigeons and doves) to nest on or nearby to the facilities. Bird excreta can reduce efficacy of PV cells (Aurecon 2011) and high density of birds could impact on the overall functioning of the facility

Data gathered and analysed from the pre- and post-construction monitoring could well refine mitigation for both phases and affect the construction or operational phases of the development.

For the collision surveys:

- Regular searches of powerline/transmission routes for collision casualties.

For the behavioural observations the following should be carried out:

- Direct observations of birds flying over the actual footprint of the development should be carried out to gauge behavioural responses to the suspected glint or glare reflected from the solar panels. These observations should be done at different times of the day to gauge responses at different light intensities and angles.
- Species, time, flight path and type of behavioural response (e.g. no response, avoidance etc.) should be recorded.

## 6.10 RECORDKEEPING

Any non-compliance must be reported to the Engineer or Project Manager by including these incidents in a regular report. The report must be compiled on a regular basis and must include, as a minimum, the following:

- Keeping records of all activities/ incidents on Site concerning the environment;
  - Keeping a register of complaints and report these first to the Engineer/ Developer for action / follow-up; and
-

- Document all non-compliance and corrective measure implemented.

## **6.11 DECOMMISSIONING PHASE**

The operational phase is expected to last approximately 20 years thereafter the PV facility would be decommissioned. During the decommissioning phase of the proposed solar energy facility all materials and all infrastructures would need to be disposed of at an approved landfill site or recycled where appropriate. All disturbed areas would be rehabilitated during decommissioning.

Since the proposed solar energy facility comprises of inert materials (mostly concrete), the residual risks associated with decommissioning would be negligible. Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist. All solar panels will be recycled as materials can be re-used to produce new solar panels.

Any hazardous substances shall be removed and disposed of in terms of the requirements of relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973). The module components would be removed and recycled as the silicon and aluminum could be re-used in the production of new modules.

The decommissioning is expected to take between 6 to 12 months.

Kindly note that should the applicant decide to decommission the Du Plessis Solar PV4 facility at some future date, the act of decommissioning would likely trigger a requirement to undertake an Environmental Assessment, as would presently be the case in terms of activity 31 of Government Notice R983 of 2014. This Environmental Assessment would assess the impacts and opportunities of decommissioning in far greater detail than is possible at this time, and would likely include a specific decommissioning EMPr.

## **6.12 CONCLUSION**

In conclusion it should be noted that the OEMPr and the decommission EMPr should be regarded as a living document and changes should be made as required by project evolution while retaining the underlying principles and objectives on which the document is based.

The compilation of the OEMPr and the decommission EMPr has incorporated impacts and mitigation measures from the EIAR as well as incorporating principles of best practice in terms of environmental management.

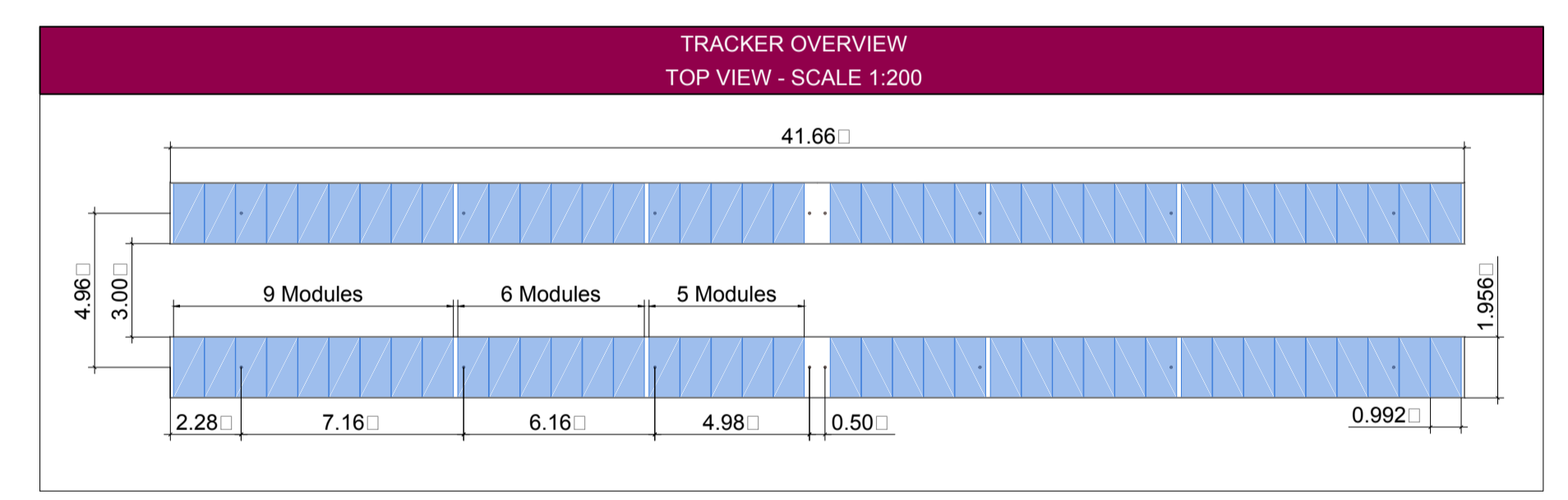
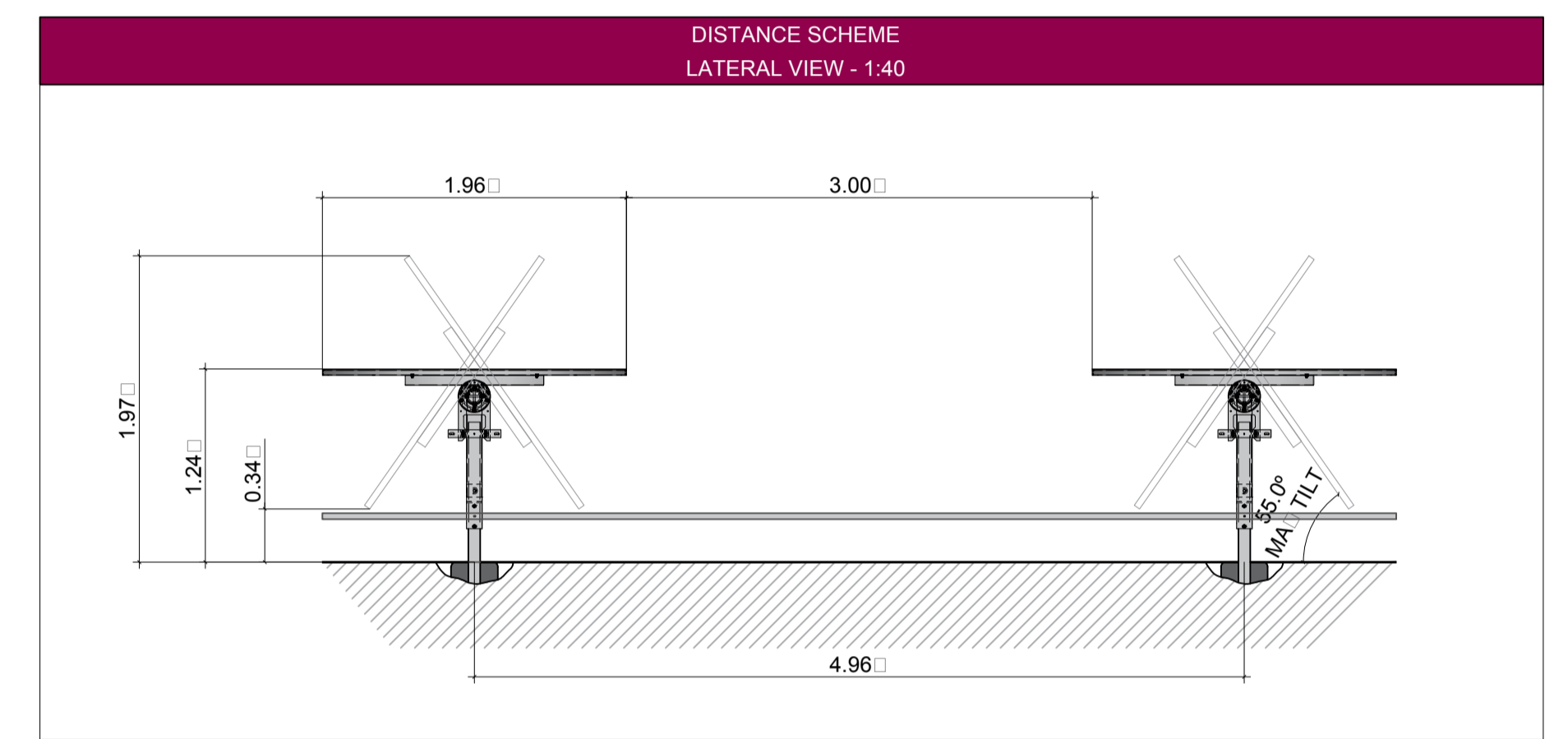
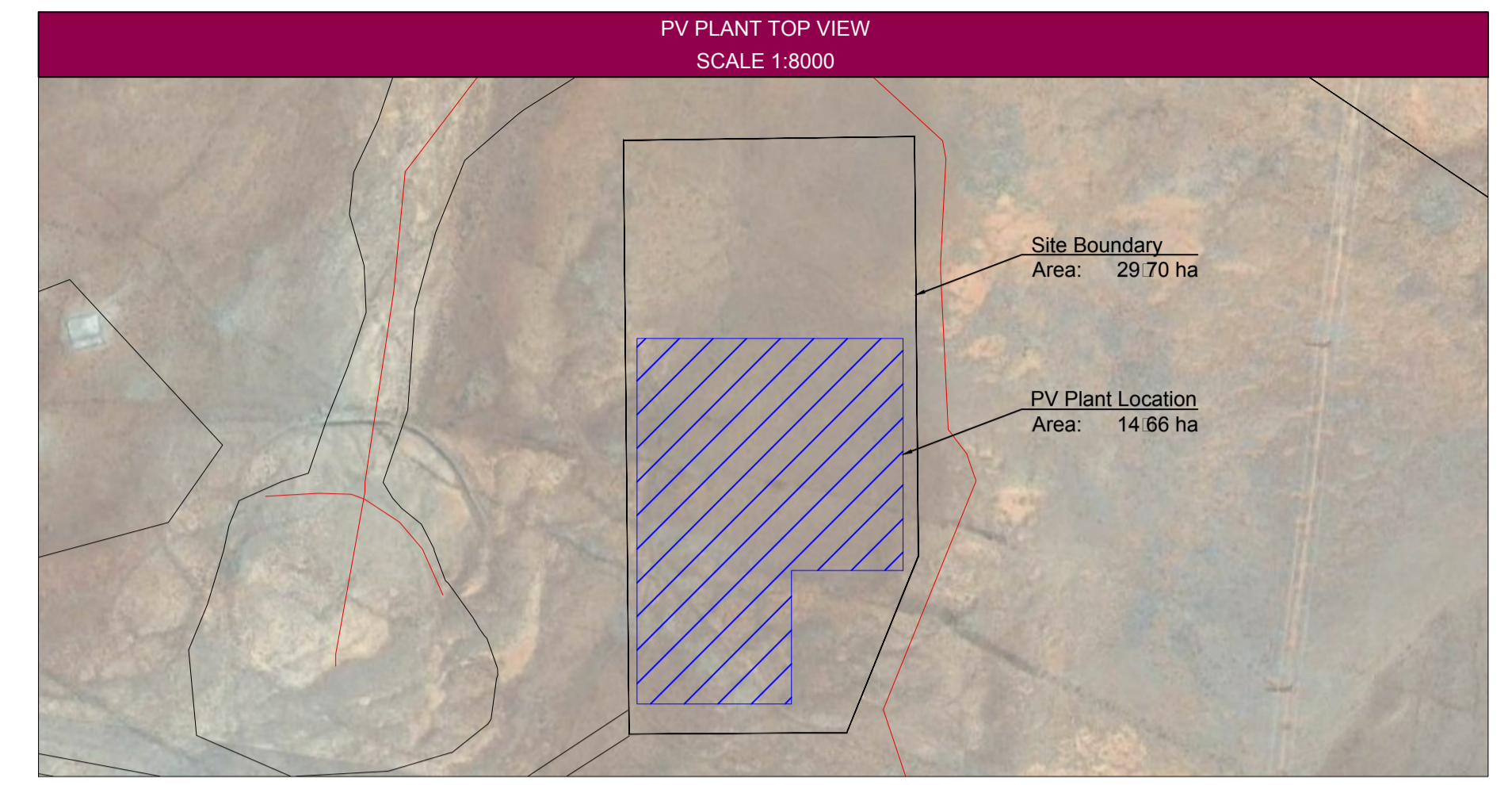
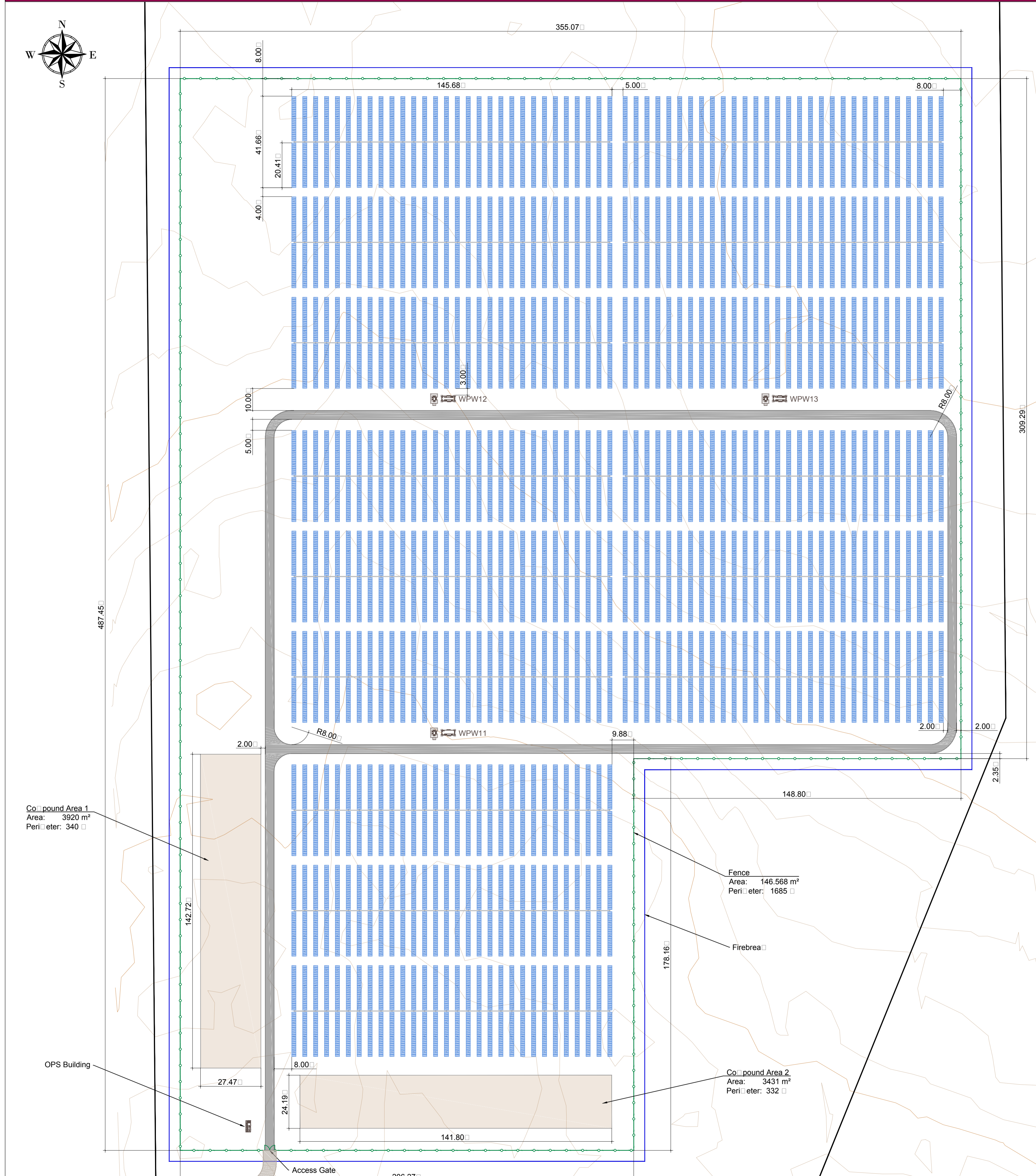
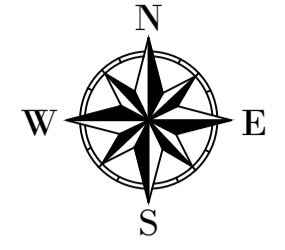
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# 7 APPENDICES

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OVERALL MODULE LAYOUT  
SCALE 1:1000



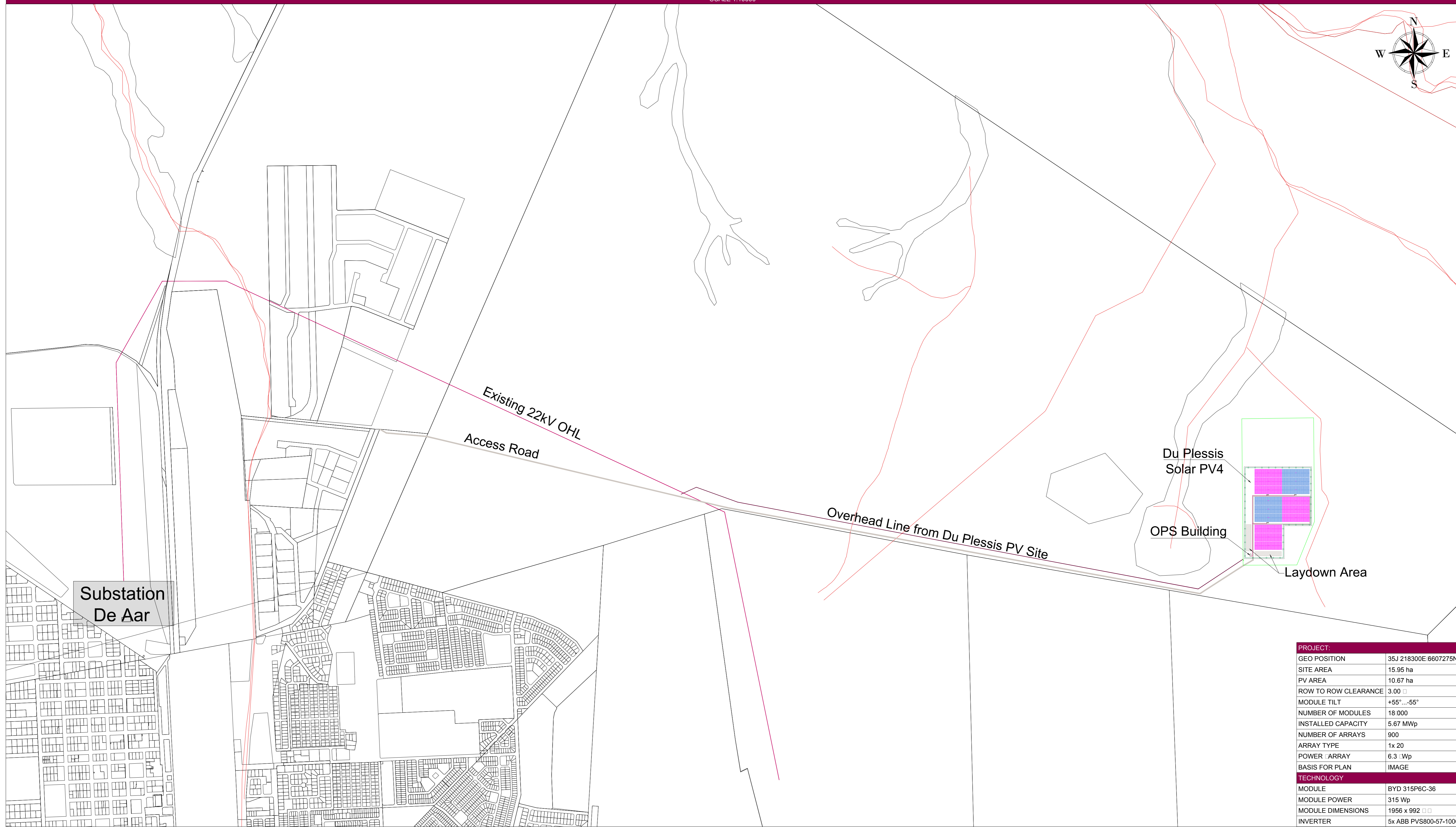
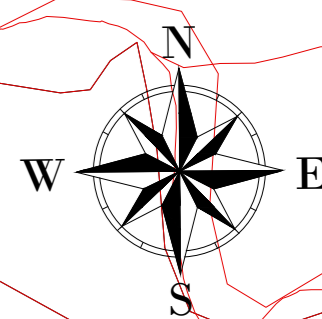
PROJECT: DU PLESSIS	
GEO POSITION	35J 218300E 6607275N
SITE AREA	29.70 ha
PV AREA	10.66 ha
ROW TO ROW CLEARANCE	3.00 m
MODULE TILT	+55°...-55°
NUMBER OF MODULES	18 000
INSTALLED CAPACITY	5.67 MWp
NUMBER OF ARRAYS	900
ARRAY TYPE	1x 20
POWER / ARRAY	6.3 Wp
BASIS FOR PLAN	TOPOGRAPHY PLAN
TECHNOLOGY	
MODULE	BYD 315P6C-36
MODULE POWER	315 Wp
MODULE DIMENSIONS	1956 x 992 mm
INVERTER	5x ABB PVS800-57-1000

LEGEND	
	TRACKER
	POWER STATION
	FENCE
	SITE BOUNDARY
	FIREBREAK
	INT. ROAD (4m width)
	ACCESS ROAD (6m width)
	ACCESS GATE

REV	DATE	BY	CHKD	APP'D	CHANGE	DATE
P2	PR	DUN	-	-	SECOND ISSUE	2016-02-16
P1	RTH	DUN	-	-	FIRST ISSUE	2015-11-20

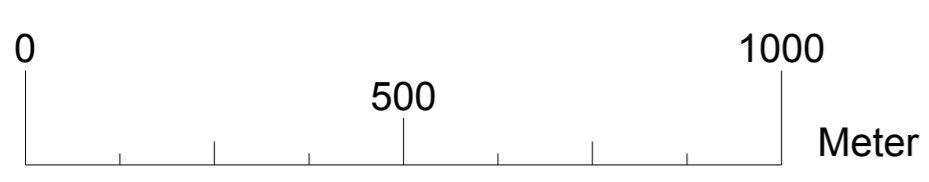
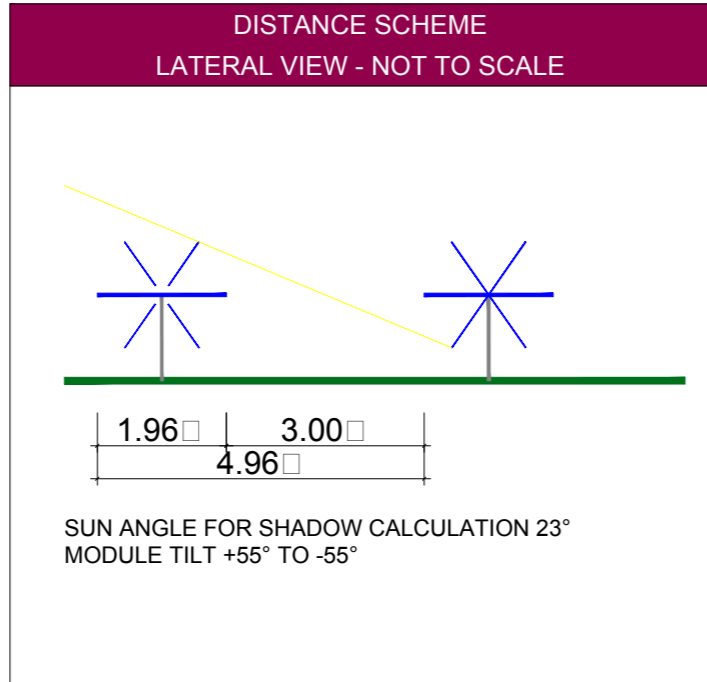
PROJECT NUMBER: 40100 1084	SHEET ID: W101	DRAWING TITLE: OVERALL MODULE LAYOUT
PROJECT NAME & ADDRESS: DU PLESSIS SOLAR PV4		CUSTOMER:
juwi Renewable Energies (Pty) Ltd 7 Walter Sisulu Avenue - Foreshore Cape Town - 8001 - South Africa Phone: +27 - (0)21 8316100 Telefax: +27 - (0)21 8316199		
APPROVAL STAMP:		STATUS: PRELIMINARY
SCALE: 1:1000		FORMAT: DIN A1





PROJECT:	
GEO POSITION	35J 218300E 6607275N
SITE AREA	15.95 ha
PV AREA	10.67 ha
ROW TO ROW CLEARANCE	3.00 □
MODULE TILT	+55°...-55°
NUMBER OF MODULES	18 000
INSTALLED CAPACITY	5.67 MWp
NUMBER OF ARRAYS	900
ARRAY TYPE	1x 20
POWER / ARRAY	6.3 Wp
BASIS FOR PLAN	IMAGE
TECHNOLOGY	
MODULE	BYD 315P6C-36
MODULE POWER	315 Wp
MODULE DIMENSIONS	1956 x 992 □□
INVERTER	5x ABB PVS800-57-1000

LEGEND	
	TRACKER
	POWER STATION
	FENCE
	PV AREA
	SITE BOUNDARY



P2	RTH	DUN	-	NEW ACCESS ROAD AND OVERHEAD LINE	DUN	2016-01-27
P1	RTH	DUN	-	FIRST ISSUE		2016-01-14
REV	DRAWN	REVIEWED	APPROVED	CHANGE	DATE	
PROJECT NUMBER	40100 1084	SHEET ID	G1102	DRAWING TITLE	OVERALL SITE PLAN	
PROJECT NAME & ADDRESS	DU PLESSIS SOLAR PV4		CUSTOMER	MULILO (PTY) LTD		
EPIC			juwi Renewable Energies (Pty) Ltd 7 Walter Sisulu Avenue - Foreshore Cape Town - 8001 - South Africa Phone: +27 - (0)21 8316100 Telefax: +27 - (0)21 8316199		APPROVAL STAMP: STATUS: <b>PRELIMINARY</b> SCALE: 1:10000    FORMAT: DIN A1	





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# Invasive Alien Management Plan for Du Plessis PV 4, De Aar, Northern Cape Province

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**PREPARED FOR:**

Mulilo Renewable Energy (Pty) Ltd

**DATED:**

5 February 2016

**PREPARED BY:**

Robin Jangle

**M** • 071 483 5504

**E** • robinj@ncc-group.co.za



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# 1 INTRODUCTION

## 1.1 The Invasive Alien Plant Management Plan

The Invasive Alien Plant Management Plan (**IAPMP**) is a subsidiary plan of the overarching Environmental Management Plan document for Du Plessis Solar PV 4, De Aar and comprises two complementary documents:

- A Strategic Plan (**SP**) (this document); and
- A Plan of Operations (**PoO**) covering the construction lifecycle.

All the information necessary to guide the management of the eradication of Invasive Alien Plants (**IAP's**) is included in these two documents. No major decisions potentially affecting the outcome of the eradication of **IAP's** will be taken without reference to the **IAPMP** and consultation with the necessary Specialists.

## 1.2 Purpose and structure of the Strategic Plan

The purpose of the **SP** is to set out the medium-to long term ambitions for the property. These ambitions are expressed through the vision and objectives. The **SP** then describes how these ambitions will be delivered through a range of management guidelines and management actions.

This **SP** has the following structure:

<b>SECTION 1</b>	<p><b>INTRODUCTION</b></p> <p>This section briefly describes the: (i) purpose of the <b>SP</b>, (ii) structure of the <b>SP</b>, (iii) lists the responsibilities of the project personnel and (iv) provides the legislative framework.</p>
<b>SECTION 2</b>	<p><b>CONTEXTUAL FRAMEWORK</b></p> <p>This section provides a succinct summary of contextual information about the site.</p>
<b>SECTION 3</b>	<p><b>CONSTRAINTS TO ERADICATION OF IAP's</b></p> <p>This section discusses the environmental constraints to eradication of <b>IAP's</b>.</p>
<b>SECTION 4</b>	<p><b>STRATEGIC OBJECTIVES FRAMEWORK</b></p> <p>This section defines the ambitions for the site, through the formulation of a vision and a set of objectives.</p>
<b>SECTION 5</b>	<p><b>STRATEGIC IMPLEMENTATION FRAMEWORK</b></p> <p>This section defines how the vision and the objectives will be delivered. It details the key management guidelines, management actions and responsible persons.</p>

### 1.3 Responsibilities

- Ensure that the **IAPMP** is implemented;
- Ensure that all principal contractors understand the content of the **IAPMP**, have allocated sufficient budget for implementation and acknowledge that it will be implemented as stipulated.

#### 1.3.1 Site engineer

- The Site engineer is responsible for the overall implementation of the **IAPMP** on site and will report progress to the Project owner;
- The Site engineer will take necessary remedial action against contractors that deviate from the **IAPMP**.

#### 1.3.2 Environmental Control Officer (ECO)

- The **ECO** will ensure that the Contractor is implementing the **IAPMP**;
- The **ECO** will report any non-compliance to the Site engineer for further action.

#### 1.3.3 Contractor(s)

- The contractor(s) will familiarise themselves with the content of the **IAPMP**;
- The contractor(s) will ensure that all sub-contractors and their personnel are familiar with the content of the **IAPMP**;
- Ensure that all staff receive the necessary toolbox talks so that the **IAPMP** is correctly implemented;
- May appoint a contractor to implement the **IAPMP**.

### 1.4 Legislative framework of the Strategic Plan

NATIONAL LEGISLATION	PROVINCIAL AND LOCAL LEGISLATION
<ul style="list-style-type: none"> <li>• National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);</li> <li>• National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (<b>NEMBA</b>);</li> <li>• Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (<b>CARA</b>);</li> <li>• Environment Conservation Act, 1989 (Act No. 73 of 1989);</li> <li>• Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)</li> </ul>	<ul style="list-style-type: none"> <li>• Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)</li> </ul>

## 2 CONTEXTUAL FRAMEWORK

### 2.1 Location

Du Plessis PV 4 is situated in the Northern Cape Province, immediately north-north-west of De Aar in the Emthamjeni Municipality.

### 2.2 Climate

The site is situated in the summer rainfall region (rainfall from November to February) with the peak in February and can be considered as having an arid climate with an average precipitation of 200mm/year.

### 2.3 Ecosystem (Vegetation)

The vegetation on site is Northern Upper Karoo. It is a grassy dwarf shrubland and in places harbours small shrubby trees – most notably *Vachellia melifera* subsp. *detinens*. No trees however have been recorded from the site.

Two **CARA** Category 1 weeds are known to occur on site, namely Mexican poppy *Argemone ochroleuca* and large thorn apple *Datura ferox*.

## 3 CONSTRAINTS TO ERADICATION OF IAP'S

Although only two **CARA**-listed Weeds are known from the site the land use in the vicinity of the PV Facility enables the establishment of numerous others. Amongst these are mesquite (*Prosopis* spp.) and various prickly pear species (*Opuntia* spp.). As these taxa are distributed by both animals and floodwaters, they can easily establish founder populations.

Mexican poppy and large thorn apple both form persistent seed banks. Even though the original population has been removed, recruitment will take place from the seed bank.

Ongoing monitoring is therefore crucial to ensure that there are no new populations and furthermore that there are no new invasive taxa.

Eradication of IAP's is resource intensive. It is therefore imperative that a suitably-experienced contractor be appointed to ensure success

## 4 VISION

The vision describes the overall long-term goal for the site.

- *Eradicate all CARA-listed Weeds and Invaders from the site to enable a self-sustaining or positively usable landform for the lifespan of the PV Facility.*

### 4.1 Key Performance Areas and Objectives

KEY PERFORMANCE AREAS (KPA)	OBJECTIVES
<p><b>KPA 1:</b> <b>Eradication of IAP's</b></p>	<ol style="list-style-type: none"> <li>1. All CARA-listed Weeds and Invaders to be eradicated from the PV Facility.</li> <li>2. Prevent any new infestations of CARA-listed Weeds and Invaders</li> </ol>



## 5 STRATEGIC IMPLEMENTATION FRAMEWORK

This section translates the strategic objectives framework described in **Section 4** into **guiding principles for management, management actions** and **management targets** (for each objective within the KPA), which will be used to inform the **PoO** and the resources required to implement it.

The guiding principles are the norms and standards that guide the activities.

### 5.1 Guiding principles for site rehabilitation

#	GUIDING PRINCIPLE
1	The project will conform to all applicable legislation. Refer to: <b>1.3 Legislative framework of the Strategic Plan.</b>
2	The property shall conform to the legal requirements of Sections 64-77 of <b>NEMBA</b> and the relevant sections of <b>CARA</b> , as amended
3	All declared <b>IAP's</b> occurring on the property shall be eradicated, using the most cost-effective and environmentally friendly methods.

<b>Objective 1.1 All CARA-listed Weeds and Invaders to be eradicated from the PV Facility</b>				
<b>Objective 1.2 Prevent any new infestations of CARA-listed Weeds and Invaders</b>				
<b>Management action</b>	<b>Management targets</b>	<b>KPIs</b>	<b>Responsibility</b>	<b>Time frame</b>
The site is to be assessed and all populations of IAP's to be identified, mapped and photographed.	All IAP populations to be eradicated.	All IAP populations identified, mapped and photographed pre-construction.  All IAP populations in construction area to be eradicated pre-construction.  All IAP populations in remaining area to be eradicated pre-commissioning.  Monthly monitoring for any new IAP populations	ECO and Botanical Specialist	Pre-construction
All IAP populations in areas required for construction including roads and PV Platform to be eradicated before construction.			Contractor	Pre-construction
All IAP populations in remaining area to be eradicated by commissioning phase.			Contractor	Post-construction
Monthly monitoring to assess any regeneration in previously controlled IAP populations			ECO and Project Owner	Ongoing (Lifespan of PV Facility)
Ongoing control and eradication of IAP's.			Project Owner	Ongoing Lifespan of PV Facility)

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# Flora Search and Rescue Management Plan for Du Plessis PV 4, De Aar, Northern Cape Province

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**PREPARED FOR:**

Mulilo Renewable Energy (Pty) Ltd

**DATED:**

5 February 2016

**PREPARED BY:**

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# 1 INTRODUCTION

## 1.1 The Flora Search and Rescue Management Plan

The Flora Search and Rescue Management Plan (**FSRMP**) is a subsidiary plan of the overarching Environmental Management Plan document for Du Plessis Solar PV 4, De Aar and comprises two complementary documents:

- A Strategic Plan (**SP**) (this document); and
- A Plan of Operations (**PoO**) covering the construction lifecycle.

All the information necessary to guide the management of the Flora Search and Rescue is included in these two documents. No major decisions potentially affecting the outcome of the Flora Search and Rescue will be taken without reference to the (**FSRMP**) and consultation with the necessary Specialists.

## 1.2 Purpose and structure of the Strategic Plan

The purpose of the **SP** is to set out the medium-to long term ambitions for the property. These ambitions are expressed through the vision and objectives. The **SP** then describes how these ambitions will be delivered through a range of management guidelines and management actions.

This **SP** has the following structure:

<b>SECTION 1</b>	<p><b>INTRODUCTION</b></p> <p>This section briefly describes the: (i) purpose of the <b>SP</b>, (ii) structure of the <b>SP</b>, (iii) lists the responsibilities of the project personnel and (iv) provides the legislative framework.</p>
<b>SECTION 2</b>	<p><b>CONTEXTUAL FRAMEWORK</b></p> <p>This section provides a succinct summary of contextual information about the site.</p>
<b>SECTION 3</b>	<p><b>CONSTRAINTS TO ERADICATION OF IAP'S</b></p> <p>This section discusses the environmental constraints to Flora Search and Rescue.</p>
<b>SECTION 4</b>	<p><b>STRATEGIC OBJECTIVES FRAMEWORK</b></p> <p>This section defines the ambitions for the site, through the formulation of a vision and a set of objectives.</p>
<b>SECTION 5</b>	<p><b>STRATEGIC IMPLEMENTATION FRAMEWORK</b></p> <p>This section defines how the vision and the objectives will be delivered. It details the key management guidelines, management actions and responsible persons.</p>

### 1.3 Responsibilities

#### 1.3.1 Proponent (Project owner)

- Ensure that the **FSRMP** is implemented;
- Ensure that all principal contractors understand the content of the **FSRMP**, have allocated sufficient budget for implementation and acknowledge that it will be implemented as stipulated.

#### 1.3.2 Site engineer

- The Site engineer is responsible for the overall implementation of the **FSRMP** on site and will report progress to the Project owner;
- The Site engineer will take necessary remedial action against contractors that deviate from the **FSRMP**.

#### 1.3.3 Environmental Control Officer (ECO)

- The **ECO** will ensure that the Contractor is implementing the **FSRMP**;
- The **ECO** will report any non-compliance to the Site engineer for further action.

#### 1.3.4 Contractor(s)

- The contractor(s) will familiarise themselves with the content of the **FSRMP**;
- The contractor(s) will ensure that all sub-contractors and their personnel are familiar with the content of the **FSRMP**;
- Ensure that all staff receive the necessary toolbox talks so that the **FSRMP** is correctly implemented;
- May appoint a contractor to implement the **FSRMP**.

### 1.4 Legislative framework of the Strategic Plan

NATIONAL LEGISLATION	PROVINCIAL AND LOCAL LEGISLATION
<ul style="list-style-type: none"> <li>• National Environmental Management Act, 1998 (Act No. 107 of 1998) (<b>NEMA</b>);</li> <li>• National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (<b>NEMBA</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)</li> </ul>



## 2 CONTEXTUAL FRAMEWORK

### 2.1 Location

Du Plessis PV 4 is situated in the Northern Cape Province, immediately north-north-west of De Aar in the Emthamjeni Municipality.

### 2.2 Climate

The site is situated in the summer rainfall region (rainfall from November to February) with the peak in February and can be considered as having an arid climate with an average precipitation of 200mm/year.

### 2.3 Ecosystem (Vegetation)

The vegetation on site is Northern Upper Karoo. It is a grassy dwarf shrubland and in places harbours small shrubby trees – most notably *Vachellia melifera* subsp. *detinens*. No trees however have been recorded from the site.

Of particular importance are two local endemic taxa namely, *Lithops hookeri* and *Stomatium pluridens*.

## 3 CONSTRAINTS TO FLORA SEARCH AND RESCUE

The timing of search and rescue is crucial to its success. Although De Aar is located in the summer rainfall zone, it does display bimodal precipitation *i.e.* rain does fall in winter as well. This has resulted in the occurrence of winter-growing geophytes. The presence of these can only be confirmed at the onset of their growing season (autumn).

Both of the local endemic taxa (*Lithops hookeri* and *Stomatium pluridens*) are cryptic and although it is not known whether they do occur on site it would be prudent to conduct a thorough assessment. Numerous succulent Euphorbiaceae and Apocynaceae are also known from the general locality and these too must be transplanted away from the development footprint. If conditions however are unfavourable *i.e.* prolonged period without precipitation, then the chances of encountering the various dwarf succulent taxa diminishes.

## 4 STRATEGIC OBJECTIVES FRAMEWORK

### 4.1 Vision

The vision describes the overall long-term goal for the site.

- *Translocate taxa of National, Regional and Local conservation concern into remaining natural areas outside of the development footprint.*

### 4.2 Key Performance Areas and Objectives

KEY PERFORMANCE AREAS (KPA)	OBJECTIVES
<p><b>KPA 1:</b> <b>Flora Search and Rescue</b></p>	<p>1. Translocate all National, Regional and Local Flora of conservation concern from the development footprint.</p>

## 5 STRATEGIC IMPLEMENTATION FRAMEWORK

This section translates the strategic objectives framework described in **Section 4** into **guiding principles for management, management actions** and **management targets** (for each objective within the KPA), which will be used to inform the **PoO** and the resources required to implement it.

The guiding principles are the norms and standards that guide the activities.

### 5.1 Guiding principles for site rehabilitation

#	GUIDING PRINCIPLE
1	The project will conform to all applicable legislation. Refer to: <b>1.3 Legislative framework of the Strategic Plan.</b>
2	All flora of conservation concern must be retained on-site to contribute towards ecological functioning.

<b>Objective 1.1 Translocate all National, Regional and Local Flora of conservation concern from the development footprint.</b>				
<b>Management action</b>	<b>Management targets</b>	<b>KPIs</b>	<b>Responsibility</b>	<b>Time frame</b>
All areas required for construction including roads and PV Platform to be sufficiently demarcated	All area required for construction to be demarcated before construction begins.	All areas demarcated pre-construction.	ECO and Contractor	Pre-construction
A suitably experienced Specialist must be appointed to perform the Search and Rescue.	All flora of conservation concern translocated out of development footprint.	Specialist appointed.	Project Owner	Pre-construction
Necessary permits acquired from Provincial Conservation Authority	Close-out report received	Permit acquired.	Project Owner	Pre-construction
All flora of conservation concern as identified by the botanical specialist to be translocated to suitable receptor sites within development envelope. All flora to be photographed and locality mapped.	acknowledging construction can commence.	Close-out report received from Specialist.	Specialist	Post Search and Rescue (Pre-construction)

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# Rehabilitation Management Plan for Du Plessis PV 4, De Aar, Northern Cape Province

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**PREPARED FOR:**

Mulilo Renewable Energy (Pty) Ltd

**DATED:**

5 February 2016

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# 1 INTRODUCTION

## 1.1 The Rehabilitation Management Plan

The Rehabilitation Management Plan (**RMP**) is a subsidiary plan of the overarching Environmental Management Plan document for Du Plessis Solar PV 4, De Aar and comprises two complementary documents:

- A Strategic Plan (**SP**) (this document); and
- A Plan of Operations (**PoO**) covering the construction lifecycle.

All the information necessary to guide the management of the rehabilitation is included in these two documents. No major decisions potentially affecting the outcome of the rehabilitation will be taken without reference to the **RMP** and consultation with the necessary Specialists.

## 1.2 Purpose and structure of the Strategic Plan

The purpose of the **SP** is to set out the medium-to long term ambitions for the property. These ambitions are expressed through the vision and objectives. The **SP** then describes how these ambitions will be delivered through a range of management guidelines and management actions.

This **SP** has the following structure:

<b>SECTION 1</b>	<p><b>INTRODUCTION</b></p> <p>This section briefly describes the: (i) purpose of the <b>SP</b>, (ii) structure of the <b>SP</b>, (iii) lists the responsibilities of the project personnel and (iv) provides the legislative framework.</p>
<b>SECTION 2</b>	<p><b>CONTEXTUAL FRAMEWORK</b></p> <p>This section provides a succinct summary of contextual information about the site and also explores the activities associated with construction.</p>
<b>SECTION 3</b>	<p><b>CONSTRAINTS TO REHABILITATION</b></p> <p>This section discusses the environmental constraints to rehabilitation.</p>
<b>SECTION 4</b>	<p><b>STRATEGIC OBJECTIVES FRAMEWORK</b></p> <p>This section defines the ambitions for the site, through the formulation of a vision and a set of objectives.</p>
<b>SECTION 5</b>	<p><b>STRATEGIC IMPLEMENTATION FRAMEWORK</b></p> <p>This section defines how the vision and the objectives will be delivered. It details the key management guidelines, management actions and responsible persons.</p>



### 1.3 Responsibilities

#### 1.3.1 Proponent (Project owner)

- Ensure that the **RMP** is implemented;
- Ensure that all principal contractors understand the content of the RMP, have allocated sufficient budget for implementation and acknowledge that it will be implemented as stipulated.

#### 1.3.2 Site engineer

- The Site engineer is responsible for the overall implementation of the **RMP** on site and will report progress to the Project owner;
- The Site engineer will take necessary remedial action against contractors that deviate from the **RMP**.

#### 1.3.3 Environmental Control Officer (ECO)

- The **ECO** will ensure that the Contractor is implementing the **RMP**;
- The **ECO** will report any non-compliance to the Site engineer for further action.

#### 1.3.4 Contractor(s)

- The contractor(s) will familiarise themselves with the content of the **RMP**;
- The contractor(s) will ensure that all sub-contractors and their personnel are familiar with the content of the **RMP**;
- Ensure that all staff receive the necessary toolbox talks so that the **RMP** is correctly implemented;
- May appoint a Specialist to complete the revegetation/reseeding component of the rehabilitation works.

### 1.4 Legislative framework of the Strategic Plan

NATIONAL LEGISLATION	PROVINCIAL AND LOCAL LEGISLATION
<ul style="list-style-type: none"> <li>• National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);</li> <li>• National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);</li> <li>• Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);</li> <li>• Environment Conservation Act, 1989 (Act No. 73 of 1989);</li> <li>• Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)</li> </ul>	<ul style="list-style-type: none"> <li>• Northern Cape Nature Conservation Act, 2009 (Act No. 9 of 2009)</li> </ul>

## 2 CONTEXTUAL FRAMEWORK

### 2.1 Location

Du Plessis PV 4 is situated in the Northern Cape Province, immediately north-north-west of De Aar in the Emthamjeni Municipality.

### 2.2 Climate

The site is situated in the summer rainfall region (rainfall from November to February) with the peak in February and can be considered as having an arid climate with an average precipitation of 200mm/year.

### 2.3 Ecosystem (Vegetation)

The vegetation on site is Northern Upper Karoo. It is a grassy dwarf shrubland and in places harbours small shrubby trees – most notably *Vachellia melifera* subsp. *detinens*. No trees however have been recorded from the site.

## 3 CONSTRAINTS TO REHABILITATION

Environmental rehabilitation is the process of returning land that has been damaged or disturbed to a functional ecosystem (albeit less complex) whereas ecological restoration looks to restore a damaged ecosystem back to a complex fully functioning ecosystem as it was before any disturbance.

Ecological restoration is practiced in natural areas or where an ecosystem is of a threatened status that warrants the resource expenditure. Rehabilitation is used as a mitigation measure to return any areas that were disturbed to a functional ecosystem that retards any further environmental degradation and also places the receiving environment on a trajectory to restoration.

In order to mitigate any further environmental degradation from arising, the rehabilitation process comprises two aspects: land rehabilitation and phytoremediation. Of these phytoremediation is the more risk constrained as it relies on climate and biological factors for success. Given that De Aar is situated in an arid region where rainfall is unpredictable, the evapotranspiration rate is high and the ambient temperature in both summer and winter is extreme, the establishment of plants is highly constrained. This therefore places more emphasis on land rehabilitation to be successful, as a properly prepared and stable landform is more conducive to plant/seedling establishment.

Despite the adverse environmental conditions it is nonetheless important that two fundamental aspects be observed to ensure a degree of success. These are: (1) seasonality and (2) provenance of seeds.

It is imperative that seed be sown at the onset of the rain season – regardless of when the construction phase culminates. The longer seed remains un-germinated in an exposed situation the more likely it is going to be consumed by granivores – be it birds, rodents or ants.

Seed must be of local origin (at least the same biome) to maintain the correct ecotype and avoid genetic contamination. This ensures that the seed is adapted to local conditions and therefore the germination cues.

Rehabilitation is considered successful if the vegetation cover is 75% six months post reseeding on most construction projects. Whilst this is feasible in high rainfall grasslands it is not considered a realistic target in the Nama Karoo. A target of 30% at the onset of the next dry season is considered realistic and feasible.

A basic tenet of rehabilitation is “first do no harm”. This implies that the less the environment is impacted upon by construction activities, the less rehabilitation will be required. Rehabilitation is a resource intensive activity and therefore the smaller the area to be rehabilitated, the proportionately lower costs are.

## 4 STRATEGIC OBJECTIVES FRAMEWORK

### 4.1 Vision

The vision describes the overall long-term goal for the site.

- *Rehabilitate the non-operational portions of the site to a self-sustaining or positively usable landform on termination of construction activities.*

### 4.2 Key Performance Areas and Objectives

KEY PERFORMANCE AREAS (KPA)	OBJECTIVES
<p><b>KPA 1:</b> <b>Site Rehabilitation</b></p>	<p>1.1 All areas to be transformed during construction must be demarcated. 1.2 Disturbance to the site must be minimised. 1.3 Wind and water erosion will be avoided and where required, mitigated. 1.4 Re-establish and maintain viable populations of locally indigenous flora.</p>

## 5 STRATEGIC IMPLEMENTATION FRAMEWORK

This section translates the strategic objectives framework described in **Section 4** into **guiding principles for management, management actions** and **management targets** (for each objective within the KPA), which will be used to inform the **PoO** and the resources required to implement it.

The guiding principles are the norms and standards that guide the activities.

### 5.1 Guiding principles for site rehabilitation

#	GUIDING PRINCIPLE
1	The project will conform to all applicable legislation. Refer to: <b>1.3 Legislative framework of the Strategic Plan.</b>
2	Only the least amount of area required for an activity will be disturbed.
3	Only the official demarcated roads will used. No additional shortcut tracks will be permitted.
4	All areas required for construction and installation are to be <u>demarcated</u> . This includes (but not limited to) access roads, site camps, laydown areas, component assembly areas etc.
5	All <u>remaining areas</u> are to be demarcated as “out-of-bounds” and this is to be communicated in toolbox talks with all staff.
6	Site camps and laydown areas to be sited in areas that are <u>most disturbed</u> <i>i.e.</i> lowest natural vegetation cover.
7	All <u>remaining indigenous plant material</u> to be <u>clered and grubbed</u> from all areas that are to be transformed and stored in a fenced off area.
8	Upon culmination of construction activities the plant material is to be spread over the disturbed areas (site camps, laydown areas, <i>etc.</i> ).
9	Wind or water erosion during the construction phase will be immediately dealt with by methods approved by the ECO.
10	All areas <u>disturbed</u> during construction activities <u>must be reseeded</u> with locally indigenous grasses and shrubs (if available)
11	Re seeding must take place at the onset of the <u>rain season</u> .

<b>Objective 1.1 Demarcate all areas to be transformed during construction</b>				
<b>Management action</b>	<b>Management targets</b>	<b>KPIs</b>	<b>Responsibility</b>	<b>Time frame</b>
The most disturbed areas (least vegetation cover) are to be identified for siting the site camps and laydown areas.	All area required for construction to be demarcated before construction begins.	All areas demarcated pre-construction.	ECO and Contractor	Pre-construction
All areas required for construction including roads and PV Platform to be sufficiently demarcated.	All personnel informed of “out-of-bounds” areas during induction and at every morning’s toolbox talk.	Importance of remaining within demarcated areas communicated during induction.	Contractor	Pre-construction
All remaining area to be declared “out-of-bounds” and reported as such to Site Engineer		Importance of remaining within demarcated areas communicated during toolbox talks.	ECO	Pre-construction
All personnel to be informed of “out-of-bounds” areas during toolbox talks every morning			Contractor	Pre- and for lifecycle of construction activities
<b>Objective 1.2 Disturbance to the site must be minimised</b>				
<b>Management action</b>	<b>Management targets</b>	<b>KPIs</b>	<b>Responsibility</b>	<b>Time frame</b>
The most disturbed areas (least vegetation cover) are to be identified for siting the site camps and laydown areas.	All area required for construction to be demarcated before construction begins.	Most disturbed areas are utilised.	ECO and Contractor	Pre-construction
All areas required for construction activities must be kept to the minimum required.	No new disturbance areas outside of demarcated areas.	No new tracks or disturbance incidents in “out-of-bounds” area.	Contractor and ECO	Pre-construction
Only the official tracks as demarcated are to be used <i>i.e.</i> no new tracks; turning points off the tracks; shortcuts <i>etc.</i>	Topsoil kept separate from subsoil in a suitable area and protected from erosion.	Topsoil separate from subsoil	Contractor and ECO	Ongoing (lifecycle)
All spoil heaps to be placed on most disturbed areas as identified by ECP		Topsoil protected from wind and soil erosion.	Contractor and ECO	Ongoing (lifecycle)

Topsoil to be kept separate from subsoil and protected from erosion (cover with tarpaulin)			Contractor and ECO	Ongoing (lifecycle)
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**Objective 1.3 Wind and water erosion will be avoided and where required, mitigated**

Management action	Management targets	KPIs	Responsibility	Time frame
All existing erosion incidents that are adjacent to construction areas must be identified (peg with a number) and photographed.	No new extensive erosion incidents.	All erosion incidents recorded by means of photograph and numbered before construction commences.  All erosion incidents adjacent the PV facility are remediated by end of construction phase.	ECO and Contractor	Pre-construction
All areas adjacent to construction areas (roads, PV platform etc.) will be inspected on a weekly basis for any new erosion incidents	No erosion incidents adjacent to constructed PV facility.		Contractor and ECO	Ongoing (lifecycle)
Where any new erosion incidents are encountered these are to be remediated (method to be approved by the ECO).			Contractor and ECO	Ongoing (lifecycle)
All existing erosion incidents adjacent to the PV facility (roads and PV platform) to be remediated to prevent further destabilisation.			Contractor and ECO	End of construction phase

**Objective 1.4 Re-establish and maintain viable populations of locally indigenous flora.**

Management action	Management targets	KPIs	Responsibility	Time frame
All remaining (indigenous) plant material within the demarcated areas must be cleared and grubbed and stockpiled with the topsoil.	Pre-construction landform is maintained.	All post-construction areas are level and have an even coverage of topsoil and organic material.  Suitably-experienced contractor appointed.  Local provenance seed	ECO and Contractor	Pre-construction
All areas that were transformed and no longer required for the Operation Phase of the PV facility must be cleared of all construction materials and levelled or ripped where compacted.	Vegetation cover of 30% is achieved by onset of dry season.		Contractor and ECO	Pre-construction
Stockpiled topsoil and harvested plant material must be placed on previously disturbed construction areas and spread out evenly.			Contractor and ECO	Ongoing (lifecycle)

The disturbed areas must be reseeded with grass and shrubs of local provenance at the onset of the rain season at a rate (kg/ha.) approved by the ECO.		applied at a rate as approved by the ECO	Contractor and ECO	Ongoing (lifecycle)
Fixed point photographs must be taken post-reseeding and thereafter every month until the onset of the dry season to gauge effectivity.		Photographic record of post-seeding emergence until onset of dry season.	Contractor and ECO	Ongoing (lifecycle)

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Juwi Renewable Energies (Proprietary)  
Limited

De Aar - Du Plessis Solar Farm PV4





H350485

Traffic Management Plan

H350485-00000-100-066-0001

Rev. 0  
9 February 2016

**Juwi Renewable Energies (Proprietary) Limited**  
**De Aar - Du Plessis Solar Farm PV4**  
**Traffic Management Plan**

						
09/02/2016	0	Final	Y. Venter	C. Manchip	C. Manchip	H. Schröder
<b>Date</b>	<b>Rev.</b>	<b>Status</b>	<b>Prepared By</b>	<b>Checked By</b>	<b>Approved By</b>	<b>Approved By</b>
Hatch Goba						Client



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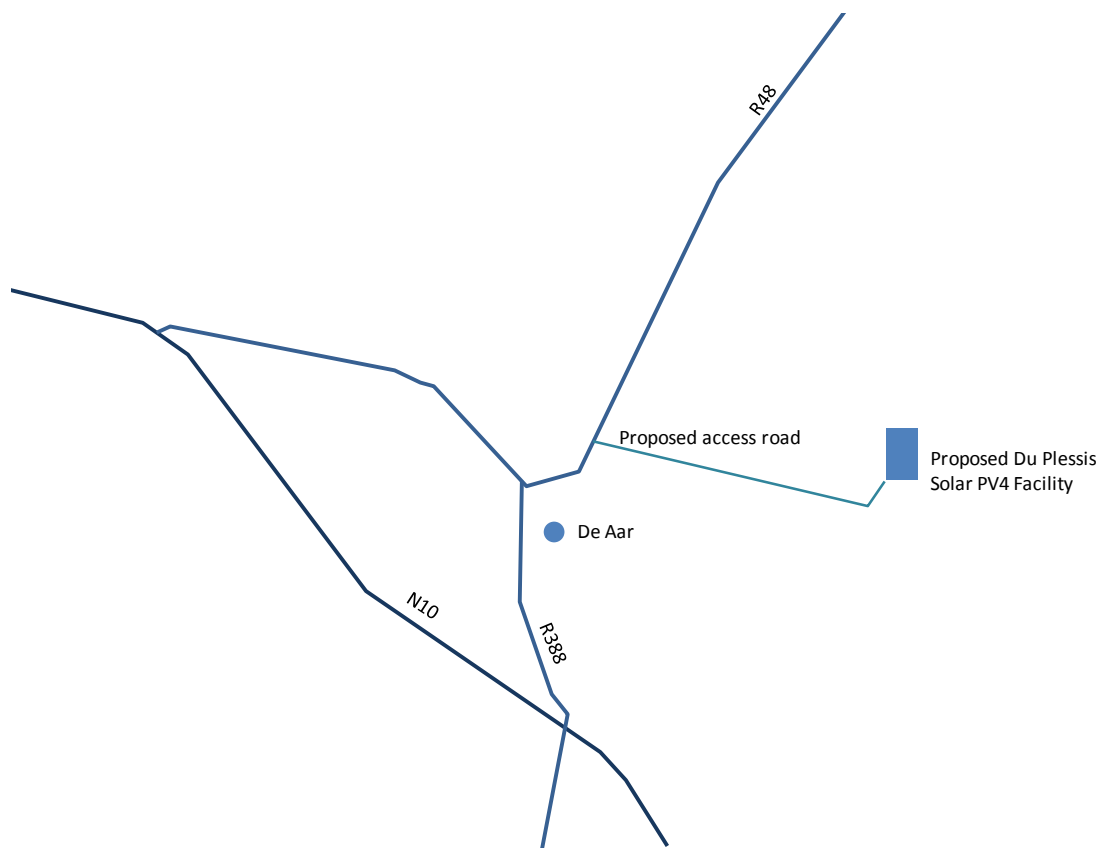
## 1. Introduction

### 1.1 Purpose

Juwi Renewable Energies (Pty) Limited (the “Client”), the EPC Contractor for the proposed Du Plessis Solar PV4, has contracted Hatch Goba (Pty) Ltd on behalf of Mulilo Renewable Project Development (Pty) Ltd, (the “Developer”), for the preparation of a Traffic Management Plan for the proposed Solar Farm located on the farm Annex du Plessis Dam (Remainder of Farm No. 179) near De Aar, Northern Cape.

The solar farm lies 6 km east of De Aar and is located in the Emthanjeni Municipality, which is located in the Pixley Ka Seme District of the Northern Cape. The Solar Farm (Du Plessis PV4) will have a generating capacity of 5 MW and will occupy a footprint of 15.2 ha .

The proposed access to the De Aar facility is located about 1 km north of De Aar as shown in **Figure 1.1**.



**Figure 1.1: Du Plessis Solar PV4 Facility – Locality plan**

## 1.2 Applicability and Validity

This document applies to the project Du Plessis De Aar PV Farm and is valid for the entire period of construction work and operational stage on site. Updates of this plan might be released and distributed during the construction and operational period, if required, to allow for unforeseen situations or requirements.

## 1.3 Scope and Objectives

The proposed development triggered the need for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act 107 of 1989) by undertaking a Basic Assessment (BA) process. Environmental Authorisation (EA) for the solar farm was issued in 2012. The preparation of a Traffic Management Plan for the development is a condition of the EA and proposed as a mitigation measure in the BA.

Requirement in terms of Environmental Authorization:

*“A traffic management plan for the site access roads to ensure no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute and avoid using roads through densely populated build-up areas so as to not disturb existing retail and commercial operations.”*

The Traffic Management Plan will consider and address the following:

- Investigate the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.
- Propose mitigation measures to accommodate vehicle movements generated during the construction time and the operational time on the public road network and minimize impacts on local commuters, e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
- Provide an opinion regarding the expected impact on the road network due to construction traffic and any other traffic generation expected.
- Describe the impact and mitigation that may be required during construction and operation. Detailed design will not be carried out as part of this scope of work.



## 2.1 Phase 1: Construction

The proposed solar farm development includes the following infrastructure:

- PV solar panels arranged in arrays, and module mountings
- Connection Centre, building, 5.44m by 2.5m by 2.55m high
- Control Centre, 6m by 10m and 2.55m high
- Inverter – Sub-station centre (3 off), 8.08m by 3.05m and 2.79m high
- Guard cabin
- MV Ring Main Unit (RMU)
- Underground cabling on site
- Underground cable from RMU to Eskom power line
- A perimeter fence and internal roadways

It is expected that the following hardware will be delivered to the site for the construction of the Du Plessis Solar PV4 facility. The largest truck that will deliver goods to the construction site is a 22m Super link, however the type of truck that will be used per load will depend on the load type, size and contractor.

**Table 2.1: Estimated Truck Loads during the construction phase**

Hardware	Estimated number of Loads	Place of Origin
Modules	20	Durban
Inverters, RMU, Transformers	3	Johannesburg
Racking	12 (Tracker) 10 (Concrete) 10 (Racking Equipment)	Johannesburg
Cables	1 (Solar Cable) 3 (DC Cable) 1 (DC Main)	Johannesburg
Cable trays	1 (Cable tray) 1 (Hooded Cable tray)	
Monitoring	1	Germany / Cape Town
Civils	200	Depending on contractor
Fencing	1 (Assuming it is diamond mesh) 2 (Concrete)	Depending on contractor
Overhead line	6 (Monopoles) 6 (Overhead line)	Depending on contractor
Q & M / Monitoring Building	2	
Site establishment – Office containers etc.	20-30	
Local employment: Buses	600 trips	De Aar
Potential Abnormal loads – 2 Crane Trucks		



Based on the information provided in **Table 2.1** the daily traffic to the site will be as follows:

- Ten truckloads per day, during site establishment it can be expected to be increase with another five trucks per day.
- Two buses in the morning and two buses in the evening for employee transport. This could be seen as four trips a day if the buses stay on site during the day, or eight trips if the buses return to De Aar when they drop off the local employees and fetch them when the work day is over. It is assumed that the buses that will be used will be the standard 66-seater buses.

It is recommended that the arrival and departure schedules of trucks offloading at site are planned, as best as possible, to take place during the daytime to limit the generation of truck noise at night. Due to the small amount of daily traffic that is expected to access the site, it is not recommended that truck traffic be limited during the morning and evening peak hours, as it will hardly have any impact on existing traffic.

## 2.2 Phase 2: Operation

It is expected that there will be three site drives (cars) per day at the site during the operational phase and security drives during the night.

Based on the information provided in **Section 2.1** and **2.2**, the expected daily traffic to the site is less than 50 daily peak hour trips which eliminates the need for a Traffic Impact Assessment.

## 2.3 Expected Project start and duration

The project is scheduled to commence at the beginning of May 2016. Construction will last approximately seven months. Most of the construction trips are expected to be generated during the first five months of the project when most of the materials are required and main installation will take place. **Table 2.2** gives a breakdown of the scheduled dates for the various work packages during the construction phase.

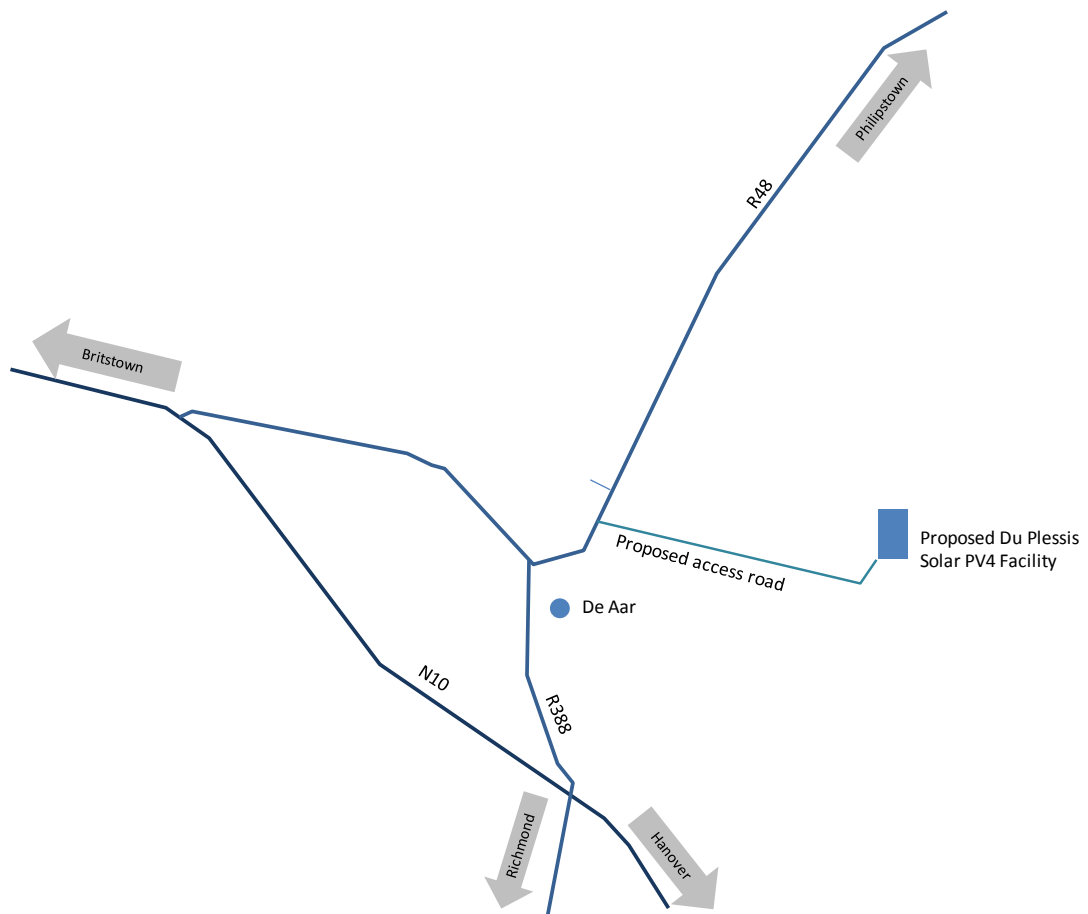
**Table 2.2: Construction phase scheduled dates**

No.	Facility Connection Works	Scheduled date
21	Facility plant site establishment	5/1/2016
22	Completion of major civil and Structural works	8/31/2016
23	Delivery and Installation of primary plant components (e.g pv modules, wind turbines etc.)	9/15/2016
24	Installation of onsite electrical cabling and Secondary plant components (completion)	9/15/2016
25	Facility plant mechanical completion	9/15/2016
No.	Commissioning	Scheduled date
31	Grid Connection	9/30/2016
39	Commence Early Operating or Commercial Operating	11/30/2016

### 3. Existing Conditions

A desktop study of the De Aar study area identified the most likely routes to be used for various types of vehicles for the construction of the solar farm and during the operational phase of the plant.

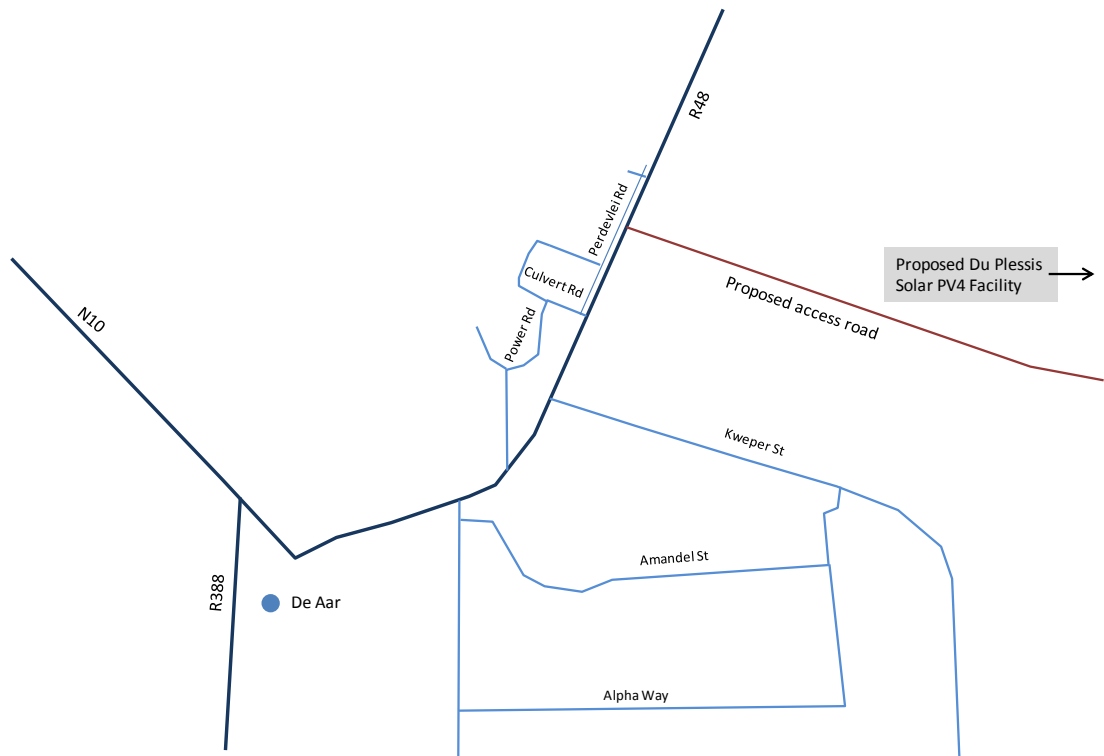
The major routes in the study area are the R48 which links De Aar with Philipstown to the northeast, the N10 that connects to Britstown to the west and Hanover to the southeast and the R388 that connects to Richmond to the south as shown in **Figure 3.1**.



**Figure 3.1: External road network**

#### 3.1 Existing road network

The road network surrounding the proposed site is shown in **Figure 3.2**. The proposed access road for the facility will connect with the R48, approximately 400m from the R48/Culvert Rd intersection to the south and 200m from the R48/Access road intersection to the north.



**Figure 3.2: Internal road network**

The R48 is a Class 3 District distributor road in terms of the RCAM Classification (TRH 26). The R48 is sign posted at 80km/h along the section where the proposed access road to the Solar PV4 facility will meet with the R48. It is a single carriageway with gravel shoulders.



To ensure that the reinstatement of the existing roads are adequate after completion of the works, a photo documentation of the current road condition of the R48 and any other immediate roads identified shall be prepared prior to the start of the construction phase.

## 4. Basic Regulation – Site Traffic Management

This section will describe some of the proposed basic regulations for the management of traffic at the solar plant site.

### 4.1 Traffic Management Safety Principles

The following safety principles will be established for the construction phase:

- Define safe routes for pedestrians,
- Motorised equipment used is in good working order,
- Influence on other vehicle operators,
- One way traffic flow where possible,
- Appropriate behaviour and respect for road rules,
- Speed control, and
- Supervision and monitoring.

### 4.2 Implementation

The Traffic Management Plan will be implemented prior to the commencement of site works. The Health, Safety and Environmental (HSE) officer will control the traffic management on site. Site traffic management shall be adapted to site conditions and HSE requirements as required. It is assumed that a HSE officer will be on-site for the duration of the construction phase of the solar farm.

### 4.3 Responsibilities

To ensure that the Traffic Management Plan is implemented and carried out, the responsibilities are attached to each of the following roles:

- Project Manager
- Site Manager
- Health, Safety and Environmental Officer

Responsibilities of the respective roles are listed in **Section 4.3.1** through **4.3.4** below.

#### 4.3.1 *Project Manager*

The project manager is responsible for ensuring that the traffic management:

- Is properly planned, organized, directed and controlled,
- Is properly resourced with people, equipment, facilities and systems,



- Meets the requirements of the contract,
- Clearly defines the roles and responsibilities,
- Complies with all other legislation and
- Is achieving its objective.

#### **4.3.2 Site Manager**

The site manager is responsible to ensure that:

- Traffic management is implemented and maintained on site,
- All the requirements for approvals, licences, permits and authorisations are obtained,
- All construction roads are clearly marked and all signage, as requested in this plan, has been installed,
- Changes on site and appropriate processes will be implemented and the Traffic Management Plan will be amended accordingly.
- Sufficient resources have been provided for traffic management,
- All roads are in a condition to ensure safe travel;
- Complaints / concerns have been properly addressed;
- The traffic management implemented on site complies with all other legislation and
- Traffic Management objectives are achieved.

#### **4.3.3 Health, Safety and Environmental Officer**

The Health and Safety and Environmental Officer (HSE Officer) is responsible to ensure that:

- Traffic management regulations will be followed on site,
- Traffic management meets the HSE requirements,
- Necessary training has been conducted,
- Traffic management processes and procedures will be monitored and controlled,
- Dangerous traffic situations will be identified and avoided and the Traffic Management Plan will be updated accordingly,
- The Traffic Management Plan is monitored in terms of adequacy and effectiveness,
- All vehicles on site are fit for safe operation,
- Traffic controllers are appointed, if required,
- Access ways are kept clear for emergency vehicles,
- All traffic adheres to the speed limits on site,

- All signage is suitable for purpose,
- Subcontractors/suppliers have suitable qualifications and experience,
- No drugs or alcohol will be consumed on site and personnel should be tested for alcohol usage when entering the site,
- Safe passage of traffic is possible at all times,
- Regular vehicle inspections are carried out,
- Traffic management implemented on site complies with all other legislation,
- Traffic management objectives are achieved.

#### **4.4 Traffic Controller**

In order to guarantee safe travel to and on site, it might be necessary to appoint traffic controllers. The Site Manager, in consultation with the HSE Manager, is responsible for the decision whether such traffic controllers are required. The HSE Manager is responsible for the appointment of the traffic controllers and their proper induction. The traffic controllers have to comply with visibility and safety standards such as, wearing high visibility vests and safety shoes.

#### **4.5 Vehicles and Equipment**

All vehicles and equipment used on site have to be in a good working condition. During poor light conditions (or where applicable at night) the construction vehicles have to be illuminated properly and an additional traffic controller with an illuminated device will direct traffic.

#### **4.6 Roads Clearance**

All plant items and similar obstructions will be removed from the normal path of vehicles, to provide a lateral clearance of at least 2 m where practicable, with a minimum clearance of 1.2 m. Plant, equipment or stored material within 2 m of the normal path of vehicles, has to be clearly marked and illuminated during night time, if traffic on site is required.

#### **4.7 Rules for Driving Vehicles**

The following rules apply to the operation of all types of vehicles:

- Staff and visitors driving and operating vehicles or equipment must do so in a safe manner,
- Vehicles operating on site must comply with all speed limits. Where signs do not define speed limits, the speed limit on site should be 20 km/h. Displayed speed limits are the maximum speeds for ideal conditions and must be adjusted to lower speeds when driving and visibility conditions deteriorate,



- Pre-operational safety checks must be conducted for vehicles and equipment,
- All debris endangering any traffic must be disposed of in the designated locations immediately on discovery.
- Only licensed and authorised staff is allowed to operate equipment. All vehicle drivers must carry a valid driving licence.
- Designated and marked roadways, where available, must always be used,
- Traffic signs and road markings must be adhered to at all times,
- Mounting/dismounting a moving vehicle is prohibited at all times,
- Riding on, or carrying passengers on vehicles or equipment without an approved seat is strictly prohibited,
- Motorised equipment must always be parked in designated parking areas,
- Vehicle engines must be switched off when unattended unless specified by relevant equipment and standard operating procedures (e.g. generator),
- When approaching a blind or obstructed corner the operator/driver must proceed with caution at walking pace,
- Where a load or obstacle impedes or blocks the view of the operator, the operator must utilise a traffic controller,
- Pedestrian walkways must be kept clear of obstacles at all times,
- Prior to starting a vehicle a safety check has to be conducted,
- Mobile phones shall not be used while driving,
- No driving is allowed under the influence of alcohol and other drugs.

#### 4.8 Dust Management

The following will form the principles for dust management:

- No unnecessary vegetation removal will be done on site where possible to limit dust,
- Clearing activities shall only be done during agreed times and suitable weather conditions to avoid dust nuisance/disturbance,
- Ground surfaces must be watered when necessary to reduce dust,
- All contractors shall be responsible for controlling dust if their activities are generating dust that could cause a nuisance to other persons,
- All complaints and requests regarding dust nuisance shall be dealt with immediately by the responsible contractor,
- All dirt roads shall be maintained to reduce dust as far as reasonably practical,
- Dust management shall be considered for all activities that could cause dust generation.



## 5. Traffic Management

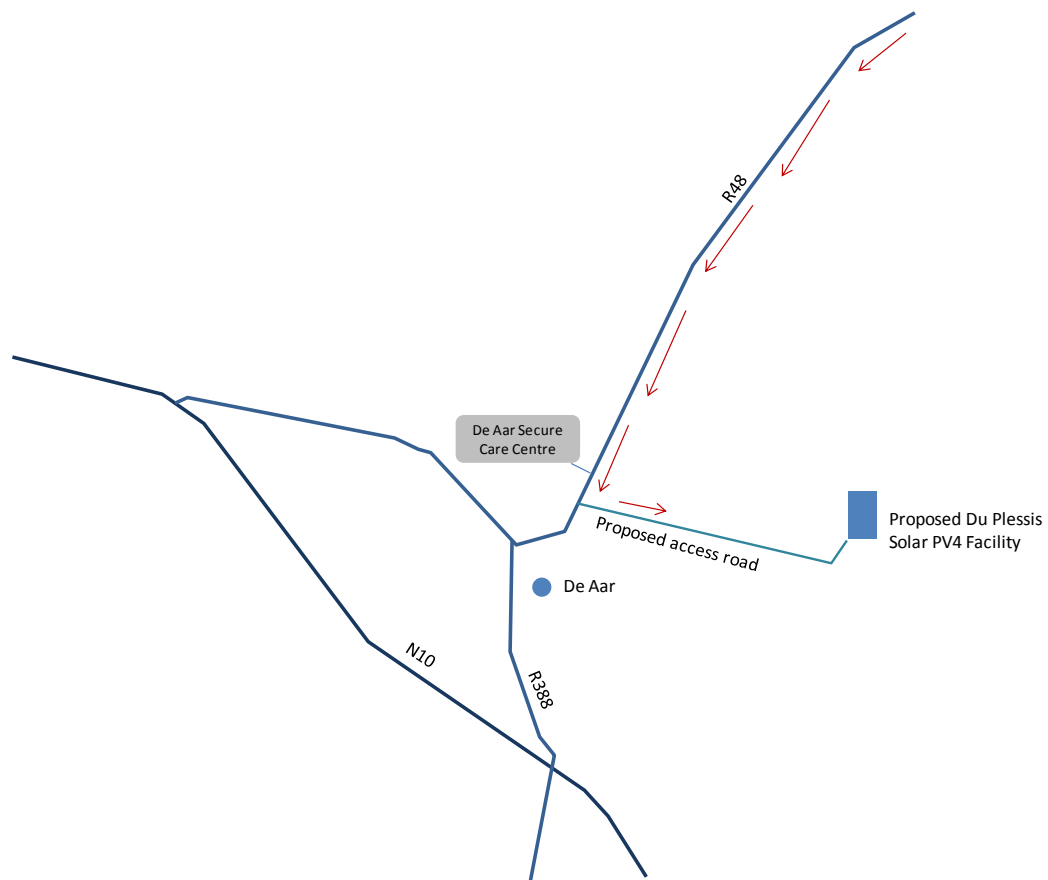
This chapter describes the proposed traffic management measures for the traffic that will access the site.

### 5.1 Transport to Site

One of the requirements from the local authorities for a similar PV plant in close proximity to the proposed site was that heavy duty transportation vehicles shall not use the roads through the town centre of De Aar. It was also mentioned that the subway under the railway line is not cleared for heavy traffic.

Taking the above into consideration, the construction and delivery traffic shall be routed via two route options, the northern and the southern route.

**Figure 5.1** shows that traffic approaching from the north (Philipstown) wishing to access the site will use the R48 and turn left 200m after the De Aar Secure Care Centre.



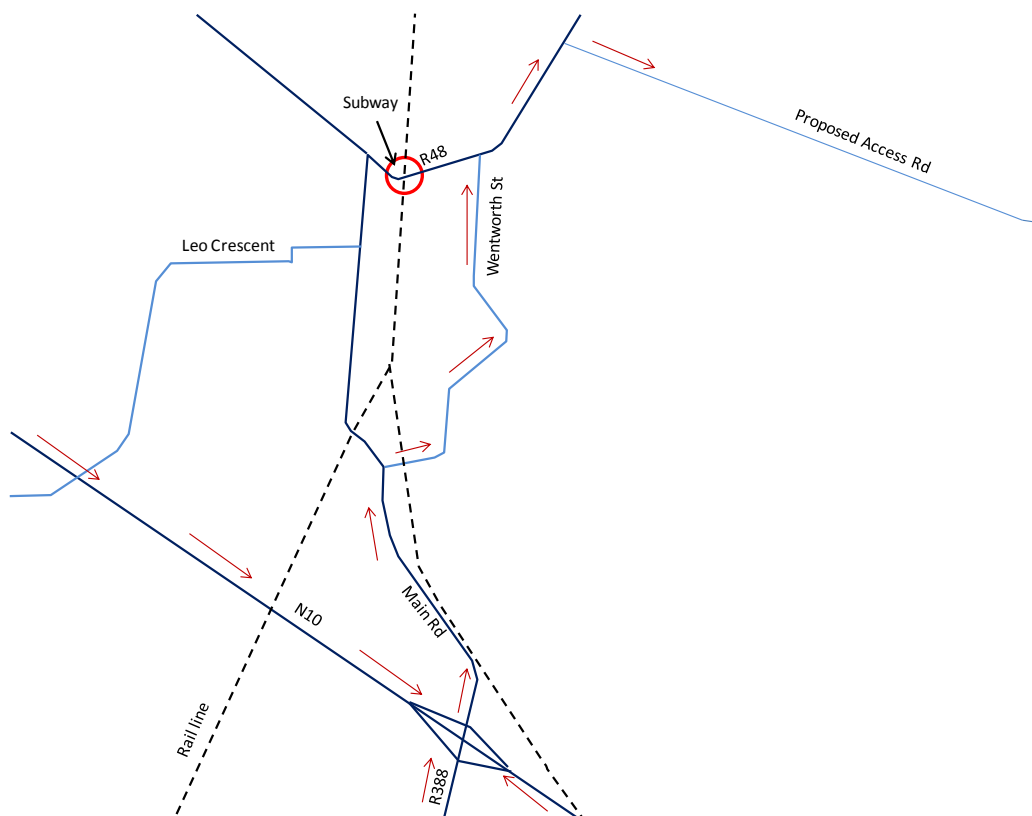
**Figure 5.1: Northern route to site**



It is recommended that any site delivery trucks or buses coming from De Aar, Britstown, Hanover or Richmond, should use the following southern approach route:

- Travelling southwards along the N10 turn left into Main Road and then turn right into Wentworth Street. Traveling northwards along the N10 turn right into Main Road and then turn right into Wentworth Street.
- Travelling along the R388 travel straight pass the N10/R388 intersection and turn right into Wentworth Street.
- At the R48/Wentworth Street intersection turn right and travel for about 1.3km north.
- Turn right onto the site access road approximately 400m after R48/Culvert Rd intersection.

This route bypasses the town centre and the subway under the railway line. Normal light vehicle traffic to the site can use Main Road (or any other minor route) and then turn right onto the R48 and access the site at the same entrance as for delivery traffic. They can also use the same route as the delivery traffic. **Figure 5.2** shows the proposed south route to site.



**Figure 5.2: Southern route to site for delivery traffic**

## 5.2 Site Access and Egress

There will be one access/egress point to the site which as shown in **Figure 5.3**. The following section describes and assesses the sight distance compliance for the proposed site access.



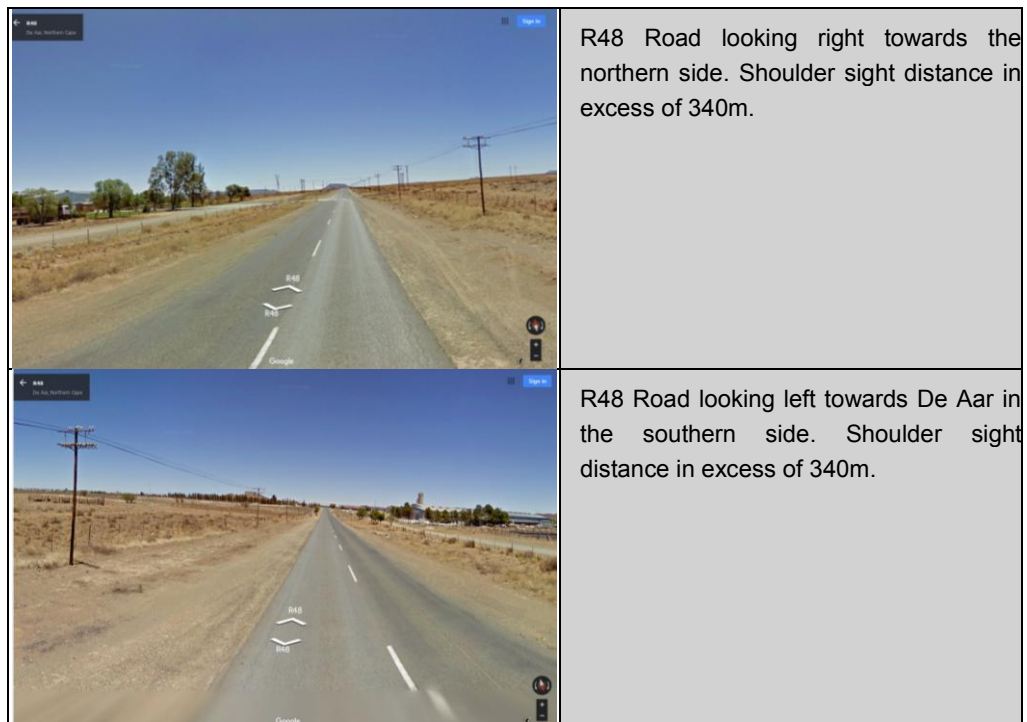
**Figure 5.3: Site access/exit location**

### 5.2.1 Geometric Design Standards/Safety

#### 5.2.1.1 Shoulder Sight Distance

*"... the driver of a stationery vehicle must be able to see enough of the major road to be able to cross before an approaching vehicle reaches the intersection, even if this vehicle comes into view just as the stopped vehicle starts to cross."* Geometric Design of Rural Roads – TRH 17, Pretoria, 1988.

In accordance to the TRH17, heavy vehicles (including the super links) require a minimum of 340m shoulder sight distance for a design speed of 80 km/h at the intersection. As shown in **Figure 5.4** the shoulder sight distance to both sides of the intersection is well in excess of 340m.



**Figure 5.4: Main Access Shoulder Sight Distances**

Signage for site access and egress will not be dealt with within this report and will form part of the detail road design phase of this project.

### 5.3 Site Access for Employees and Visitors

Staff and visitors to site will follow the same routes as discussed in **Section 5.1**. Workers and visitors would be required to undergo a mandatory induction course, including a health, safety and environment briefing. The briefing will highlight awareness of the traffic on site and about the shortest routes to the car parks.

Parking provision will not be discussed as part of this report and will form part of the detail road design phase of this project.

### 5.4 Pedestrian Management

It is difficult and not always possible to keep vehicles and pedestrians separated on construction sites. These areas will need careful consideration when planning their pedestrian movement plan. A pedestrian management plan should be planned as part of an internal movement plan for the site, and will not form part of this report.

All activities specific to passengers with special needs will be included in the risk assessment process. The physical layout, hours of operation and scheduled activities/movements on site are to be considered when implementing control measures. Environmental factors must be

considered such as lighting, noise, heat and weather conditions i.e. (wind, rain or sun). All control measures to be implemented must be in consultation with all key stakeholders on site. A review process to ascertain the effectiveness of an implemented control measure must be detailed in the Control Action Plan. An occurrence / incident or near hit (near miss) involving a pedestrian and/or vehicle/equipment demands a review of the relevant risk assessment and subsequently the Traffic Management Plan.

## 5.5 Traffic Incident Management

Traffic incidents or near misses would have to be reported as described in the Health and Safety Plan. Mitigation measures have to be implemented after traffic incidents and the Traffic Management Plan has to be reviewed and revised if necessary.

Traffic incident management refers to the response to a traffic incident. This is achieved through collaboration with emergency services and other key stakeholders to facilitate effective management of road users, and the on and off-site road network.

## 5.6 Emergency routes

Figure 5.5 shows a proposed emergency route south of the site connecting with Kweper St, to provide an addition exit/entry point during an emergency.

A detailed discussion focusing on the internal emergency route and emergency assembling point will follow in the detail design stage of the internal road network.

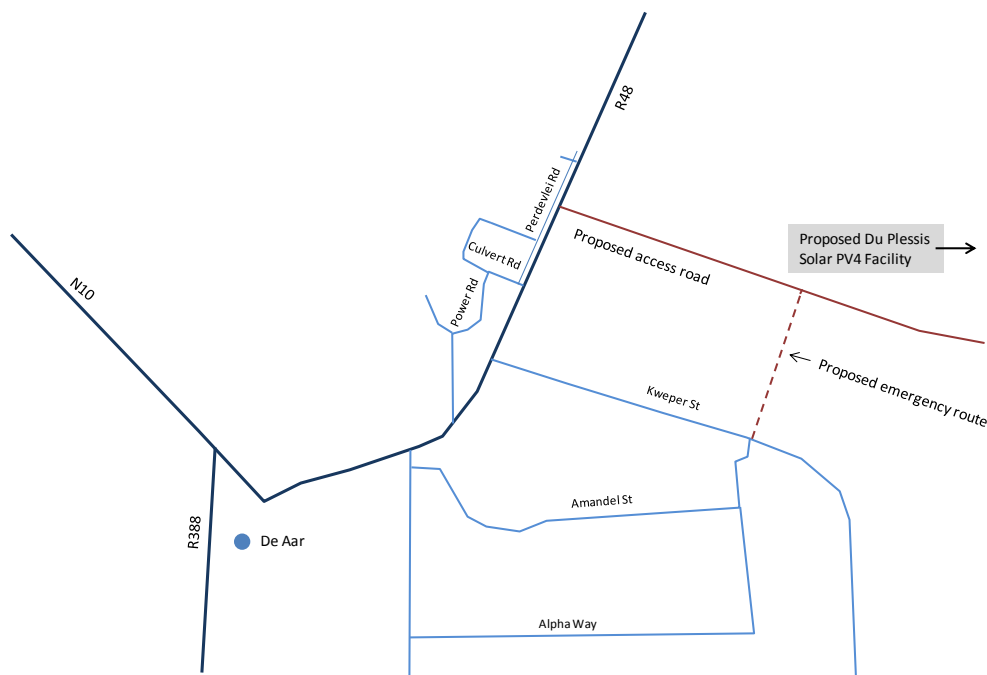


Figure 5.5: Proposed Emergency route location

## 5.7 Road maintenance

It is important to keep all roads maintained in a way that a safe travel is possible and keep public roads clean in case of excessive soil spillage, caused by construction traffic. The Site Manager shall be responsible for instructions pertaining to road maintenance on internal roads as required.

## 5.8 Reviews and Changes

The HSE Officer shall review the Traffic Management Plan frequently to ensure it is appropriate and is being implemented and monitored effectively. Changes may arise from a change of scope or from opportunities for improvement.

The Plan will then be updated by the HSE Officer to reflect any changes which have occurred. The revised document and the occurrence which led to the revisions, will be reviewed by the Site Manager and approved by the Project Manager.

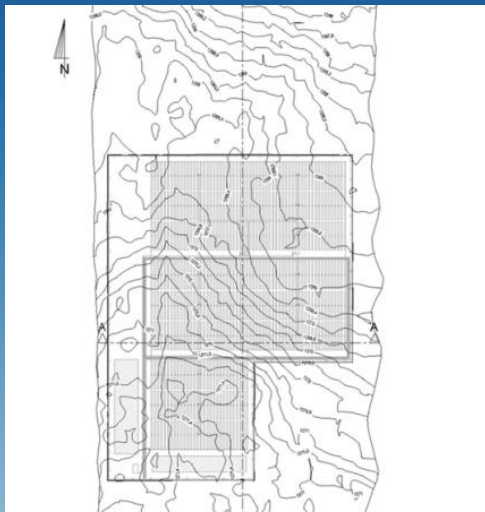
## 6. Conclusions and Recommendations

This Traffic Management Plan has reviewed the existing transport conditions at the proposed Du Plessis De Aar PV Farm as well as the expected traffic generated during the construction and operational phase of the solar farm. The proposed access road location was also assessed and general traffic management principles were recommended.

The following conclusions and recommendations are drawn:

- The expected daily traffic to the site during the construction phase will be as follows:
  - ◆ Ten truckloads per day. During site establishment this can increase by another five trucks per day.
  - ◆ Two buses in the morning and two buses in the evening for employee transport. This could be seen as four trips a day if the buses stay on site during the day, or eight trips if the buses return to De Aar when they drop off the local employees and fetch them when the work day is over. It is assumed that the buses that will be used will be the standard 66-seater buses.
- It is recommended that the arrival and departure schedules of trucks offloading at site be planned, as best as possible, to take place during the daytime to limit the generation of truck noise at night.
- Due to the low daily traffic that is expected to access the site, truck traffic will not be limited during the morning and evening peak hours, as it will hardly have any impact on existing traffic.
- It is expected that there will be three site drives (cars) per day travelling to and from the site during the operational phase as well as security drives during the night.
- Based on the information provided in **Section 2.1** and **2.2**, the expected daily traffic to the site is less than 50 daily peak hour trips, which eliminates the need for a Traffic Impact Assessment.
- **Section 5.1** describes the proposed northern and southern routes that vehicles should follow to access the solar farm.
- The following points were made with regards to the sight distance for the proposed access road:
  - ◆ Adequate shoulder sight distance well in excess of 340m is available to the north and south as shown in the **Figure 5.4**.





Juwi Renewable Energies (Proprietary)  
Limited

De Aar - Du Plessis Solar Farm PV4

H350485

Stormwater Management Plan

H350485-00000-100-066-0002

Rev. 1  
08 February 2016





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## 1. Introduction

Juwi Renewable Energies (Pty) Ltd (the “Client”), the EPC Contractor for the proposed Du Plessis Solar PV4, has contracted Hatch Goba (Pty) Ltd on behalf of Mulilo Renewable Project Development (Pty) Ltd, (the “Developer”), for the preparation of a Stormwater Management Plan (SWMP) for the proposed Solar Farm located on the farm Annex du Plessis Dam (Remainder of Farm No. 179) near De Aar, Northern Cape.

The authorised solar farm is located on a portion of farmland which lies 6 km north east of the town of De Aar, east of the R48 and to the south of the Brak River. The site is within the jurisdiction of the Emthanjeni Local Municipality in the Pixley ka Seme District Municipality district of the Northern Cape.

The proposed Solar Farm (Du Plessis PV4) will have a generating capacity of 5 MW and will occupy a footprint of 15.2 ha. Refer to Figure 1 below for the site location plan.



Figure 1-1 – Du Plessis Solar PV Site Location Plan

The proposed solar farm development includes the following infrastructure:

- PV solar panels arranged in arrays, and module mountings
- Connection Centre, building, 5.44m by 2.5m by 2.55m high
- Control Centre, 6m by 10m and 2.55m high
- Inverter – Sub-station centre (3 off), 8.08m by 3.05m and 2.79m high
- Guard cabin
- MV Ring Main Unit (RMU)
- Underground cabling on site
- Underground cable from RMU to Eskom power line
- A perimeter fence and internal roadways

The proposed development triggered the need for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act 107 of 1989) by undertaking a Basic Assessment (BA) process. Environmental Authorisation (EA) for the solar farm was issued in 2012. The preparation of a SWMP plan for the development is a condition of the EA (refer to extract from EA below) and proposed as a mitigation measure in the BA:

*“A comprehensive storm water management plan must be compiled for the solar array. This must indicate how water velocities will be reduced before the storm water is allowed to enter natural channels and how natural processes for water infiltration of the affected landscape will be accommodated”.*

1. *Requirement from Environmental Authorization:*

*“A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off- site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as to not impede natural surfaces and subsurface flows. Drainage measures must promote the dissipation of storm water”.*

The EA was based on a Solar Farm with a generating capacity of 19.9 MW and a footprint of 64 ha. The current development is however proposed for a capacity of 5 MW and a footprint of 15.2 ha. It is not clear whether further phases will be constructed and if so what the timing of location of the other solar farms might be. This SWMP report therefore considers the site characteristics and hydrology of the area and formulates the concepts for the management of stormwater to mitigate the impact on the proposed 5 MW PV array at Du Plessis Farm on the environment.

Consideration is given to both the external catchment areas and the internal stormwater runoff management to ensure adequate drainage of the site and minimise the risk of flooding and related damage to infrastructure.

The stormwater management plan considers and addresses the following:

- The Site
- Climate
- Land Use & Vegetation
- Geology and Soils
- Natural Ecosystems
- Cultural and Historical Significance
- Development Requirements
- Maintenance Capacity
- Topography
- Catchment Areas and Natural Drainage Routes

The access road from the nearest public road to the site does not form part of the scope of this SWMP.

## 2. Design Standards and Assumptions

Currently there are no formal design guidelines for stormwater management for rural developments that apply directly to this type of development, however, the industry best practice normally applied is to design infrastructure to accommodate the 1 in 50 year recurrence interval rainfall event and flood.

This is based on the Guidelines for Human Settlement (Red Book) standard for industrial areas. However, it must be noted that it may not be feasible, in the case of a PV array development, to fully prevent erosion damage in the case of a major rainfall event without large scale earthworks. The design proposals are therefore aimed at preventing erosion which could cause damage to the PV array and associated infrastructure and the environment or disrupt the generating performance or cut off access to the site.

It should be expected that some erosion damage may occur during a major rainfall event and that periodic and seasonal maintenance would be required to maintain adequate stormwater drainage of the site. It is assumed that the solar panels of the PV array rotate on a north/south axis thus tracking the movement of the sun from east to west across the site. The placement of the solar panel supports and the positioning of the inverters should be such that it will not cause obstruction to the existing surface and sub-surface stormwater flows. It is assumed that minimal earthworks will be carried out on the site and that the PV array will be positioned to follow the existing topography and existing site contours.

### 3. Site Characteristics

#### 3.1 The Site

The site is located approximately 6 km north-east of the town De Aar. The picture below provides a view to the north-east showing the typical landscape and vegetation of the area.



Figure 3-1 – Typical Landscape and Terrain at the Site

#### 3.2 Climate

The Solar Farm is located in the Central Karoo, a semi-arid climate region of the Northern Cape. The majority of the rainfall occurs in summer and early autumn. The area has a mean annual precipitation (MAP) of less than 300 mm per year. The area is prone to hot days and cold nights. Refer to rainfall and temperature statics provided later in this report.

#### 3.3 Land Use & Vegetation

The site is undeveloped and zoned Agriculture 1. Ground cover on site consists predominantly of low shrubs and grasses. The site was historically used for agricultural purposes including grazing veld for sheep, cattle, goats, ostriches and small game. The dominant land use on site is pastoral agriculture, however there are also lands given over to fodder crops and grasslands that is unused. The surrounding area consists of vacant land with an agriculture and industrial character including Eskom and Transnet infrastructure, the De Aar and Hydra Substations and the industrial edge of town, railway sidings and estates.

Land uses of the surrounding area includes medium density residential, light industrial, dam reservoir (small, breeched farm dam), agriculture and some historical buildings. There are a number of renewable energy projects within the De Aar area in various stages of approval and development. Refer to the EIA BA report for a detailed land use map of the study area.



**Figure 3-2 – Site Vegetation**

### **3.4 Geology and Soils**

The site is underlain by flat-lying sedimentary rocks of the Karoo Super group, intruded by sills and dykes of dolerite. The overlying soils include shallow to deep, red- yellow apedal, soils that drain freely to shallow Glenrosa and Misphah forms. The site is covered by mainly red soils with a restricted depth, excessive drainage, low fertility and high levels of erosion. Due to the climatic conditions and underlying parent material Calcrete is also predominant.

### **3.5 Natural Ecosystems**

The site is located within the Brak River catchment, a seasonal tributary of the Orange River. The river is located approximately 2 km north of the site and two ephemeral streams are located west and east of the site. According to the Habitat Integrity Assessment conducted to inform the Basic Assessment (2012) these streams are considered to be of low Ecological Importance and Sensitivity. All the drainage lines on site are considered and classified as having high sensitivity and have a protection value according to the National Water Act (NWA) (Act 36 of 1998). Ecologically they provide moderate value ecosystem services to the site. The drainage lines on site are however in poor condition and affected by erosion. The majority of the rest of the site is considered as having a medium sensitivity. These areas have no conservation concern and is moderately invaded in places.

### 3.6 Cultural and Historical Significance

Mr John Almond of Natura Viva cc undertook a Paleontological Impact Assessment (PIA) to inform the Basic Assessment Report undertaken in 2012. The potentially fossiliferous sediments of the Late Palaeozoic Karoo Supergroup (Ecca and Beaufort Groups) that underlie the study area is almost entirely mantled in a thick layer of superficial deposits of probable Pleistocene to Recent age. The diverse superficial deposits within the study area (e.g. soils, gravels, alluvium, calcrete hardpans) as a whole are of low paleontological sensitivity.

### 3.7 Development Requirements

The development requirements are that the PV array should not impact unduly on the natural drainage of the site and that the proposed infrastructure be designed to avoid concentration of runoff that could cause erosion and damage to infrastructure.

### 3.8 Maintenance Capacity

The stormwater drainage infrastructure should be designed with ease of maintenance in mind. Pipes should be avoided and open drains and berms are preferred to allow access for cleaning and removal of silt. Periodic maintenance of ditches, roads and berms should be implemented to ensure that drainage of the development is efficient and effective at all times. The build-up of silt or debris after rain storms should be cleaned and removed immediately.

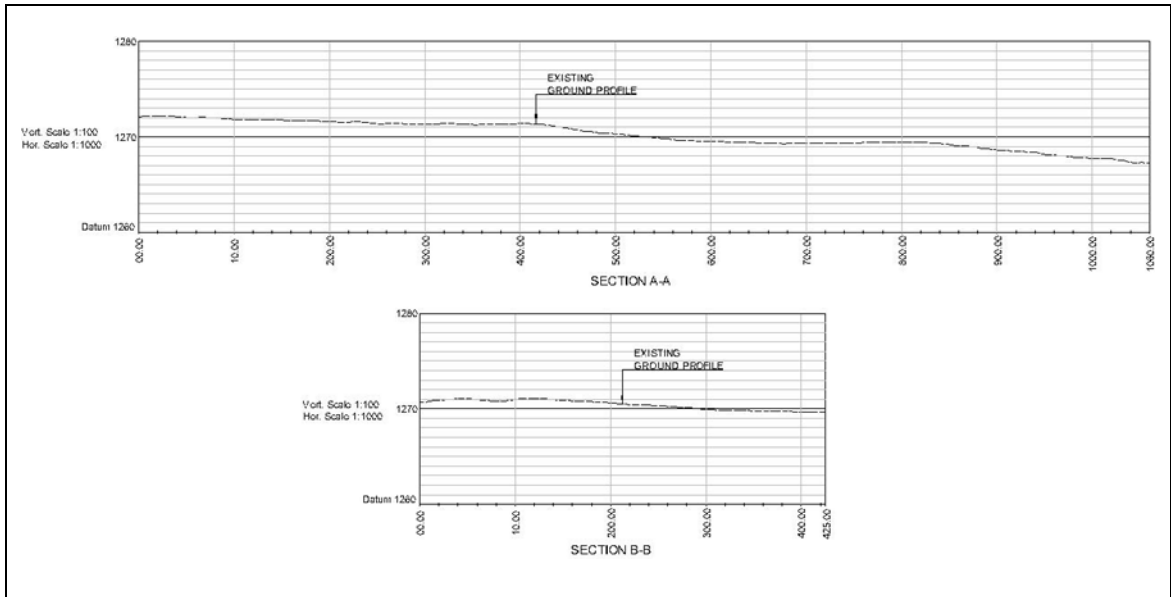
### 3.9 Topography

A topographical survey of the proposed site was undertaken. The survey was restricted to the boundary of the proposed site which covered an area of approximately 45 ha. Refer to the figure below for the survey contour plan of the site.

The site slopes predominantly in an north-easterly direction with parts of the western side of the site sloping in a north-westerly direction. The natural ground level ranges between 1272.6 m to 1266.5 m with an average slope of 0.50% in a northerly direction. Minor depressions are noted in the topography across the site which could be prone to local ponding during heavy rainfall events.







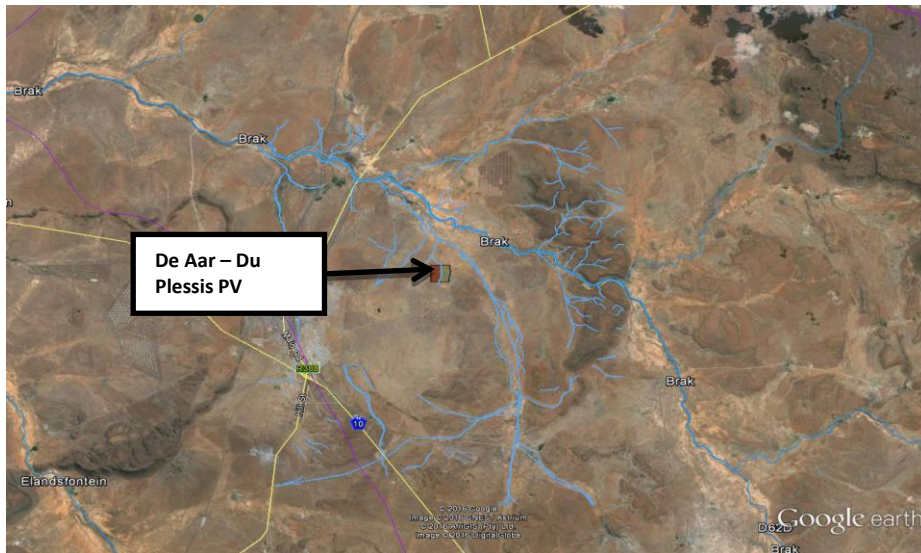
**Figure 3-4 – Site Profiles**

The profiles shown above illustrate the natural ground level profile across the site along the south–north and west-east axis.

### 3.10 Catchment Areas and Natural Drainage Routes

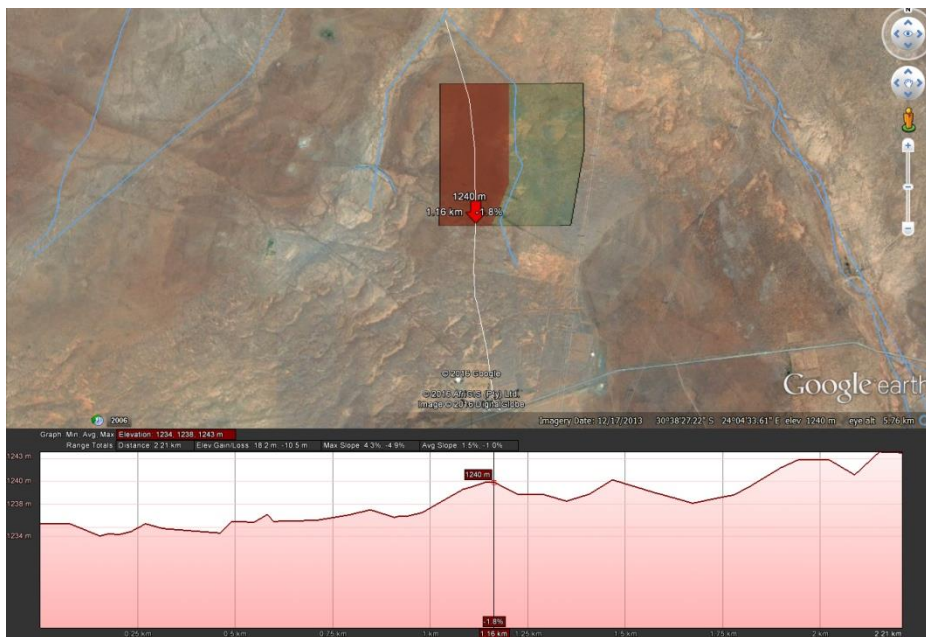
#### 3.10.1 Catchment area and river system

The PV area is located next to a tributary of the Brak River in Quaternary Drainage Region D62D. See figure below. The PV array will should not be influenced by the tributary as the site is located on higher ground between two tributary streams.



**Figure 3-5 – Rivers and Regional Natural Drainage Routes (Source of Image: Google Earth)**

The river system shape files were obtained from the Department of Water and Sanitation website.



**Figure 3-6 – North-South Elevation Profile Through the Site (Source of Image: Google Earth)**

The north-south ground profile above shows that the site is located on a high point and that it does not have an external catchment area. Stormwater drainage from the south will flow either east or west in the direction of the existing tributary streams located either side of the site. The proposed site for the PV array is sloping to the north east an average slope of 0.50%. The location of the site is at the top of the catchment of a small tributary stream of the Brak River system catchment area. There are no know obstructions downstream of the site which could cause flooding of the site and the area is generally free draining.

## 4. Hydrology

### 4.1 Weather Stations

There are six weather stations within a 20 km radius of the site. These are Ebenezer, De Aar (2), Blaauwkrantz, Hartenbeesthoek and Rietfontein, as shown in the image below.



Figure 4-1 – Regional Weather Stations

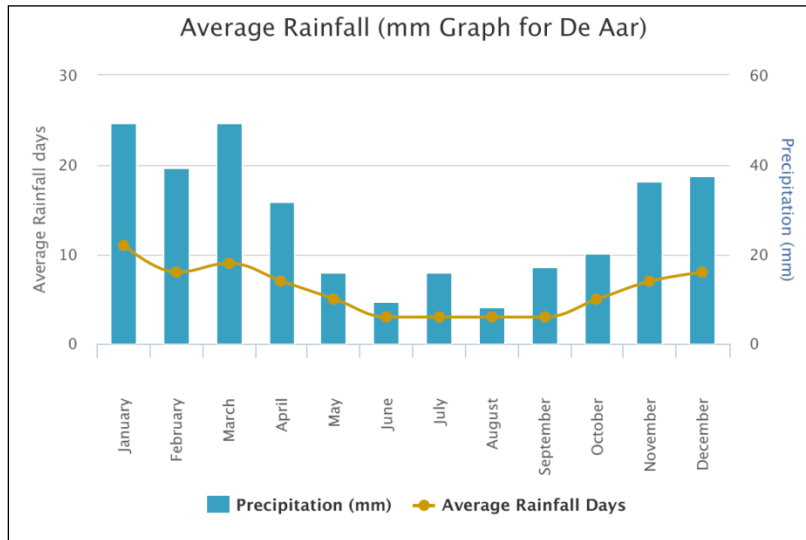
Information regarding these weather stations are provided in the table below.

Table 4.1 – Rainfall Stations

SAWB Number	Station Name	MAP (mm)	Data Record (years)	Distance from Site (km)
0170099_W	Ebenezer (Wettevrede)	288	68	1.8
0170009_A	De Aar	303	87	5.7
0170009AW	De Aar (TNK)	290	68	7.4
0169844_W	Blaauwkrantz	268	41	14.1
0170137_W	Hartenbeesthoek	270	65	14.8
0170315_W	Rietfontein	286	45	16.6

## 4.2 Rainfall data

The site is located in the summer rainfall area, with a Mean Annual Precipitation of below 300 mm per annum. The average monthly rainfall days and average monthly precipitation for the De Aar area is provided in the table below. (Source worldweatheronline.com)

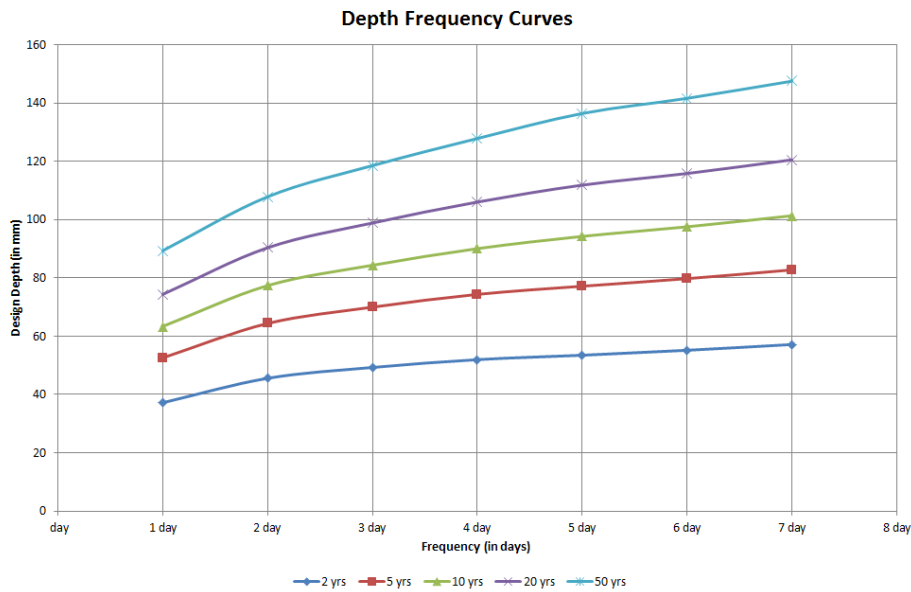


**Figure 4-2 – Average Rainfall for De Aar region**

Weather station 0170099\_W (Ebenezer (Wettevrede)), is located only 1.8 km from the site. The rainfall statistics from this station is summarised in the table below.

**Table 4.2 – Nearest Rainfall Station Data**

Station Name		Ebenezer (Wettevrede)					
SAWB Station Number		0170099_W		MAP		288 mm	
Latitude		30°39'		Altitude		1243 m	
Longitude		24°04'		Record		68	
Duration (days)	Return Period (years)						
	2	5	10	20	50	100	200
	Rainfall (mm)						
1	37.2	52.6	63.4	74.4	89.4	101.4	113.9
2	45.6	64.4	77.4	90.4	107.9	121.6	135.7
3	49.3	70	84.4	98.9	118.6	134	150
4	52	74.4	90.1	106.1	127.9	145.3	163.4
5	53.5	77.2	94.3	111.9	136.5	156.3	177.5
6	55.2	79.8	97.6	115.9	141.7	162.5	184.8
7	57.2	82.8	101.4	120.6	147.6	169.6	192.9

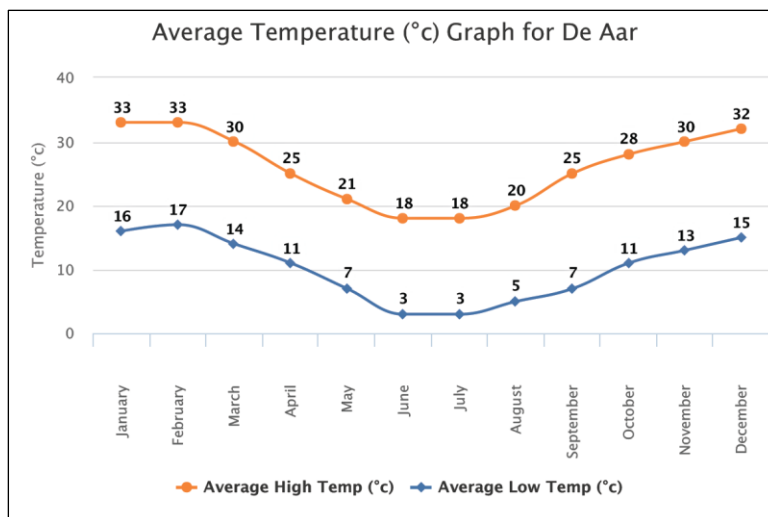


**Figure 4-3 – Rainfall – Depth/Duration/Frequency Curves  
(Rainfall Station: Ebenezer (Wettevrede))**

The Depth/Duration/Frequency curves for the nearest rainfall station is shown above.

### 4.3 Temperature data

The ambient temperature in the region site varies significantly, ranging from more than 40°C (in summer) to as low as -10°C (in winter). The average monthly maximum and minimum daily temperature for the De Aar area is provided in the table below. (Source worldweatheronline.com)



**Figure 4-4 – Average Rainfall for De Aar region**

#### 4.4 Runoff Characteristics

Runoff from the PV array area will largely be dictated by the existing topography and soil conditions and may be influenced to some degree by the layout of the PV arrays and the layout of the internal roads. The PV array and the size and configuration of the PV array should be designed to have minimal impact on the natural drainage patterns off the site. Since there is no prevailing watercourse on the site, stormwater runoff in the event of a high intensity rainfall event will occur as sheet flow across the surface and along the roads. The site is on higher ground than the upstream catchment between two small natural water courses to the east and further to the west. Hence, runoff will tend to flow away from the site predominantly in a north-easterly direction and concentration of flow will not occur unless caused by man made obstructions or hardened surfaces.

##### 4.4.1 Method and Assumptions

The Rational Method was used to calculate the runoff from the site for various return periods. The following assumptions were applied:

- The PV area is on higher ground than the upstream catchment areas and therefore the area considered in the calculations is the footprint of the site for the PV array and associated roads and fencing only.
- Wash water is included in the runoff calculations as the volumes are relatively small (0.25 to 0.5 l/s) and washing of the panels do not generally coincide with rainfall.

##### *Physical Characteristics*

- Size of catchment = 0.296 km<sup>2</sup>
- Longest watercourse = 0.88 km
- Average slope = 0.0054 m/m

##### *Return Periods*

The flow was calculated for the 1:2, 1:5, 1:10, 1:20, 1:50 and 1:100 year return periods.

##### *Runoff Coefficient*

The runoff coefficient used for the runoff calculations are as follows:

**Table 4.3 – Site Runoff Coefficient**

Slope	%Area	Permeability	%Applied	Vegetation	%Applied
< 3%	100%	Very	0	Thick bush	0
3% to 10%		Permeable	70	Light bush	40
10% to 30%		Semi Permeable	30	Grassland	10
>30%		Non-permeable	0	No vegetation	50

### Time of Concentration

Time of concentration is calculated by the widely used USBR stream flow formula:

$$T_c = \left( \frac{0,87 \cdot L^2}{1000 \cdot S} \right)^{0.385}$$

Where  $T_c$  = Time of concentration [hours] ,  $L$  = Length of watercourse [km] ,  $S$  = Average slope.

### Point Intensity

Point intensity is based on standard time of concentration using the depth/duration/frequency data for the nearest rainfall station.

### Peak flow

The peak flow was obtained from the following relationship:

$$Q = \frac{C \cdot I \cdot A}{3.6}$$

Where  $Q$  = Peak flow [ $m^3/s$ ],  $C$  = Runoff coeff,  $I$  = Ave rainfall intensity [mm/hour],  $A$  = Area [ $km^2$ ]

The results is as seen in the following table.

**Table 4.4 – Site Runoff Calculations**

Return period (years)	1:2	1:5	1:10	1:20	1:50	1:100
Area ( $km^2$ )	0.296					
Ave rainfall intensity (mm/h)	58	81.35	96.11	116.23	159.57	186.15
Runoff coeff.	0.2915					
Time of concentration (min)	26.7					
Peak flow ( $m^3/s$ )	0.74	1.13	1.46	1.97	3.35	4.71



## 5. Stormwater Drainage Philosophy/Principles

The philosophy for management of stormwater runoff is based on utilisation of the natural drainage routes and avoiding the construction of any structures that could retain or obstruct the natural runoff causing ponding or acceleration of flows that would enhance erosion. The PV array will be laid out on the existing topography and major earthworks platforms are not proposed. Local depressions may be filled in to prevent ponding from occurring. The formal lay down and parking areas as well as the roads must be sloped to drain along with the natural slopes and away from the structures. Rain will infiltrate into the soft sandy soil and no or very little surface flow will be observed, especially during light rain.

During heavy rainfall and when the topsoil becomes saturated, surface water flow is likely, however, due to the relatively flat terrain concentrated flow is unlikely. Surface water flow is likely to be in the form of sheet flow with small erosion channels occurring.

The following design principles need to be incorporated during the detail design of stormwater infrastructure and other civils works for the development:

- Prevent concentration of surface runoff.
- Allow rainfall to infiltrate the natural topsoil layer and avoid exposing harder underlying layers of shaley sandstone.
- Provide erosion protection along steeper sections especially along roads.
- Construct internal access roads parallel to the natural slope of the site to facilitate natural stormwater drainage.
- Ensure all parking areas, access roads, internal roads and lay down areas can drain freely with a slope of 1% to 2% away from buildings and structures.
- Construct internal roads by excavating into the natural surface, compacting the bottom of the excavated area and importing and compacting road base material so that the final surface is at grade with the natural ground level.

## 6. Major/Minor Risks

The hydrological assessment of the proposed development indicated that there are no obvious existing watercourse that will affect the development footprint and that the site is located in higher ground situated to the south of the Brak River, upstream to an ephemeral tributary of the Brak River. A 1 in 100 year recurrence interval floodline determination study carried out by Aurecon found that the development site did not warrant a floodline inspection due to the fact that it was not located in a flood plain or affected by any defined water course.

On this basis there is therefore no major risk associated with flooding for this site. The following minor flood risks are however identified:

**Table 6.1 – Risk Identification**

Minor Risks	Risk Description	Impact	Mitigation measures
1	Erosion of site during heavy rainfall	Erosion of PV array foundations and structures may cause instability	Avoid concentration of stormwater runoff. Avoid physical obstructions that will cause ponding or acceleration of surface water flows.
2	Ponding	Standing water may soften the soil leading to subsidence under load conditions	Fill in depressions to prevent ponding and avoid placing important structures in low lying areas.
3	Erosion along roads	Internal roads will require hardening of base layers through mechanical compaction and possibly the impartation of road materials to create suitable load capacity. The roads will lead to acceleration of surface water flows across and along roads in the direction of flow.	Construct roads to ensure that surface course is at grade with the natural ground level and construct v-drains along steep sections parallel to the roads.
4	Waste Water Spillage into the environment during flooding	Excessive rainfall may cause temporary sheet flow or ponding which may flow into or damage structures and potentially wash out sewage contained in the proposed conservancy tank located just outside the site.	Position conservancy tank on the higher side of the site just outside the fencing for access by the municipal suction tanker. Construct conservancy tank to ensure that the external walls and top slab protrude by at least 150 mm above the natural ground level.
5	External catchment	External catchment runoff effecting the site during heavy rainfall	Due to the location of the site on a south to north slope and with a local high point just south of the site, there is no risk of the external upstream catchment impacting on the PV array footprint.

## 7. Conceptual Stormwater Management Plan

### 7.1 General

This conceptual SWMP defines the proposed stormwater control measures that are to be taken into consideration during the detailed design phase, and include inter alia;

- All stormwater control measures implemented before, during and after construction shall align and complement the final SWMP.
- All stormwater runoff upstream of the site shall be diverted around the site and adequately dispersed into the adjacent environment without causing long-term degradation of the environment.
- The drainage system on site shall follow the natural drainage flow paths and shall prevent the concentration of flow from surfaced areas into unsurfaced areas.
- Wash water for cleaning of the panels will be allowed to infiltrate the sandy soils and no specific provision for accumulation and drainage of wash water is proposed.

During construction, the contractor is to compile a Stormwater Control Method Statement, ensuring that all construction activities does not cause long-term degradation of the environment and satisfies the requirements of the Stormwater Management Plan.

### 7.2 Design Recommendations

The following options are to be considered and incorporated into the detail design of civil works and stormwater drainage infrastructure for the development. Two design options are considered:

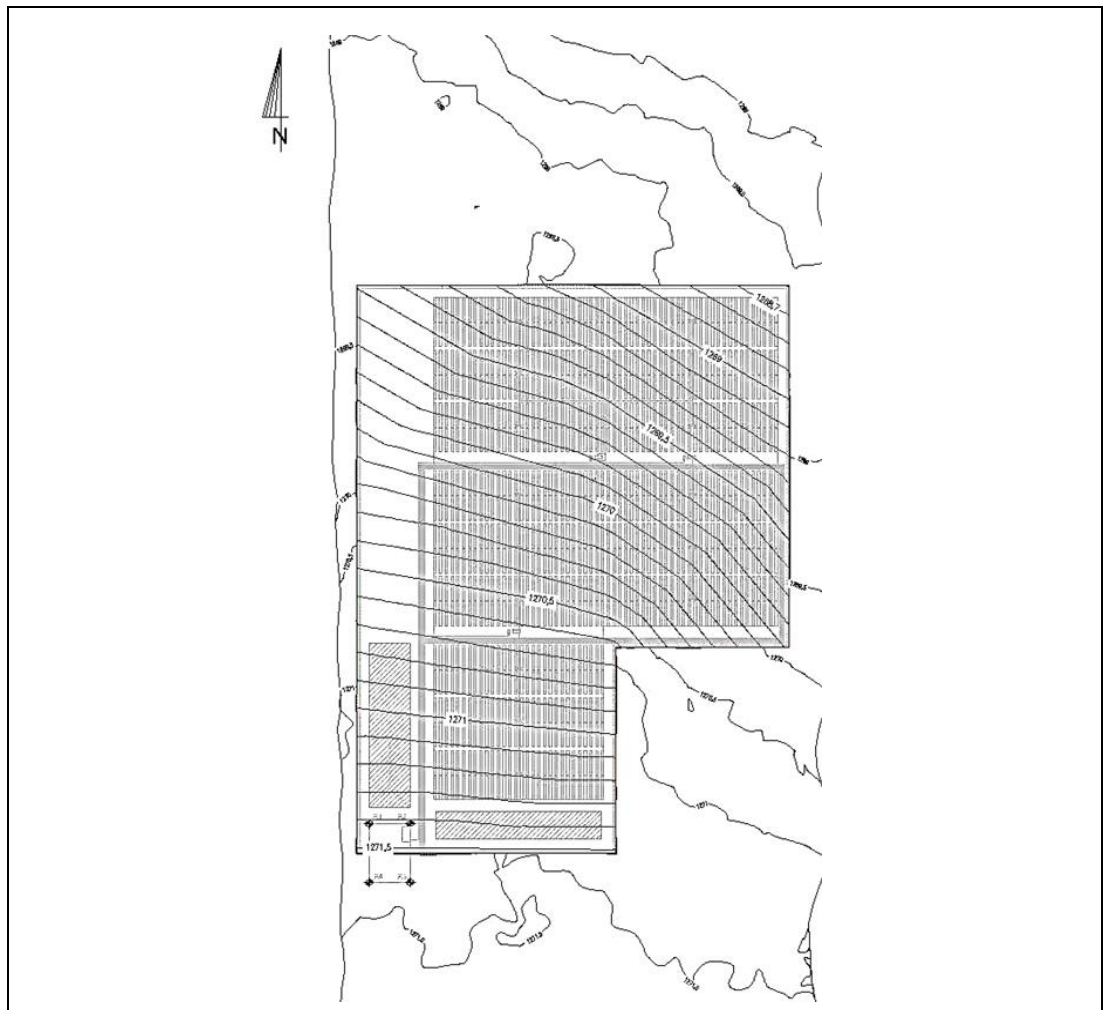
#### Option 1 – Natural Drainage

The existing terrain is relatively flat (average gradient of 0.5% mainly in a north-easterly direction), hence considered ideal for the proposed development. However, minor depressions across the terrain could result in local ponding during heavy rainfall subject to the type of underlying soil material. In the case where the soil conditions are highly permeable ponding will be unlikely. At this stage no geotechnical information is available for the site. The supports for the PV panels will be constructed by punching the metal supports into the ground to an adequate depth and excavations should be avoided where possible.

The construction of roads will require a “box-cut” excavation and filling in with imported sub base and base material which will be compacted. The surface/wearing course of the roads will be designed to be level with the existing ground to ensure that it does not obstruct the natural stormwater flow across the site. Material recovered from the road excavations can be utilized to construct stormwater berms, if required, or be used to fill in depressions/low points on site. The stormwater berms will be located in the upper parts of the site (south of the development) to divert stormwater run-off away from the development. In the event where the in-situ soil material is impermeable or has poor drainage characteristics and there is a risk of the compacted road pavement layers obstructing the sub-surface stormwater flow, consideration should be given to the installation of subsoil drains across the road at strategic points along the road to drain the stormwater permeating through the top sandy layer.

**Option 2 – Uniformly Sloped Platform to Formalise Drainage**

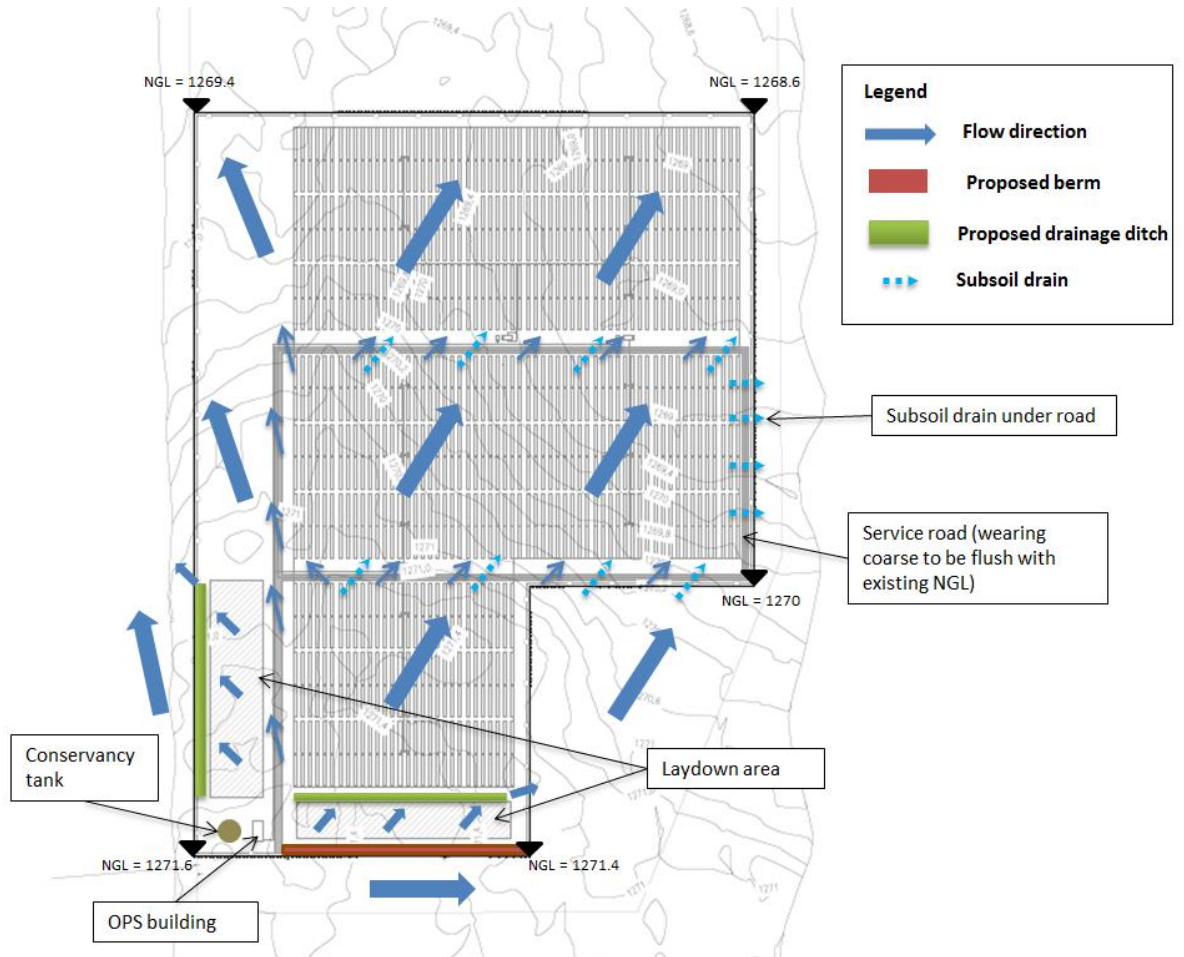
Construction of an earthworks platform for the development to prevent local ponding and good drainage. The platform will be designed to follow the natural ground profile, i.e. sloping in a north-easterly direction. The platform design will be such that no additional fill material will be imported to construct the platform or surplus cut material be carted off site, i.e. balancing the cut and fill material. All the depressions and high points of the existing terrain will be removed, creating a uniform platform that slopes in the same direction as the existing site, mitigating the risk of local ponding on site and ensuring uniform drainage. Earthworks for the road layer works will be required and material recovered from this operation can be utilised to construct stormwater berms, if required. The stormwater berms will be located in the upper parts of the site (southern section) to divert stormwater run-off away from the development. Consideration should be given to the installation of subsoil drains across the road at strategic points along the road to drain the stormwater permeating through the top sandy layer.



**Figure 7-1 – Option 2 – Uniform Sloping Platform**

### 7.3 Proposed Site Drainage Plan

The sketch plan below illustrates the proposed drainage and stormwater management plan for the proposed PV array.



**Figure 7-2 – Conceptual Site Drainage and Stormwater Management Plan**

The detail design of civil and drainage infrastructure should be based on the conceptual stormwater management plan and recommendations above.

End



# EROSION MANAGEMENT PLAN

## **Anticipated Erosion Impacts**

Excessive erosion can lead to land degradation and the reduction of the area's carrying capacity. It is therefore of importance to implement an erosion management plan during the lifespan of the project.

## **Soil Erosion Mitigation Measures**

The following mitigation measures should be implemented:

- Clearing activities shall be kept to a minimum and must only be undertaken during agreed working times, as well as permitted weather conditions. If heavy rains are expected clearing activities shall be put on hold. In this regard, the contractor must be aware of weather forecasts.
- The further unnecessary removal of groundcover vegetation from slopes shall not be allowed, especially on steep slopes. Following the clearing of an area, the surfaces of all exposed slopes shall be roughened to retain water and increase infiltration (especially important during the wet season). Any steep or large embankments that are expected to be exposed during the 'rainy' months shall either be armoured with fascine like structures or vegetated<sup>1</sup>.
- If a cleared area is not going to be built on immediately, the top layer (300 mm) of soil shall be removed and stockpiled in a designated area approved by the ECO. Vegetation shall be stripped in a sequential manner as the work proceeds so as to reduce the time that stripped areas are exposed to the elements. Top-soiling and re-vegetation shall start immediately after the completion of an activity and at an agreed distance behind any particular work front.
- Existing farm roads must be used as far as possible, while the additional creation of access roads shall be kept to a minimum.
- Storm water control and wind screening shall be undertaken to prevent soil loss from the site. All embankments shall be protected by a cut off drain to prevent water from running down the face of the embankment, resulting in soil erosion. Typical erosion control measures such as the installation of silt fences, hay bales, EcoLogs<sup>TM</sup> and Bio Jute<sup>TM</sup> are recommended if erosion problems are noted during construction and operation phases.

To mitigate soil erosion and an increased loading of suspended solids the following measures should be taken, both as erosion prevention and control measure:

- Straw barriers should be installed in drainage paths to act as a check dam, i.e. to reduce velocity, and as a sediment trap during construction (Figure 1). Suspended solids carried by overland flow will be intercepted. These are erosion barriers placed at intervals of 25-50 m apart in the drainage paths which will intercept suspended solids from entering the natural drainage paths.

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<sup>1</sup> A fascine structure usually consists of natural wood material and is used for the strengthening earthen structures or embankments.

- Packed stone (also known as rip-rap) must be placed as liners for channel spines. These comprise packed stones with an average diameter of 100 mm, packed in the channels as lining material to control flow velocities and hence erosion.
- Earth cut-off channels at boundaries of the facility. These will assist in directing flow away from the site and reduce the possibility of flooding from runoff origination from outside the site.
- Provide erosion protection at channel outfalls and positions of high flow concentration. These comprise packed stones with an average diameter of 200 mm, packed in the drainage path to control flow velocities and hence erosion.

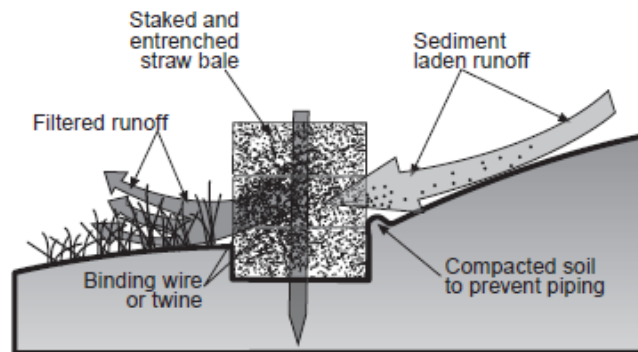


Figure 1 | Cross-sectional view of an installed straw bale

The sediment and erosion control measures should remain in place until construction is complete. The above noted sediment traps will require regular monitoring during construction and reinstatement as necessary.

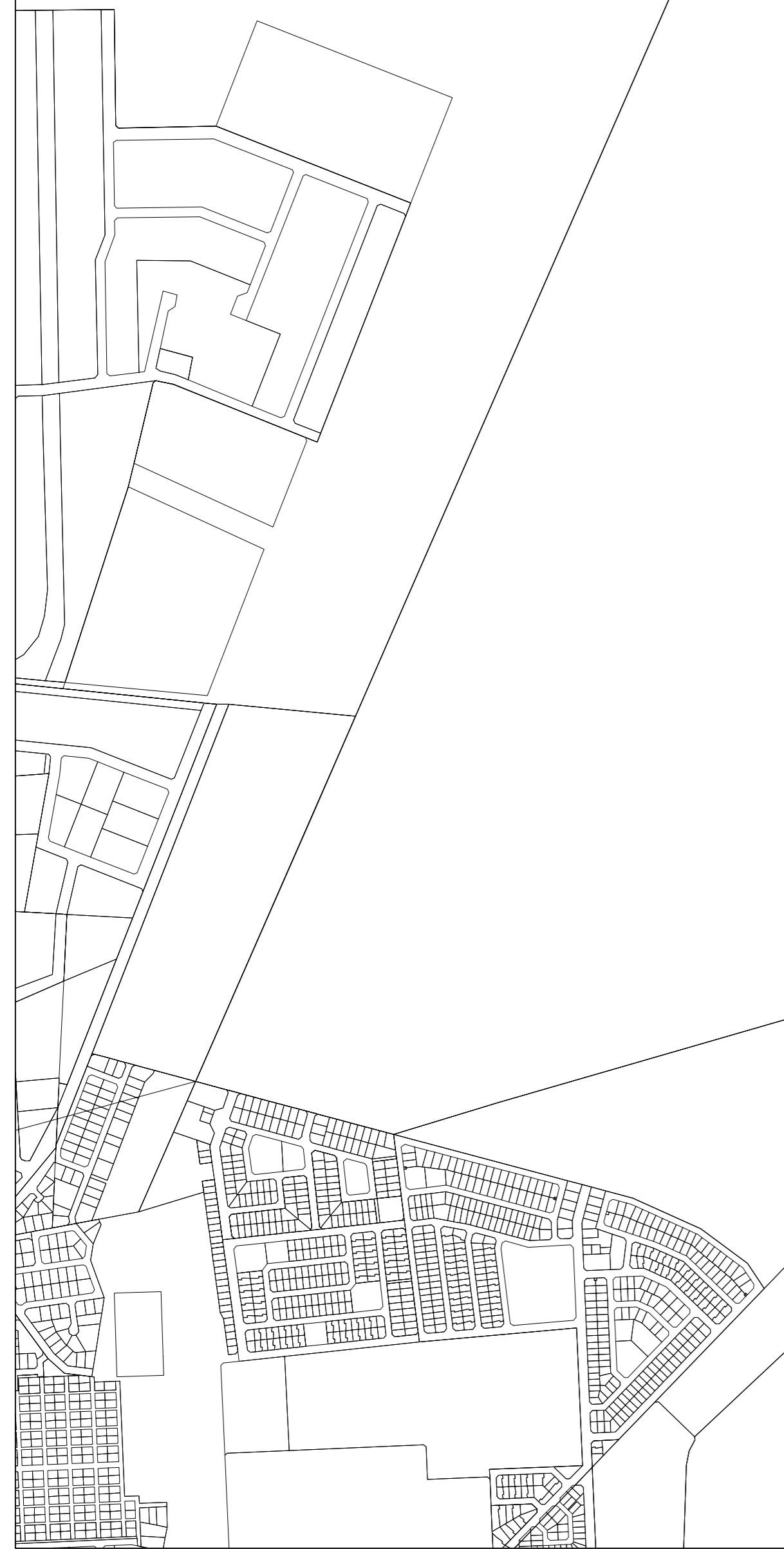
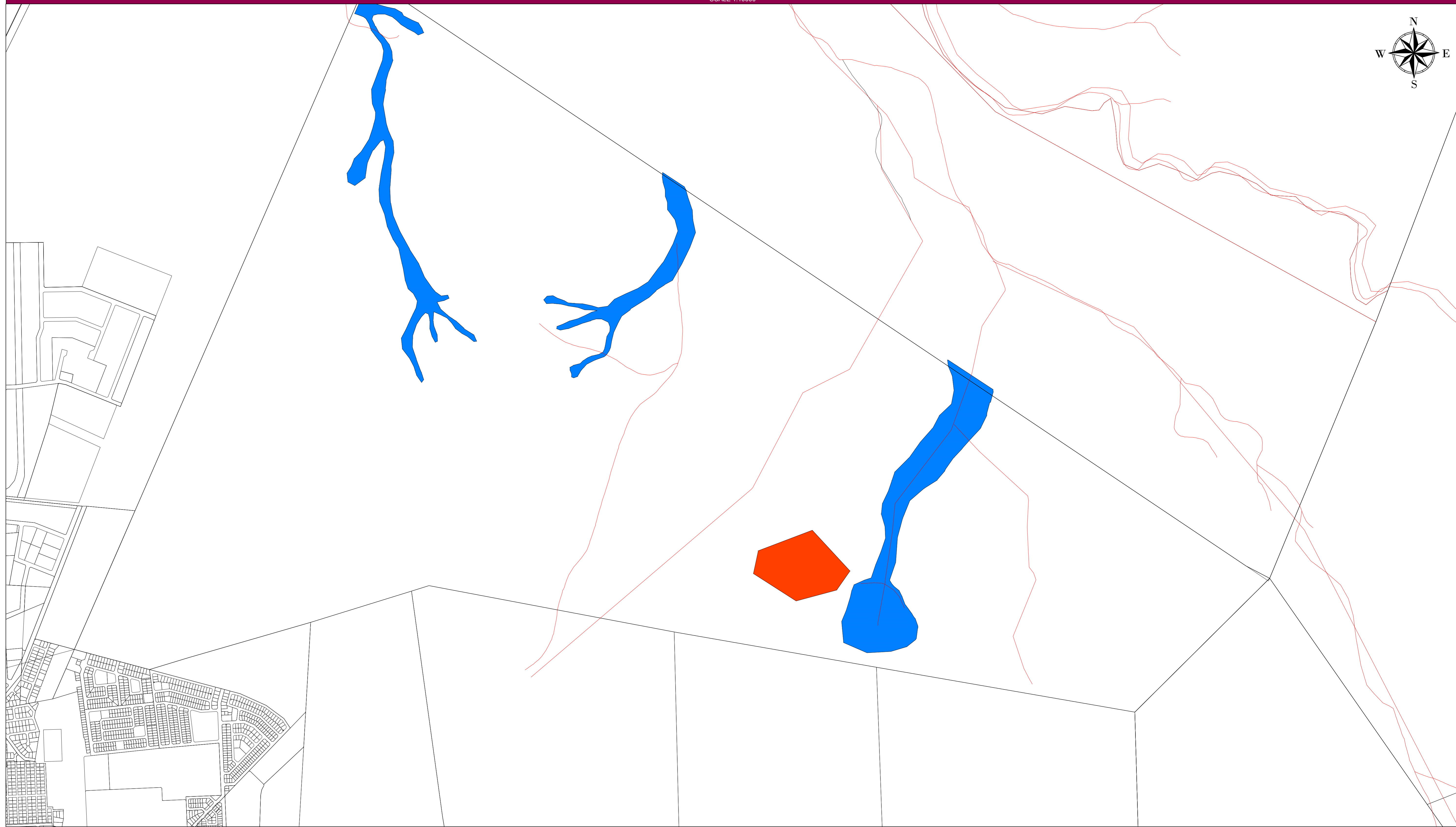
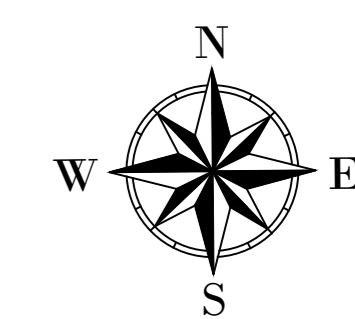
### **Soil Erosion Monitoring**

Soil erosion shall be monitored visually by the appointed ECO:

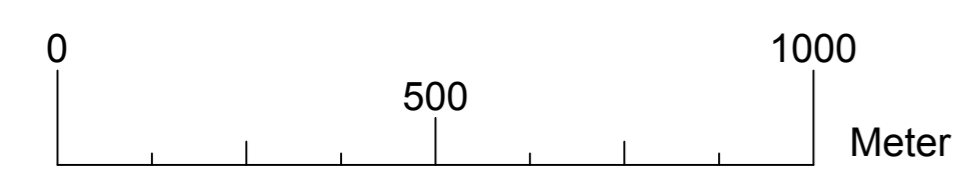
- Areas around roads, stockpiles and PV panels shall be visually monitored during audits.
- A photographic record of the on-site conditions shall be kept to aid in the identification of erosion problems.
- Signs of rill and gully erosion shall be remediated as soon as possible. Typical remediation techniques are provided below.







LEGEND	
	TRACKER
	POWER STATION
	FENCE
	PV AREA
	SITE BOUNDARY
	WATER COURSES
	SENSITIVE HERITAGE
	NO-GO AREA



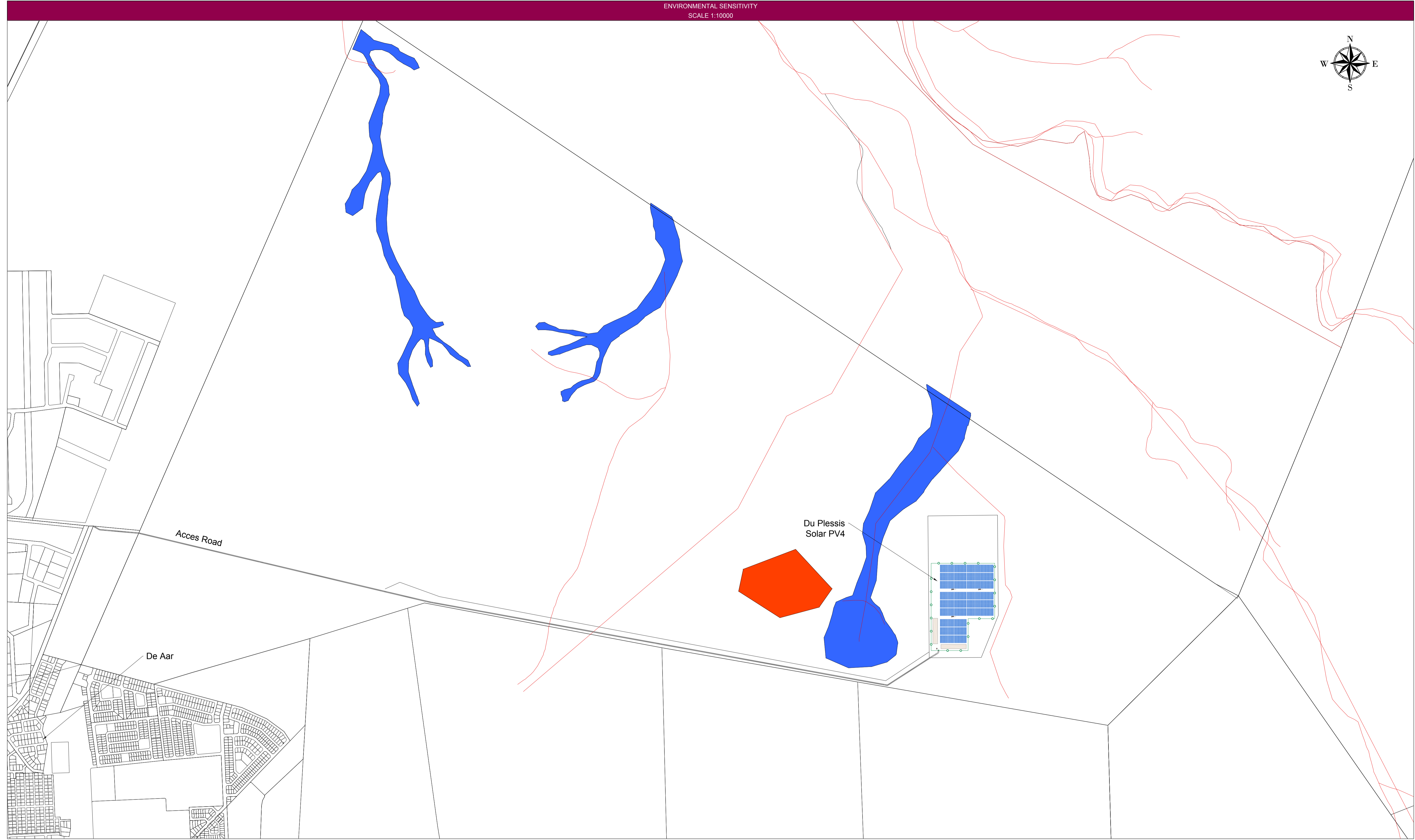
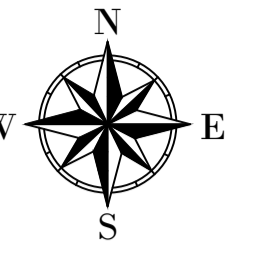
REV	DATE	BY	DATE	APPROVED	DATE
P1	RTH	DUN	-	FIRST ISSUE	2016-02-09
PROJECT NUMBER		SHEET NO.		DRAWING TITLE	
40100 1084		G1103		ENVIRONMENTAL SENSITIVITY	
PROJECT NAME & ADDRESS				CUSTOMER	
DU PLESSIS SOLAR PV4				MULILO (PTY) LTD	
EPC:				APPROVAL STAMP	
juwi Renewable Energies (Pty) Ltd 7 Walter Sisulu Avenue - Foreshore Cape Town - 8001 - South Africa Phone: +27 - (0)21 8316100 Telefax: +27 - (0)21 8316199				STATUS: <b>PRELIMINARY</b>	
SCALE:				FORMAT:	
1:10000				DIN A1	

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**Appendix 9**

*Final Layout Plan superimposed on Environmental Sensitivity Map*

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LEGEND		TRACKER
		POWER STATION
		FENCE
		SITE BOUNDARY
		WATER COURSES
		SENSITIVE HERITAGE
	NO-GO AREA	

P2	PR	DUN	-	SECOND ISSUE	2016-02-17
P1	RTH	DUN	-	FIRST ISSUE	2016-02-09
REV	DRAWN	REVIEWED	APPROVED	CHANGE	DATE
PROJECT NUMBER: 40100 1084		SHEET ID: GI103		DRAWING TITLE: ENVIRONMENTAL SENSITIVITY	
PROJECT NAME & ADDRESS: DU PLESSIS SOLAR PV4				CUSTOMER:	
EPC:				APPROVAL STAMP:	
juwi Renewable Energies (Pty) Ltd 7 Walter Sisulu Avenue - Foreshore Cape Town - 8001 - South Africa Phone: +27 - (0)21 8316100 Telefax: +27 - (0)21 8316199				STATUS: <b>PRELIMINARY</b>	
SCALE: 1:1000				FORMAT: DIN A1	





## environmental affairs

Department:  
Environmental Affairs  
**REPUBLIC OF SOUTH AFRICA**

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Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

**NEAS Reference:** DEA/EIA/0000609/2011

**DEA Reference:** 12/12/20/2498

**Enquiries:** Mr Jay-Jay Mpelane

**Telephone:** 012-310-3004 **Fax:** 012-320-7539 **E-mail:** jmpelane@environment.gov.za

Mr Warren Morse  
Mulilo Renewable Energy (Pty) Ltd  
P.O. Box 50  
**CAPE TOWN INTERNATIONAL AIRPORT**  
7525

Fax no: 021-935-0505

### **PER FACSIMILE / MAIL**

Dear Mr Morse

### **APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998: GN R.544 AND R. 546: 19.9MW PHOTOVOLTAIC SOLAR ENERGY FACILITY (PV4) ON ANNEX DU PLESSIS DAM FARM NEAR DE AAR, EMTHANJENI LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE**

With reference to the above application, please be advised that the Department has decided to accept the Amended Basic Assessment Report (BAR) dated 17 August 2012 and grant authorisation. The environmental authorisation (EA) and reasons for the decision are attached herewith.

In terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the EA, of the Department's decision in respect of your application as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

- By facsimile: 012 320 7561;
- By post: Private Bag X447,  
Pretoria, 0001; or
- By hand: 2nd Floor, Fedsure Building, North Tower,  
Cnr. Lilian Ngoyi and Pretorius Streets,  
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department (*Attention: Director: Integrated Environmental Authorisations*) in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

**Appeals must be submitted in writing to:**

Mr T Zwane, Senior Legal Administration Officer (Appeals), of this Department at the above mentioned addresses or fax number. Mr Zwane can also be contacted at:

Tel: 012-310-3929

Email: [tzwane@environment.gov.za](mailto:tzwane@environment.gov.za)

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours sincerely



**Mr Mark Gordon**  
**Chief Director: Integrated Environmental Authorisations**  
**Department of Environmental Affairs**

Date: 28/09/2012

CC:	Ms Karen de Bruyn	Aurecon	Tel: 021-526-9400	Fax: 021-526-9500
	Ms Anga Yaphi	NDEANC	Tel: 054-332-2885	Fax: 054-331-1155
	Mr Isack Visser	Emthanjeni Local Municipality	Tel: 053-632-9100	Fax: 053-631-0105
	Mr T Zwane	Appeals Authority (DEA)	Tel: 012-310-3929	Fax: 012-320-7561
	Mr S Malaza	Compliance Monitoring (DEA)	Tel: 012-310-3397	Fax: 012-320-5744

**APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R.543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)**

<b>APPLICANT</b>	<b>INTERESTED AND AFFECTED PARTIES (IAPs)</b>
1. Receive EA from the relevant Competent Authority (the Department of Environmental Affairs [DEA]).	1. Receive EA from Applicant/Consultant.
2. Within 12 days of date of the EA notify all IAPs of the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of the Regulations.	2. N/A.
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IAP with a copy of the notice of intention to appeal within 10 days of lodging the notice.	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 days of lodging the notice.
5. The Applicant must also serve on each IAP: <ul style="list-style-type: none"> <li>• a notice indicating where and for what period the appeal submission will be available for inspection.</li> </ul>	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, <ul style="list-style-type: none"> <li>• a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.</li> </ul>
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to that appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to may submit a responding statement to the appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.

**NOTES:**

1. **An appeal against a decision must be lodged with:-**
  - a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
  - b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
2. **An appeal lodged with:-**
  - a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
  - b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
3. **An appeal must be:-**
  - a) submitted in writing;
  - b) accompanied by:
    - a statement setting out the grounds of appeal;
    - supporting documentation which is referred to in the appeal; and
    - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.





**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

## **Environmental Authorisation**

In terms of regulation 36 of the Environmental Impact Assessment Regulations, 2010

**Construction of a 19.9MW Photovoltaic Solar Energy Facility (PV4) on the farm Annex Du  
Plessis Dam near De Aar, Northern Cape Province**

**Pixley ke Seme District Municipality**

<b>Authorisation register number:</b>	12/12/20/2498
<b>NEAS reference number:</b>	DEA/EIA/0000609/2011
<b>Last amended:</b>	First issue
<b>Holder of authorisation:</b>	Mulilo Renewable Energy (Pty)
<b>Location of activity:</b>	Northern Cape Province: Within the Emthanjeni Local Municipality

This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

## Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the EIA regulations.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

## Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act 107 of 1998) and the Environmental Impact Assessment Regulations, 2010 the Department hereby authorises –

### **Mulilo Renewable Energy (Pty) Ltd**

with the following contact details –

Mr Warren Morse

Mulilo Renewable Energy (Pty) Ltd

P.O. Box 50

**CAPE TOWN INTERNATIONAL AIRPORT**

7525

Tel: (021) 934 5278

Fax: (021) 935 0505

Cell: (083) 760 9586

E-mail: [warren@mulilo.com](mailto:warren@mulilo.com)

to undertake the following activities (hereafter referred to as "the activity") indicated in Listing Notices 1 and 3, (GN R.544 & 546):

Listed activities	Activity/Project description
<p><u>GN R. 544 Item 1:</u>                      The construction of facilities or infrastructure for the generation of electricity where:                      (i) the electricity output is more than 10 megawatts but less than 20 megawatts.</p>	<p>Construction of a 19.9 MW photovoltaic solar energy plant on a site of approximately 1060ha near De Aar in the Northern Cape.</p>
<p><u>GN R. 544 Item 10:</u>                      The construction of facilities or infrastructure for the transmission and distribution of electricity-                      (i) outside urban areas or industrial complexes with a capacity of more 33 but less than 275 kilovolts.</p>	<p>A 132 kV distribution line would be required to connect into Eskom's Hydra Sub-station.</p>
<p><u>GN R. Item 11 (x and xi):</u>                      The construction of:                      (x) buildings exceeding 50 square metres in size.                      (xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.</p>	<p>Buildings and structures exceeding 50m<sup>2</sup> are being proposed and it is possible that these might be within 32 metres of small tributaries.</p>
<p><u>GN R.546 Item 10 (a):</u>                      The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.  <b>(a) In Northern Cape Province:</b>                      (ii) Outside urban areas</p>	<p>Dangerous goods might be stored and handled on site from time to time within 100 m of a watercourse.</p>

as described in the Amended Basic Assessment Report (BAR) dated August 2012 at:

	Latitude (S)	Longitude (E)
<b>Site Alternative S1</b>	30° 38'15.47"	24° 04'41.00"
<b>Transmission line Alternative 1 (T1.1)</b>		
Starting point of activity	30° 38'11.85"	24° 02'32.47"
Middle point of activity	30° 38'12.17"	24° 03'31.24"
End point of activity	30° 38'15.48"	24° 04'25.92"
<b>Access route</b>		
Starting point of activity	30° 38'28.88"	24° 04'27.25"
Middle point of activity	30° 38'36.04"	24° 04'53.36"
End point of activity	30° 38'52.79"	24° 05'15.50"

- for the construction of a 19.9 MW Photovoltaic (PV) Solar Energy Facility (PV4) on the farm Annex Du Plessis Dam near De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, hereafter referred to as "the property".

Associated infrastructure for the PV facility includes:

- **Powerline:** A 132 kV line (3 km in length) to be connected to the De Aar Substation. The voltage of the line will most likely be 132 kV, but could be reduced to 22 kV depending on the available capacity.
- **Storm water:** Storm water infrastructure such as concrete channels to manage the on-site runoff and to direct the flow of storm water.
- **Access roads:** Access road of 1.5 km in length which will connect the site to Arend Street.
- **Internal access:** Internal access routes to link key inverter houses and the solar arrays with roads of between 2m and 4m in width.
- **Substation:** The distribution substation which is approximately 50m x 50m in size.
- **Buildings:** Connection centre building: 2.5m x 2.55m; Control centre: 6m x 10m x 2.55m (HxWxL); Guard cabin / offices; and an electrical sub-station.

- **Solar resource measuring station:** Resource measuring stations providing remote monitoring and feedback of the plant performance.
- **Fencing:** An electrified fence of  $\pm 2.9\text{m}$  height.

## Conditions of this Environmental Authorisation

1. The preferred site (Site Alternative 1, Transmission line Alternative 1 (T1.1) and the preferred access) are approved.
2. Authorisation of the activity is subject to the conditions contained in this authorisation, which form part of the environmental authorisation and are binding on the holder of the authorisation.
3. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this environmental authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.
4. The activities authorised may only be carried out at the property as described above.
5. Any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further authorisation in terms of the regulations.
6. This activity must commence within a period of three (3) years from the date of issue of this authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.
7. Commencement with one activity listed in terms of this authorisation constitutes commencement of all authorised activities.
8. The holder of an environmental authorisation must notify the competent authority of any alienation, transfer and change of ownership rights in the property on which the activity is to take place.

### **Notification of authorisation and right to appeal**

9. The holder of the authorisation must notify every registered interested and affected party, in writing and within 12 (twelve) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.
10. The notification referred to must –
  - 10.1. specify the date on which the authorisation was issued;
  - 10.2. inform the interested and affected party of the appeal procedure provided for in Chapter 7 of the Environmental Impact Assessment (EIA) Regulations, 2010;
  - 10.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
  - 10.4. give the reasons of the competent authority for the decision.
11. The holder of the authorisation must publish a notice –
  - 11.1. informing interested and affected parties of the decision;
  - 11.2. informing interested and affected parties where the decision can be accessed; and
  - 11.3. drawing the attention of interested and affected parties to the fact that an appeal may be lodged against this decision in the newspaper(s) contemplated and used in terms of regulation 54(2)(c) and (d) and which newspaper was used for the placing of advertisements as part of the public participation process.

### **Management of the activity**

12. A copy of the final site layout plan must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout plan. Existing infrastructure must be used as far as possible e.g. roads. The layout plan must indicate the following:
  - 12.1 Position of solar facilities and its associated infrastructure;
  - 12.2 Foundation footprint;
  - 12.3 Internal roads indicating width (construction period width and operation period width) and with numbered sections between the other site elements which they serve (to make commenting on sections possible);
  - 12.4 Wetlands, drainage lines, rivers, stream and water crossing of roads and cables indicating the type of bridging structures that will be used;

- 12.5 All sensitive features e.g. heritage sites, wetlands and drainage channels that will be affected by the facility and associated infrastructure;
  - 12.6 Sub-station(s) and/or transformer(s) sites including their entire footprint;
  - 12.7 Connection routes (including pylon positions) to the distribution/transmission network;
  - 12.8 All existing infrastructure on the site, especially roads;
  - 12.9 Buildings, including accommodation; and
  - 12.10 All "no-go" and buffer areas.
13. The Environmental Management Programme (EMPr) submitted as part of the Amended BAR dated August 2012 must be **amended** to include measures as dictated by the final site lay-out plan and micro-siting; and the provisions of this environmental authorisation. The EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.
  14. The EMPr is amendable and must be implemented and strictly enforced during all phases of the project. It shall be seen as a dynamic document and shall be included in all contract documentation for all phases of the development when approved.
  15. Changes to the EMPr, which are environmentally defensible, shall be submitted to this Department for acceptance before such changes could be effected.
  16. The Department reserves the right to amend the EMPr should any impacts that were not anticipated or covered in the Amended Bar dated August 2012 be discovered.
  17. The provisions of the approved EMPr including recommendations and mitigation measures in the Amended Bar dated August 2012 and specialist' studies shall be an extension of the conditions of this EA and therefore noncompliance with them would constitute noncompliance with the EA.
  18. The EMPr amendment must include the following:
    - 18.1 All recommendations and mitigation measures recorded in the Amended BAR dated August 2012.
    - 18.2 The requirements and conditions of this authorisation.
    - 18.3 The final site layout plan.
    - 18.4 An alien invasive management plan to be implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.
    - 18.5 A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled

- by a vegetation specialist familiar with the site in consultation with the ECO and be implemented prior to commencement of the construction phase.
- 18.6 A re-vegetation and habitat rehabilitation plan to be implemented during the construction and operation of the facility. Restoration must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- 18.7 A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimize impacts on local commuters e.g. limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time and avoid using roads through densely populated built-up areas so as not to disturb existing retail and commercial operations.
- 18.8 A storm water management plan to be implemented during the construction and operation of the facility. The plan must ensure compliance with applicable regulations and prevent off-site migration of contaminated storm water or increased soil erosion. The plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.
- 18.9 An erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.
- 18.10 An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.
- 18.11 Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.
- 18.12 An environmental sensitivity map indicating environmental sensitive areas and features identified during the EIA process.
- 18.13 A map combining the final layout plan superimposed on the environmental sensitivity map.



### **Environmental Control Officer (ECO) and duties**

19. The holder of this authorisation must appoint a suitably experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the conditions referred to in this authorisation are implemented and to ensure compliance with the provisions of the EMPr.
20. The ECO shall be appointed before commencement of any authorised activity.
21. Once appointed, the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring of the Department.
22. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.
23. The ECO must:
  - 23.1 Keep record of all activities on site, problems identified, transgressions noted and a schedule of tasks undertaken by the ECO.
  - 23.2 Keep and maintain a detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.
  - 23.3 Keep and maintain a daily site diary.
  - 23.4 Keep copies of all reports submitted to the Department.
  - 23.5 Keep and maintain a schedule of current site activities including the monitoring of such activities.
  - 23.6 Obtain and keep record of all documentation, permits, licences and authorisations required by this facility.
  - 23.7 Compile a monthly monitoring report.

### **Environmental audit report**

24. The holder of the authorisation must submit an environmental audit report to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and within 30 days of completion of rehabilitation activities.
25. The environmental audit report must:
  - 25.1 Be compiled by an independent environmental auditor;

- 25.2 Indicate the date of the audit, the name of the auditor and the outcome of the audit;
- 25.3 Evaluate compliance with the requirements of the approved EMPr and this environmental authorisation;
- 25.4 Include measures to be implemented to attend to any non-compliances or degradation noted;
- 25.5 Include copies of any approvals granted by other authorities relevant to the development for the reporting period;
- 25.6 Highlight any outstanding environmental issues that must be addressed, along with recommendations for ensuring these issues are appropriately addressed;
- 25.7 Include a copy of this authorisation and the approved EMPr.
- 25.8 Include all documentation pertaining to this authorisation.
- 25.9 Include evidence of adherence to the conditions of this authorisation and the EMPr where relevant such as training records and attendance records.

#### **Commencement of the activity**

26. The authorised activity shall not commence within twenty (20) days of the date of signature of the authorisation.
27. An appeal under section 43 of the National Environmental Management Act (NEMA), Act 107 of 1998 (as amended), does not suspend an environmental authorisation or exemption, or any provisions or conditions attached thereto, or any directive, unless the Minister, MEC or delegated organ of state directs otherwise.
28. Should you be notified by the Minister of a suspension of the authorisation pending appeal procedures, you may not commence with the activity until such time that the Minister allows you to commence with such an activity in writing.

#### **Notification to authorities**

29. Fourteen (14) days written notice must be given to the Department that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number. This notification period may coincide with the Notice of Intent to Appeal period.

### **Operation of the activity**

30. Fourteen (14) days written notice must be given to the Department that the activity operational phase will commence.

### **Site closure and decommissioning**

31. Should the activity ever cease or become redundant, the holder of this authorisation shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

### **Specific conditions**

32. The holder of this authorisation must obtain a Water Use Licence from the Department of Water Affairs (DWA) prior to the commencement of the project should the applicant impact on any wetland or water resource. A copy of the license must be kept by the ECO on site.
33. No exotic plants may be used for rehabilitation purposes. Only indigenous plants of the area may be utilised.
34. A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce the impacts associated with glare and light trespass.
35. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a landfill licensed in terms of section 20 (b) of the National Environment Management Waste Act, 2008 (Act No. 59 of 2008). Copies of all waste disposal certificates must be kept on site.
36. Vegetation clearing must be limited to the required footprint. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.
37. Before the clearing of the site, the appropriate permits must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act 87 of 1998 and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation.
38. Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but should be temporarily stored in a demarcated area.

39. Removal of alien invasive species or other vegetation and follow-up procedures must be in accordance with the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).
40. The applicant must ensure that all the "No-go" areas are clearly demarcated (using fencing and appropriate signage) before construction commences.
41. Construction activities must be restricted to demarcated areas to restrict impact on vegetation, birds and animals. Contractors and construction workers must be clearly informed of the no-go areas.
42. Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.
43. Should any archaeological sites, artefacts, paleontological fossils or graves be exposed during construction work, work in the immediate vicinity of the find must be stopped, the South African Heritage Resources Agency (SAHRA) must be informed and the services of an accredited heritage professional obtained for an assessment of the heritage resources must be made.
44. Appropriate dust suppression techniques must be implemented on all exposed surfaces during periods of high wind. Such measures must include wet suppression, chemical stabilization, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.
45. Erosion and loss of soil must be prevented by minimizing the construction site exposed to surface water run-off. Where necessary erosion stabilizing actions such as gabions or re-vegetation must be implemented to prevent further habitat deterioration.
46. The applicant must train safety representatives, managers and workers in workplace safety. All applicable safety standards and regulations, including for subcontractors must be enforced.
47. A bird monitoring programme must be implemented and undertaken once every six months for a period of up to 12 months prior to construction and 12 months after construction (operation phase) to document the effect of the operation of the solar energy facility on birds.
48. Final reports regarding bird monitoring must be submitted to BirdLife South Africa, the Endangered Wildlife Trust (EWT) and this Department on a six-monthly basis. The report will assist all stakeholders in identifying potential and additional mitigation measures and to establish protocols for bird monitoring programmes for PV solar energy development in the country.
49. The area around the historical farm werf must be cordoned off, protected from all harm and treated as an outright no-go area.
50. Disturbed areas within the riparian zones and stream beds must be rehabilitated after construction has been completed and revegetated with suitable indigenous vegetation.
51. A buffer of 30m must be maintained adjacent to the identified rivers and streams and 75m from the wetland areas.

52. The applicant must obtain a way leave from the Department of Public Transport Roads and Works prior construction.
53. Anti-collision devices such as bird flappers must be installed where transmission lines crosses avifaunal corridors.

#### **General**

54. A copy of this authorisation and the approved EMPr must be kept at the property where the activity will be undertaken. The environmental authorisation as well as any amendment to the environmental authorisation and approved EMPr must be provided to any authorised official of the Department who requests to see it and must be made available for inspection by any employee or agent of the holder of the environmental authorisation who works or undertakes work at the property.
55. The holder of the authorisation must notify both the Director: Integrated Environmental Authorisations and the Director: Compliance Monitoring at the Department, in writing and within 48 (forty eight) hours, if any condition of this authorisation cannot be or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.
56. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder or his successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of environmental authorisation: 28/09/2012



**Mr Mark Gordon**

**Chief Director: Integrated Environmental Authorisations  
Department of Environmental Affairs**

## Annexure 1: Reasons for Decision

### 1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

- a) The information contained in the BAR dated April 2012 and the amended BAR dated August 2012;
- b) The comments received from organs of state and interested and affected parties as included in the BAR dated April 2012 and the amended BAR dated August 2012;
- c) Mitigation measures as proposed in the amended BAR dated August 2012;
- d) The information contained in the specialist studies contained within Appendix D of the BAR dated August 2012;
- e) Findings of the site visit conducted on 06 June 2012; and
- f) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998).

### 2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

- a) The findings of all the specialist studies conducted and their recommended mitigation measures.
- b) The need for the proposed project stems from the provision of electricity to the national grid in terms of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) and the provision of electricity from Independent Power Producers (IPPs) as required by the Department of Energy.
- c) The FBAR dated April 2012 and the amended BAR dated August 2012 identified all legislation and guidelines that have been considered in the preparation of the amended BAR dated August 2012.
- d) The methodology used in assessing the potential impacts identified in the amended BAR dated August 2012 and the specialist studies have been adequately indicated.

- e) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2010 for public involvement.

### **3. Findings**

After consideration of the information and factors listed above, the Department made the following findings -

- a) The identification and assessment of impacts are detailed in the amended BAR dated August 2012 and sufficient assessment of the key identified issues and impacts have been completed.
- b) The procedure followed for impact assessment is adequate for the decision-making process.
- c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.
- d) EMPr measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the Amended BAR dated August 2012 and will be implemented to manage the identified environmental impacts during the construction process.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the proposed activity will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the proposed activity can be mitigated to acceptable levels. The application is accordingly granted.



## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

Private Bag X 447 · PRETORIA · 0001 · Fedure Building · 315 Pretorius Street · PRETORIA  
Tel (+ 27 12) 310 3911 · Fax (+ 2712) 322 2682

NEAS Reference: DEA/EIA/0000609/2011

DEA Reference: 12/12/20/2498

Enquiries: Jay-Jay Mpelane

Telephone: (012) 310 3004 Fax: 012-320-7539 E-mail: Jmpelane@environment.gov.za

Mr Warren Morse  
Du Plessis Solar PV4 (Pty) Ltd  
PO Box 50  
**CAPE TOWN INTERNATIONAL AIRPORT**  
7525

Fax Number: (021) 935 0505  
Telephone Number: (021) 934 5278

### **PER FACSIMILE / MAIL**

Dear Mr Morse

### **AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 28 SEPTEMBER 2012 FOR THE PROPOSED CONSTRUCTION OF A 19.9MW PHOTOVOLTAIC SOLAR ENERGY FACILITY (PV4) ON THE FARM ANNEX DU PLESSIS DAM NEAR DE AAR, EMTHANJENI LOCAL MUNICIPALITY IN THE NORTHERN CAPE PROVINCE**

The Environmental Authorisation (EA) issued for the above application by this Department on 28 September 2012, the application for amendment received by this Department on 02 October 2013 and the amended application form for amendment dated 06 December 2013 submitted in terms of the provisions of sub-regulation 39(1) of the EIA Regulations 2010, refer.

#### **Amendment 1: Amendment to the holder of the Environmental Authorisation:**

Based on a review of the reason for requesting an amendment to the above Environmental Authorisation, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided to amend the EA dated 28 September 2012 as follows:

The current holder of the Environmental Authorisation:

#### **From:**

"Muliio Renewable Energy (Pty) Ltd"

Represented by: Mr Warren Morse  
PO Box 50  
**CAPE TOWN INTERNATIONAL AIRPORT**  
7525

Tel: (021) 934 5278  
Fax: (021) 935 0505



Cell: (083) 760 9586  
E-mail: warren@mulilo.com

**To:**

"Du Plessis Solar PV4 (Pty) Ltd"

Represented by: Mr Warren Morse  
PO Box 50  
**CAPE TOWN INTERNATIONAL AIRPORT**  
7525

Telephone Number: (021) 934 5278  
Cell phone Number: (083) 760 9586  
Fax Number: (021) 935 0505  
Email Address: warren@mulilo.com

**Amendment 2: Amendment to a change in the route of the approved transmission line:**

Based on a review of the reasons for requesting an amendment to the powerline route, this Department, in terms of Regulation 42 of the Environmental Impact Assessment Regulations, 2010, has decided not to amend the Environmental Authorisation dated 28 September 2012. The reasons for the decision are provided below:

The change in the route of the transmission line from the approved T.1.1 to Alternative 1 transmission alignment assessed during the current EIA process undertaken at Du Plessis Dam Farm is not approved.

The Department is currently reviewing and considering an application for another project on the same property which will share the powerline with the already approved facility. This Department cannot consider the application for amendment as the final decision on the approval or refusal for the new project has not been made. In addition, it is uncertain which powerline route may be approved by this Department. Approval of this amendment will be subject to the decision relating to the application for Environmental Authorisation for the PV facilities on Du Plessis Dam Farm as well as the final powerline route.

Once a decision on the application for Environmental Authorisation has been made, this Department may reconsider the application for amendment. A new application for amendment needs to be submitted which can be downloaded from the following link <https://www.environment.gov.za/documents/forms>.

You are hereby reminded of Section 24F of the National Environmental Management Act, Act No 107 of 1998, as amended, that no activity may commence prior to an environmental authorisation being granted by the Department.

Furthermore, a shapefile of the approved development layout/footprint must be submitted to this Department within two (02) months of the date of this letter. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and; .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .avl file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative

scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:

**Postal Address:**

Department of Environmental Affairs  
Private Bag X447  
Pretoria  
0001

**Physical address:**

Department of Environmental Affairs  
Fedsure Forum Building (corner of Pretorius and Lillian Ngoyi Streets)  
4<sup>th</sup> Floor South Tower  
315 Pretorius Street  
Pretoria  
0002

For Attention: Mr Muhammad Essop  
Integrated Environmental Authorisations  
Strategic Infrastructure Developments  
Telephone Number: (012) 395 1734  
Fax Number: (012) 320 7539  
Email Address: MEssop@environment.gov.za

This amendment letter must be read in conjunction with the EA dated 08 August 2013.

In terms of Regulation 10(2) of the Environmental Impact Assessment Regulations, 2010 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 12 (twelve) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 7 of the Regulations, which prescribes the appeal procedure to be followed. This procedure is summarised in the attached document. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should the applicant or any other party wish to appeal any aspect of the amendment decision a notice of intention to appeal must be lodged by all prospective appellants with the Minister, within 20 days of the date of the EA, by means of one of the following methods:

By facsimile: (012) 320 7561;  
By post: Private Bag X447,  
Pretoria, 0001; or  
By hand: 2nd Floor, Fedsure Building, North Tower,  
Cnr. Lillian Ngoyi (Van der Walt) and Pretorius Streets,  
Pretoria.

If the applicant wishes to lodge an appeal, it must also serve a copy of the notice of intention to appeal on all registered interested and affected parties as well as a notice indicating where, and for what period, the appeal submission will be available for inspection, should you intend to submit an appeal.

Please include the Department (*Attention: Director: Integrated Environmental Authorisations*) in the list of interested and affected parties, notified through your notification letter to interested and affected parties, for record purposes.

**Appeals must be submitted in writing to:**

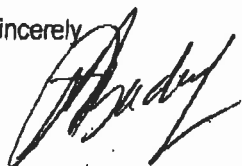
Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses or fax number. Mr Hassam can also be contacted at:

Tel: (012) 310 3271

Email: AppealsDirectorate@environment.gov.za

The authorised activities shall not commence within twenty (20) days of the date of signature of the authorisation. Further, please note that the Minister may, on receipt of appeals against the authorisation or conditions thereof suspend the authorisation pending the outcome of the appeals procedure.

Yours sincerely



**Mr Ishaam Abader**

**Deputy Director-General: Legal, Authorisations, Compliance and Enforcement**  
**Department of Environmental Affairs**

Date: 14/02/2014

CC:	Miss Franci Gresse	Aurecon South Africa (Pty) Ltd	Tel: (021) 526 6022	Fax: (021) 526 9500
	Mr Anga Yaphi	NDEANC	Tel: (054) 332 2885	Fax: (054) 331 1155

**APPEALS PROCEDURE IN TERMS OF CHAPTER 7 OF THE NEMA EIA REGULATIONS, 2010 (THE REGULATIONS) AS PER GN R.543 OF 2010 TO BE FOLLOWED BY THE APPLICANT AND INTERESTED AND AFFECTED PARTIES UPON RECEIPT OF NOTIFICATION OF AN ENVIRONMENTAL AUTHORISATION (EA)**

APPLICANT	INTERESTED AND AFFECTED PARTIES (IAPs)
1. Receive EA from the relevant Competent Authority (the Department of Environmental Affairs (DEA)).	1. Receive EA from Applicant/Consultant.
2. Within 12 days of date of the EA notify all IAPs of the EA and draw their attention to their right to appeal against the EA in terms of Chapter 7 of the Regulations.	2. N/A.
3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA with the Minister of Water and Environmental Affairs (the Minister).	3. If you want to appeal against the EA, submit a notice of intention to appeal within 20 days of the date of the EA. with the Minister of Water and Environmental Affairs (the Minister).
4. After having submitted your notice of intention to appeal to the Minister, provide each registered IAP with a copy of the notice of intention to appeal within 10 days of lodging the notice.	4. After having submitted your notice of intention to appeal to the Minister, provide the applicant with a copy of the notice of intention to appeal within 10 days of lodging the notice.
5. The Applicant must also serve on each IAP: <ul style="list-style-type: none"> <li>• a notice indicating where and for what period the appeal submission will be available for inspection.</li> </ul>	5. Appellant must also serve on the Applicant within 10 days of lodging the notice, <ul style="list-style-type: none"> <li>• a notice indicating where and for what period the appeal submission will be available for inspection by the applicant.</li> </ul>
6. The appeal must be submitted in writing to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.	6. The appeal must be submitted to the Minister within 30 days after the lapsing of the period of 20 days provided for the lodging of the notice of intention to appeal.
7. Any IAP who received a notice of intention to appeal may submit a responding statement to that appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.	7. An Applicant who received notice of intention to may submit a responding statement to the appeal to the Minister within 30 days from the date that the appeal submission was lodged with the Minister.

**NOTES:**

1. **An appeal against a decision must be lodged with:-**
  - a) the Minister of Water and Environmental Affairs if the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
  - b) the Minister of Justice and Constitutional Development if the applicant is the Department of Water Affairs and the decision was issued by the Director- General of the Department of Environmental Affairs (or another official) acting in his/ her capacity as the delegated Competent Authority;
2. **An appeal lodged with:-**
  - a) the Minister of Water and Environmental Affairs must be submitted to the Department of Environmental Affairs;
  - b) the Minister of Justice and Constitutional Development must be submitted to the Department of Environmental Affairs;
3. **An appeal must be:-**
  - a) submitted in writing;
  - b) accompanied by:
    - a statement setting out the grounds of appeal;
    - supporting documentation which is referred to in the appeal; and
    - a statement that the appellant has complied with regulation 62 (2) or (3) together with copies of the notices referred to in regulation 62.





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko, Arcadia· PRETORIA  
Tel (+ 27 12) 399 9372

**DEA Reference:** 12/12/20/2498/AM4

**Enquiries:** Mr Muhammad Essop

**Telephone:** (012) 399 9406 **E-mail:** MEssop@environment.gov.za

Mr Warren Morse  
Du Plessis Solar PV4 (Pty) Ltd  
PO Box 50  
**CAPE TOWN INTERNATIONAL AIRPORT**  
7525

Telephone Number: (021) 934 5278  
Email Address: warren@mulilo.com

### **PER EMAIL / MAIL**

Dear Mr Morse

### **AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION ISSUED ON 28 SEPTEMBER 2012 FOR THE CONSTRUCTION OF A 19.9MW PHOTOVOLTAIC SOLAR ENERGY FACILITY (PV4) ON THE REMAINDER OF THE FARM DU PLESSIS DAM NUMBER 179 NEAR DE AAR, PIXLEY KE SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE**

The Environmental Authorisation (EA) issued for the above application by this Department on 28 September 2012, your application for amendment to the EA received by this Department on 12 June 2015 and receipt thereof acknowledged on 19 June 2015 refer.

Based on a review of the reason for requesting an amendment to the above EA, this Department, in terms of Chapter 5 of the Environmental Impact Assessment Regulations, 2014, has decided to amend the EA dated 28 September 2012 as follows:

#### **Amendment 1: Amendment to the property description:**

The title on Page 01 of the EA:

#### **From:**

*"Construction of a 19.9MW Photovoltaic Solar Energy Facility (PV4) on the farm Annex Du Plessis Dam near De Aar, Northern Cape Province."*

#### **To:**

*"Construction of a 19.9MW Photovoltaic Solar Energy Facility (PV4) on Remainder of the Farm Du Plessis Dam Number 179 near De Aar, Northern Cape Province."*

Page 04 of the EA:

**From:**

*"- for the construction of a 19.9 MW Photovoltaic (PV) Solar Energy Facility (PV4) on the farm Annex Du Plessis Dam near De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, hereafter referred to as "the property"."*

**To:**

*"- for the construction of a 19.9 MW Photovoltaic (PV) Solar Energy Facility (PV4) on Remainder of the Farm Du Plessis Dam Number 179 near De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, hereafter referred to as "the property"."*

**Amendment 2: Amendment to extend the validity period of the EA:**

The activity must commence within a period of two (02) years from the date of expiry of the EA issued on 28 September 2012 (i.e. the EA lapses on 28 September 2017). If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

It must be noted that whilst you have applied for an extension of three (03) additional years, this Department is only granting an extension for two (02) additional years due to possible changes in the receiving environment.

Furthermore, a shapefile of the approved development layout/footprint must be submitted to this Department within two (2) months from the date of this letter. The shapefile must be created using the Hartebeesthoek 94 Datum and the data should be in Decimal Degree Format using the WGS 84 Spheroid. The shapefile must include at a minimum the following extensions i.e. .shp; .shx; .dbf; .prj; and, .xml (Metadata file). If specific symbology was assigned to the file, then the .avl and/or the .lyr file must also be included. Data must be mapped at a scale of 1:10 000 (please specify if an alternative scale was used). The metadata must include a description of the base data used for digitizing. The shapefile must be submitted in a zip file using the EIA application reference number as the title. The shape file must be submitted to:

**Postal Address:**

Department of Environmental Affairs  
Private Bag X447  
Pretoria  
0001

**Physical address:**

Department of Environmental Affairs  
Environment House  
473 Steve Biko  
Arcadia  
Pretoria

For Attention: Mr Muhammad Essop  
Integrated Environmental Authorisations  
Strategic Infrastructure Developments  
Telephone Number: (012) 399 9406  
Email Address: MEssop@environment.gov.za

This proposed amendment letter must be read in conjunction with the EA dated 28 September 2012.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the Department's decision in respect of the amendment made as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of Government Notice No. R. 993, which prescribes the appeal procedure to be followed. Kindly include a copy of this document with the letter of notification to interested and affected parties.

An appellant must submit an appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the applicant by the competent authority.

By post: Private Bag X447,  
Pretoria,  
0001; or  
By hand: Environment House  
473 Steve Biko,  
Arcadia, Pretoria,

**Appeals must be submitted in writing to:**

Mr Z Hassam, Director: Appeals and Legal Review, of this Department at the above mentioned addresses. Mr Hassam can also be contacted at:

Tel: (012) 399 9356  
Email: Appealsdirector@environment.gov.za

Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, an appeal under section 43 of that Act will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

For guidance on appeals submitted to the Minister in terms of NEMA and the SEMAs, please find a copy of the guideline on the administration of appeals on the Department's website:  
([https://www.environment.gov.za/documents/forms#legal\\_authorisations](https://www.environment.gov.za/documents/forms#legal_authorisations)).

Yours faithfully

  
**Mr Sabelo Malaza**  
**Chief Director: Integrated Environmental Authorisations**  
**Department of Environmental Affairs**  
Date: 2/2/2015

cc:	Ms Nicole Holland	Holland and Associates Environmental Consultants (Pty) Ltd	Email: nicole@hollandandassociates.net
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# R.M. Holland

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## **CURRICULUM VITAE**

**Name** : Ross Matthew Holland  
**Profession** : Environmental Management Consultant  
**Year of Birth** : 1975  
**Nationality** : South African

**Contact Details** : P.O. Box 31108  
Tokai  
7966  
Cell: 072 601 0803  
Fax: 086 653 1765  
Email: [ross@hollandandassociates.net](mailto:ross@hollandandassociates.net)

### **MEMBERSHIP IN PROFESSIONAL SOCIETIES:**

- Member, South African affiliate of International Association for Impact Assessment (IAIASa)
- Founder Member, Environmental Assessment Practitioners Association of South Africa (EAPASA)
- Green Star SA Accredited Professional

### **KEY QUALIFICATIONS:**

Ross Holland is an Environmental Consultant with a MSc in Environmental and Geographical Science (UCT), specializing in Environmental Management, with over eleven years of experience in the environmental field. Ross also holds certificates of competence in the fields of Water Quality and Fresh Water Ecology, with distinction. Ross has extensive experience in managing a diverse range of Environmental Impact Assessment processes including water supply projects; river rehabilitation, housing, resort, and commercial developments; renewable energy facilities; educational facilities; new roads and road upgrades; pipelines, municipal waste sites, and a shooting range. Ross has also undertaken the independent specialist review of a number of Environmental Applications, across a diverse range of projects.

Ross has also been involved in a wide spectrum of other environmental work including the undertaking of capacity building within the National Department of Environmental Affairs' Marine and Coastal Management Directorate, the undertaking of environmental opportunity and constraints analysis, due diligence investigations, as well as lecturing, environmental auditing, drafting of Environmental Management Plans/ Programs (EMP) and Environmental Control Officer (ECO) work.

### **EXPERIENCE RECORD**

#### **1) Regulatory Processes and Environmental Impact Assessment:**

2014 to present	Project Manager and Environmental Assessment Practitioner	<b>The Rectification of Unlawful Commencement of Listed Activities on Portion 3 of Farm De Hoek Estate No. 35 and Remainder Farm Vorentoe No. 356, Near Porterville, Western Cape, South Africa: NEMA S24G Rectification Process.</b> Appointed by Claassen Boerdery to to undertake the NEMA S24G Assessment Process, including the management of the multi-disciplinary EIA team, in respect of the unlawful commencement of construction of a Dam, construction of a Lapa and Hostel within 32m of a watercourse, and unlawful agricultural expansion.
2014 to present	Project Manager and Environmental Assessment Practitioner	<b>The Proposed Skoongesig Dam, and decommissioning of 10 small dams, near Malmesbury, Western Cape, South Africa.</b> Appointed by Claassen Boerdery to to undertake the Basic Assessment Process, including the management of the multi-disciplinary EIA team, for the above mentioned project.

# R.M. Holland

2015	Independent Peer Reviewer	<p><b>Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility: Independent Peer Review of Environmental Management Programme.</b></p> <p>Appointed by Longyuan Mulilo De Aar Wind Power (PTY) Ltd, to undertake the independent peer review of the Environmental Management Programme for the proposed Wind Energy Facility, in light of the findings of specialist peer reviews of the pre-construction Avifauna and Bat monitoring, as requested by the Department of Environmental Affairs.</p>
2015 to present	Project Manager and Environmental Assessment Practitioner	<p><b>The Rectification of Unlawful Commencement of Listed Activities on Breeland Farm, Near Rawsonville, Western Cape, South Africa: NEMA S24G Rectification Process.</b></p> <p>Appointed by Blaarfontein Slanghoek (Edms) Bpk to undertake the NEMA S24G Assessment Process, including the management of the multi-disciplinary EIA team, in respect of the unlawful commencement of expansion of a dam, unlawful clearance of vegetation, and unlawful establishment of a clay borrow area within a watercourse.</p>
2015 to present	Project Manager and Environmental Assessment Practitioner	<p><b>The Rectification of Unlawful Commencement of Listed Activities on Farm 220 Sandown Estate, Near Gansbaai, Western Cape, South Africa: NEMA S24G Rectification Process.</b></p> <p>Appointed by Mystic Pearl 133 (Pty) Ltd to undertake the NEMA S24G Assessment Process, including the management of the multi-disciplinary EIA team, in respect of the unlawful commencement of construction of two bridge structures and a river diversion channel.</p>
2014 to present	Project Manager and Environmental Assessment Practitioner	<p><b>The proposed Poplar Grove Off- Channel Dam Scheme and Agricultural Expansion Areas, near Villiersdorp, Western Cape, South Africa</b></p> <p>Appointed by Chiltern Farms (Pty) Ltd to undertake the Scoping and Environmental Impact Assessment Process, including the management of the multi-disciplinary EIA team, for the above mentioned project.</p>
2013 to Present	Independent Peer Reviewer	<p><b>Borrow Pits For The Supply Of Material For Use in Maintenance and Re-Gravelling Work on Provincial and District Roads in the Western Cape, South Africa.</b></p> <p>Appointed by Aurecon (Pty) Ltd to undertake the independent peer review of 32 Basic Assessment Reports for gravel borrow pits across the Western Cape.</p>
2013 to 2014	Project Manager and Environmental Assessment Practitioner	<p><b>The proposed enlargement of the Soetmelksvlei Dam, near Riviersonderend, Western Cape, South Africa</b></p> <p>Appointed by the Japie Groenewald Trust to undertake the Basic Assessment Process, including the management of the multi-disciplinary EIA team, for the proposed enlargement of the Soetmelksvlei Dam, for irrigation purposes, in the vicinity of Riviersonderend, in the Western Cape.</p>
2013 to 2014	Project Manager and Environmental Assessment Practitioner	<p><b>The Rehabilitation and widening of the MR529, between Piketberg and Velddrif, Western Cape, South Africa.</b></p> <p>Appointed by Jeffares &amp; Green (on behalf of the provincial Department of Transport and Public Works) to undertake the Basic Assessment Process, including the management of the multi-disciplinary EIA team, for the rehabilitation and widening of this provincial road in the Western Cape.</p>

# R.M. Holland

2014	Environmental Assessment Practitioner	<b>The independent review of twelve Basic Assessment Reports for proposed borrow pits for the supply of materials for the re-gravelling and maintenance of various roads in the Western Cape</b> Appointed by Aurecon Pty Ltd to undertake the independent review of the Final Basic Assessment Reports for the above mentioned project within the Western Cape.
2013 to present	Project Manager and Environmental Assessment Practitioner	<b>The proposed raising of the Jan Koekemoer Dam, in order to augment potable water supply to Pearly Beach, Western Cape, South Africa</b> Appointed by PSP Eiendomme to undertake the Basic Assessment Process, including the management of the multi-disciplinary EIA team, for the proposed raising of the Jan Koekemoer Dam in the vicinity of Pearly Beach, in the Western Cape.
2012 to 2013	Project Manager and Environmental Assessment Practitioner	<b>NEMA Section 24 G APPLICATION (for rectification of illegal activities) on Portion 4 of the Farm Twistwyk 182, Caledon, Western Cape</b> Appointed by the Japie Groenewald Trust to undertake the Rectification Application, including the management of the multi-disciplinary EIA team, in terms of the National Environmental Management Act (107 of 1998), for unlawful commencement of activities within a water course, and rehabilitation of a water course.
2013	Project Manager	<b>Proposed Citrus Pack House, Citrusdal, Western Cape, South Africa</b> Appointed by Mouton Citrus to undertake the Set Back Line application for a proposed new Citrus Pack House in the Citrusdal area of the Western Cape, South Africa.
2013	Project Manager and Environmental Assessment Practitioner	<b>Proposed Wood Treatment Facility, Paarden Eiland, Western Cape</b> Appointed by Mericraft (Pty) Ltd, to undertake a full Enviro-Legal Due Diligence Investigation into to possible establishment of a new Chromated Copper Arsenic (CCA) wood treatment facility, in Paarden Eiland, Western Cape, South Africa.
2012 to 2013	Member of Project Team	<b>Proposed Paarl Mountain and Ysterbrug Pumping Main Upgrades, Paarl, Western Cape, South Africa.</b> Appointed by the Drakenstein Municipality to undertake the EIA process for the proposed water pipeline upgrades (partly within the sensitive Paarl Mountain Nature Reserve), Paarl, Western Cape
2012 to present	Member of Project Team	<b>Proposed Kleinberg Dams, Hex River Valley, Western Cape South Africa</b> Appointed by the Hex Valley Water Users Association to undertake the EIA process for the proposed Kleinberg Dam scheme, Western Cape, South Africa.
2012	Project Manager and Environmental Assessment Practitioner	<b>New Chemical Manufacturing and Wood Treatment Facility, Mosselbay, Western Cape South Africa.</b> Appointed by Dolphin Bay Chemicals (Pty) Ltd, to undertake a full Enviro-Legal Due Diligence Investigation (in association with Havemann Inc. Attorneys) into to possible establishment of a new chemical manufacturing facility and wood treatment facility, at various potential locations in the Mosselbay Area, Western Cape, South Africa.
2012	Member of Project team	<b>Raising of the Keerom Dam, Western Cape, South Africa.</b> Appointed by the Worcester East Water Users Association to undertake the EIA process for the proposed raising of the Keerom Dam in the vicinity of Worcester in the Western Cape.

# R.M. Holland

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2011 to 2012	Project Manager	<p><b>Shale Gas Exploration, Karoo, South Africa.</b> Appointed by “Treasure the Karoo Action Group” to undertake the specialist Environmental Review (in association with Havemann Inc. Attorneys) of Applications by Shell Exploration Company B.V., Bundu Gas and Oil Exploration (Pty) Ltd and Falcon Oil and Gas Limited, to undertake shale gas exploration in the Karoo, via Seismic Survey and Hydraulic Fracturing (“Fracking”).</p>
2011	Member of Project team	<p><b>Proposed Groenwater Solar Farm, Northern Cape, South Africa</b> Sub-contracted by Environmental Resource Management (ERM) to assist in the undertaking of the EIA process for this proposed renewable energy facility in the vicinity of Postmasberg in the Northern Cape.</p>
2011 to 2012	Project Manager	<p><b>Proposed Driehoek Residential/Office Development and Jip De Jagger Drive Extention, Belleville, Western Cape, South Africa</b> Appointed by Barinor Management Services PTY Ltd to undertake the Basic Assessment, including the management of the multi-disciplinary EIA team, and associated public participation process, for the abovementioned project, including the management of the multi-disciplinary EIA team.</p>
2010 to 2011	Member of Project team	<p><b>Proposed Southdrift Solar Farm, Free State, South Africa</b> Sub-contracted by Environmental Resource Management (ERM) to assist in the undertaking of the EIA process for this proposed renewable energy facility in the vicinity of Bloemfontein in the Free State.</p>
2011	Project Manager	<p><b>Proposed Fourth Kloof Abstraction and River Diversion Scheme, Ceres, Western Cape, South Africa</b> Appointed by Verlorenvlei Investments PTY Ltd to undertake the Basic Assessment process and application for amendment of an Existing Environmental Authorization and associated public participation processes for the abovementioned project, including the management of the multi-disciplinary EIA team.</p>
2011	Member of Project team	<p><b>Mothae Diamond Mine, North-Eastern Lesotho</b> Member of multi-disciplinary project team undertaking the EIA process for the application for full scale mining production at the Mothae site, in the vicinity of Letseng, Leshoto.</p>
2009 to 2011	Member of Project Team	<p><b>MR302 Road Upgrade, Worcester, Western Cape, South Africa</b> Appointed by Amathemba Environmental Management Consulting CC to undertake the external review of environmental reports associated with the application for authorization to undertake the proposed development.</p>
2010	Project Manager	<p><b>Detailed Third Party Critical Review: NEMA S24G Rectification Application, Erf 293, Plettenberg Bay, Western Cape, South Africa</b> Appointed by Thule South (Pty) Ltd to undertake a detailed independent review of a NEMA S24G application for Erf 293 Plettenberg Bay. The review entailed a site inspection followed by a detailed analysis of the information provided and process undertaken for the application. This analysis was undertaken in association with a specialist Environmental Lawyer, and culminated in the compilation of a detailed critical review report.</p>

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2010	Project Manager	<b>Environmental Opportunities and Constraints Analysis, Doornkom Farm, Alicedale, Eastern Cape, South Africa</b> Appointed by Mr Prop Olkers to undertake an Environmental Opportunities and Constraints analysis with respect to a possible resort development proposal for the site. The project entailed interacting with the consulting planner and undertaking a detailed site inspection together with an analysis of aerial imagery. The development proposal was then analysed against the environmental characteristics of the site and its surrounds, as well as against the requirements of the prevailing environmental legislation as well as relevant spatial planning guidelines and policies. This analysis was then collated into an environmental opportunities and constraints report.
2010	Project Manager	<b>Proposed Sky Tower Project, Breakwater Precinct, V&amp;A Waterfront, Western Cape, South Africa</b> Appointed by Tourvest to undertake a Basic Assessment for the proposed construction of a proposed tourist facility on the site.
2008 to 2010	Project Manager	<b>Proposed Water Rock mixed use development, Hout Bay, Western Cape, South Africa</b> Appointed by the Water Rock development consortium to undertake a Basic Assessment for the proposed construction of a mixed use development on the site. The project entailed the compilation of a Basic Assessment Report and undertaking a public participation process.
2008 to 2010	Project Manager	<b>Proposed Construction of the Groenvlei Farm Dam, Citrusdal, Western Cape, South Africa</b> Appointed by Mouton Citrus to undertake a Basic Assessment for the proposed construction of a new farm dam on Groenvlei Farm just outside Citrusdal. The project entailed the compilation of a Scoping Report and Environmental Impact Report and undertaking a public participation process, including the management of the multi-disciplinary EIA team.
2009 to 2010	Project Manager	<b>Erf 1591, Simonstown, Western Cape, South Africa</b> Appointed by the Avril Ocean Trust to undertake a Basic Assessment for the proposed construction of a new house on the site. The project entailed the compilation of a Basic Assessment Report and undertaking a public participation process.
2007 - 2009	Member of Project Team	<b>Proposed Welbeloond mixed use development and road infrastructure, Potsdam Interchange, Western Cape, South Africa</b> Appointed by Kagiso Property Development to undertake an EIA for the proposed Welbeloond mixed use development and road infrastructure at Potsdam Interchange. Member of the environmental team, responsible for assistance in the management of the Environmental Process, as well as assistance with the writing and review of reports associated with the application for authorization (Scoping & Environmental Impact Assessment) to undertake a mixed use development on the property.
2008	Member of Project Team	<b>Proposed Hassendal mixed use development and road infrastructure, Kuilsrivier, Western Cape, South Africa</b> Appointed by Amphoria (Pty) Ltd to undertake an EIA for the proposed Hassendal mixed use development in Kuilsrivier. Member of the environmental team, responsible for assistance in the management of the Environmental Process, as well as assistance with the writing and review of reports associated with the application for authorization (Scoping & Environmental Impact Assessment) to undertake a mixed use development on the property.

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2008 to 2014	Project Manager	<p><b>Proposed Caledon Flight Park Development, Caledon, Western Cape, South Africa</b></p> <p>Appointed by Amathemba Environmental Management Consulting CC to undertake the external review of reports associated with the application for authorization (Scoping &amp; Environmental Impact Assessment) to undertake the proposed development.</p>
2008	Member of Project Team	<p><b>Application to amend the Record of Decision for the Bisschop Rd Electrical Cable installation, Hout Bay, Western Cape, South Africa</b></p> <p>Appointed by the City of Cape Town to undertake an application for the amendment of the conditions of authorization of the Bisschop Road Electrical Cable installation project, in order to allow for the removal of certain trees along the cable route. The project entailed the compilation of the prescribed application form as well as undertaking a public participation process.</p>
2007	Project Manager	<p><b>Environmental Opportunities and Constraints Analysis, Erf 36 St Helena Bay, Western Cape, South Africa</b></p> <p>Appointed by Northern Spark Trading 307 (Pty) Ltd to undertake an environmental assessment of the site, and the subsequent compilation of an environmental opportunities and constraints report, with regard to a possible future housing development on the property.</p>
2006 - 2007	Member of Project Team	<p><b>Proposed St Helena Views residential development and road infrastructure, St Helena Bay, Western Cape, South Africa</b></p> <p>Appointed by West Coast Miracles (Pty) Ltd to undertake an EIA for the proposed residential development in St Helena Bay. Member of the environmental team, responsible for assistance in the management of the Environmental Process, as well as assistance with the writing and review of reports associated with the application for authorization to undertake a residential development on the property.</p>
2006 - 2007	Member of Project Team	<p><b>Proposed Britannia Beach residential development and road infrastructure, St Helena Bay, Western Cape, South Africa</b></p> <p>Appointed by Britannia Beach Estate (Pty) Ltd to undertake a Basic Assessment for the proposed residential development in St Helena Bay. Member of the environmental team, responsible for assistance in the management of the Environmental Process, as well as assistance with the writing and review of reports associated with the application for authorization to undertake a residential development on the property.</p>
2006 - 2007	Project Manager	<p><b>Proposed Bodensee Residential development and road infrastructure, Sunnyside, Western Cape, South Africa</b></p> <p>Appointed by CHZA Investments (Pty) Ltd to undertake a Basic Assessment for the proposed construction of a residential development on the site. The project entailed the compilation of a Basic Assessment Report and undertaking a public participation process.</p>
2006	Project Staff	<p><b>Erf 115, Rooi Els, Western Cape, South Africa</b></p> <p>Appointed by Tommy Brummer Town Planners to undertake the Environmental Process for the proposed construction of a residential house on the property. The project entailed the compilation of an application form and scoping checklist and undertaking a public participation process.</p>
2006	Project Staff	<p><b>Proposed Tennis Courts for Reddam House School, Steenberg, Western Cape, South Africa</b></p> <p>Appointed by Reddam House Properties to undertake the Environmental Process for the proposed construction of additional tennis courts on the property. The project entailed the compilation of an application form and scoping checklist, Scoping Report, Environmental Impact Report and undertaking a public participation process.</p>

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2005 - 2007	Project Manager	<b>Proposed Stallion Ridge Wine and Equestrian Estate, Malmesbury, Western Cape, South Africa</b> Appointed by Jupiter Consulting CC to undertake an Environmental Impact Assessment for the proposed construction of a residential and equestrian development on the site. The project entailed the compilation of a Scoping Report and undertaking a public participation process.
2005 - 2007	Project Manager	<b>Proposed Vineyards Residential Estate and road infrastructure, Bellville, Western Cape, South Africa</b> Appointed by Umdiliya Estates (Pty) Ltd to undertake an Environmental Impact Assessment for the proposed construction of a residential development on the site. The project entailed the compilation of a Scoping Report and undertaking a public participation process.
2004 - 2006	Project Staff	<b>Proposed Residential Development on Erf 2 Gordons Bay, Western Cape, South Africa</b> Sub-contracted by Withers Environmental Consultants to assist in undertaking the Environmental Process for the proposed construction of a residential development on the property. The project entailed the compilation of an application form and scoping checklist, Scoping Report, Environmental Impact Report and undertaking a public participation process.
2004	Project Staff	<b>Proposed Pringle Bay Community Hall, Pringle Bay, Western Cape, South Africa</b> Appointed by the Kleinmond Municipality to undertake the Environmental Process for the proposed construction of a community hall on the property. The project entailed the compilation of an application form and scoping checklist, and undertaking a public participation process.
2004	Project Staff	<b>Proposed Oostenberg Refuse Transfer Station, Cape Town, Western Cape, South Africa</b> Appointed by the then Oostenberg Municipality to undertake the Environmental Process for the proposed construction of a refuse transfer station. Involved in assisting with the compilation of the Scoping Report for the project.
2004	Project Staff	<b>Drakenstein Municipality State of Environment Report, Western Cape, South Africa</b> Appointed by the Drakenstein Municipality to undertake the studies necessary to undertake a detailed assessment of all aspects of the environment within the Drakenstein Municipal Boundary. Involved in the compilation of a photo documentary of the Berg River and major tributaries, a visual river survey, and water sampling. Assisted in the compilation of the chapter entitled "A Situational Assessment of the Berg River System".

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## 2. ENVIRONMENTAL MANAGEMENT PLANS (EMP) AND ENVIRONMENTAL CONTROL (ECO) WORK

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2015	Environmental Assessment Practitioner	<b>Cultivation of Virgin Soil on Remainder of Farm Monte Vista No 43, Hex River Valley, Western Cape, South Africa: Environmental Management Programme.</b> Appointed by Mr Bernard Joubert to compile the EMP for the proposed cultivation of virgin soil on the above mentioned property.
2014 to 2015	Environmental Assessment Practitioner	<b>The Proposed Kleinberg Dam Scheme, Western Cape, South Africa: Environmental Management Programme.</b> Appointed by the Hex Valley Water Users Association to compile the EMP for the proposed water supply scheme entailing up to 3 dams, diversion weirs, pipelines and a clay borrow area, near De Doorns.
2015	Environmental Control Officer	<b>The Raising of the Tienrivieren Dam, Citrusdal, Western Cape, South Africa.</b> Appointed by Mouton Citrus. Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this dam raising project.
2015	Environmental Control Officer	<b>The Expansion of Vyeboom Dam F1, Villiersdorp, Western Cape, South Africa.</b> Appointed by the Vyeboom Irrigation Board. Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this dam raising project.
2015	Environmental Control Officer	<b>Riverbank Stabilization at 58 Plamboom Road, Newlands, Cape Town Western Cape, South Africa.</b> Appointed by Mr David Evans. Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this river bank stabilization project.
2015	Environmental Control Officer	<b>The Construction of the Groenvlei Dam, Citrusdal, Western Cape, South Africa.</b> Appointed by Mouton Citrus. Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP the construction of this new irrigation dam.
2014 to present	Environmental Control Officer	<b>The Upgrade of Main Road (Phase 3) between Muizenberg and Clovelly, Cape Town, Western Cape, South Africa.</b> Appointed by Martin and East (Pty) Ltd. Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this road upgrading project.
2014	Project Manager	<b>Wolwerivier Farm Operational Environmental Management Plan (OEMP), Melkbosstrand, Western Cape, South Africa.</b> Appointed by Mr Marthinus Stoffberg to compile an OEMP for his farming operation on Wolwerivier Farm which is leased from Garden Cities (Inc).
2013	Environmental Control Officer	<b>Delft TRA-6 Low Cost Housing Project, Delft, Western Cape, South Africa.</b> Appointed by Power Construction, responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this low cost housing project.
2012 to 2013	Member of Project Team	<b>Ghaghoo Diamond Mine, Central Kalahari Game Reserve, Botswana.</b> Appointed by Gem Diamonds, Botswana (Pty) Ltd, to undertake an external Audit of compliance with the EMP, Monitoring Plan and Environmental Conditions of Authorization for the Project. The appointment also included assisting the site team with EMP and monitoring plan implementation on site, as well as training of the newly appointed site Environmental Officer.
2013 to 2015	Environmental Control Officer	<b>Caledon Low Cost Housing Project, Caledon, Western Cape, South Africa.</b> Appointed by Power Construction (on behalf of the Theewaterskloof Municipality). Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this low cost housing project.



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2012 to 2014	Environmental Consultant and Control Officer	<b>Kapteinskop Road Maintenance and Repair, Aurora, Western Cape, South Africa.</b> Appointed by the Department of Public Works to compile a Construction EMP for the project, and to act as Environmental Control Officer for the duration of the project
2013 to 2014	Environmental Control Officer	<b>Bot River Low Cost Housing Project, Bot River, Western Cape, South Africa.</b> Appointed by Power Construction (on behalf of the Theewaterskloof Municipality). Responsible for the implementation of the Environmental Awareness Training Course and monitoring and auditing compliance with the EMP for this low cost housing project.
2010 to 2014	Environmental Site Officer	<b>Lake Michelle Housing Estate, Noordhoek, Western Cape, South Africa.</b> Appointed by various owners within the estate to undertake the environmental monitoring of house construction. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP
2010 to 2012	Environmental Control Officer	<b>Driftsands Nature Reserve Hiking Trail, Western Cape, South Africa.</b> Appointed by Cape Nature. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of phase 1 & 2 of the new hiking trail within the reserve.
2013	Environmental Control Officer	<b>Eerste River Bank Stabilization Project, Stellenbosch, Western Cape, South Africa.</b> Appointed by Remgro PTY Ltd. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the installation of gabions and associated erosion repair works on a reach of the Eerste River, Stellenbosch, Western Cape.
2010 to 2012	Member of Project Team	<b>Millennia Park Extension and Refurbishment - Green Building Project, Stellenbosch, Western Cape, South Africa.</b> Appointed by Remgro PTY Ltd. Responsible for the compilation of a combined Green Star SA and NEMA compliant Environmental Management Program, as well as the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction phase of this Green Star SA registered project.
2011	Environmental Consultant and Control Officer	<b>Cleanup of a sediment spill into the Liesbeek River, Cape Town, Western Cape, South Africa</b> Appointed by WBHO Pty Ltd to compile a management plan for adoption by the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP), in respect of the emergency clean-up of a portion of the Liesbeek River which was inadvertently polluted with sediment from a construction site. Following the adoption of the management plan by DEA&DP, responsibilities included the environmental monitoring of the clean-up operation and co-ordination of specialist input

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2010	Member of Project Team	<b>Eastgate 20 Office Complex - Green Building Project, Johannesburg, Gauteng, South Africa.</b> Appointed by Amathemba Environmental Management Consulting CC. Responsible for the compilation of the Green Star SA compliant Environmental Management Plan for the construction phase of this Green Star SA registered project.
2009 to 2011	Environmental Control Officer	<b>Alpen Sewerage Pumpstation and Rising Main, Constantia, Western Cape South Africa.</b> Appointed by Aurecon Pty Ltd, Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for the construction of a new pumpstation and 2km sewer pipeline
2009	Project Manager	<b>Proposed Construction of the Groenvlei Farm Dam, Citrusdal, Western Cape, South Africa.</b> Appointed by Mouton Citrus. Responsible for the compilation of the Environmental Management Program for the proposed new irrigation dam.
2009	Project Manager	<b>Erf 1591, Simons Town, Western Cape, South Africa.</b> Appointed by the Avril Ocean Trust. Responsible for the compilation of the Environmental Management Program for the proposed housing development.
2011 and 2008	Project Manager	<b>Long Beach Mall OEMP Audit, Cape Town, Western Cape, South Africa:</b> Appointed by Growthpoint Properties (PtY) Ltd to undertake an Audit of the Operational Phase Environmental Management Plan for the Long Beach Mall shopping centre for the 2008 and 2011 audit periods. Responsibilities included auditing compliance with the OEMP for the project and the compilation of an audit report outlining the degree of compliance with the OEMP as well as recommendations for changes required to the OEMP and management practices to improve environmental management of the site
2008	Project Manager	<b>Sea Lodge, Bloubergstrand, Western Cape, South Africa.</b> Appointed by Portland (Pty) Ltd. Responsible for the compilation of a construction phase Environmental Management Plan for the proposed luxury apartment complex.
2008 to 2009	Environmental Control Officer	<b>Bisschop Road Electrical Cable, Cape Town, Western Cape, South Africa:</b> Appointed by City of Cape Town. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for the installation of a high voltage electrical cable between Wynberg and Hout Bay.
2008 to 2011	Environmental Control Officer	<b>Gugulethu Square Shopping Centre, Gugulethu, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of this large new shopping precinct.
2008 to 2009	Environmental Control Officer	<b>Bainskloof Housing Estate and Conference Centre, Wellington, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP.
2008 to 2013	Environmental Control Officer	<b>Stellenbosch Urban Re-newal Project, Stellenbosch, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the redevelopment of an area covering 4 city blocks (centred around the Eikestad Mall) in central Stellenbosch.
2008 to Date	Environmental Control Officer	<b>Mitchell's Plain District Hospital, Mitchell's Plain, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of this large new provincial hospital.
2008 to	Environmental Control Officer	<b>Fisantekraal Waste Water Treatment Works, Fisantekraal, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental

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2012		Awareness Training Course and monitoring compliance with the EMP, for the construction of this new waste water treatment works, including the construction of the outlet works into the Mosselbank River.
2008 to 2011	Environmental Control Officer	<b>Fisantekraal Sewer Line and Pumpstation, Fisantekraal, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for the construction of a new pumpstation and 7km sewer pipeline.
2007	Environmental Control Officer	<b>Riverbank Stabilization of a portion of the Liesbeek River, Kirstenbosch Drive, Cape Town, Western Cape, South Africa</b> Subcontracted to Ninham Shand Pty Ltd. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for the installation of gabions for the stabilization of a portion of the bank of the Liesbeek River adjacent to the remainder of Erf 240, Kirstenbosch Drive, Cape Town.
2006 to 2009	Environmental Control Officer	<b>Helderstroom Prison, Caledon, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of additional staff quarters, sports facilities, and a filling station at the prison.
2005 to 2009	Environmental Control Officer	<b>Tygerfalls Mixed Use Development, Bellville, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of two separate commercial developments (The Cliffs & Avanti Towers) within the development precinct.
2005 to 2012	Environmental Control Officer	<b>N2 Gateway Housing Project, Langa, Gugulethu and Delft, Western Cape, South Africa:</b> Compiled construction phase Environmental Management Plan (EMP) for the construction of the "New Rest" Low Cost Housing Project. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of five separate housing and infrastructure projects undertaken under the auspices of the N2 Gateway housing project.
2004 to 2009	Environmental Control Officer	<b>Lagoon Beach Housing, Hotel&amp; Shops, Milnerton, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of three separate commercial developments within the development precinct.
2006 to 2009	Project Staff & Environmental Control Officer	<b>Western Cape Sport Shooting Union - new shooting range near Atlantis, Western Cape, South Africa:</b> Compiled construction phase Environmental Management Plan (EMP) and Operational Phase Environmental Management Plan for the construction of a new shooting range complex, as well as developing the Environmental Awareness Training Course for construction personnel and monitoring compliance with the EMP.
2006 to 2008	Environmental Control Officer	<b>Patryfontein Piggery, Fisantekraal, Western Cape, South Africa:</b> Appointed by Garden Cities (inc) responsible for writing the method statements for closure and cleanup of an illegal pig farming operation on the property, including the monitoring of the cleanup and rehabilitation of the Mosselbank River, to the satisfaction of DWAF and the City of Cape Town.
2006 to 2008	Environmental Control Officer	<b>Diep River Bridge, near Kilarney, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of a new provincial road bridge across the Diep River.

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2006 to 2008	Environmental Control Officer	<b>Bergvliet Farm Housing Development, Cape Town, Western Cape, South Africa:</b> Appointed by Invest Afrique (Pty) Ltd. Compiled construction phase Environmental Management Plan (EMP) for the construction of the Bergvliet Farm Housing Development, as well as developing the Environmental Awareness Training Course for construction personnel and monitoring compliance with the EMP.
2004 to 2008	Environmental Control Officer	<b>Bella Roas Village, Mixed Use Development, Bellville, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP, for the construction of this large mixed residential and commercial development.
2006 to 2008	Environmental Control Officer	<b>Wellington – Hermon MR23 Road Upgrade, Wellington, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP.
2006 to 2008	Environmental Control Officer	<b>The Bantry Luxury Apartment Complex, Bantry Bay, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for this construction of a luxury apartment complex, in close proximity to the coastal zone.
2006 to 2007	Environmental Control Officer	<b>Lustigan Road Water Pipeline, Paarl, Western Cape, South Africa:</b> Appointed by Drakenstein Municipality. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for a 5 km water pipeline.
2007	Environmental Control Officer	<b>Erf 240, Kirstenbosch Drive, Cape Town, Western Cape South Africa:</b> Responsible for the monitoring of rehabilitation and bank stabilization of the Liesbeek River at this location. Responsible for the Environmental Awareness Training of workforce, monitoring compliance with the EMP, and compilation of a compliance report upon project completion.
2006	Environmental Control Officer	<b>Withoogte Dam, Wellington, Western Cape, South Africa:</b> Appointed by Drakenstein Municipality. Compiled construction phase Environmental Management Plan (EMP) for the emergency maintenance of the Dam, and water supply pipeline to Wellington, as well as developing the Environmental Awareness Training Course for construction personnel and monitoring compliance with the EMP.
2006	Environmental Control Officer	<b>Orange Kloof Electrical Cable, Table Mountain National Park, Western Cape, South Africa:</b> Appointed by City of Cape Town. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for the installation of a high voltage electrical cable between Constantia Neck, and the Orange Kloof water purification works.
2006 to 2007	Environmental Control Officer	<b>Newtown Effluent Pipeline, between Wellington and Paarl Waste Water Treatment Works, Western Cape, South Africa:</b> Appointed by Drakenstein Municipality. Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for this 11km effluent pipeline.
2006 to 2007	Environmental Control Officer	<b>Land en Zeezicht housing development, Somerset West, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP.
2005	Environmental Control Officer	<b>Overberg Roads Re-gravelling, Overberg, Western Cape, South Africa:</b> Responsible for Environmental Awareness Training of site staff, monitoring compliance with the EMP, and the assessment of borrow pits following flood damage.

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2004 to 2005	Environmental Control Officer	<b>Eventide Luxury Apartment Complex, Bantry Bay, Western Cape, South Africa:</b> Responsible for the implementation of the Environmental Awareness Training Course and monitoring compliance with the EMP for this construction of a luxury apartment complex, in close proximity to the coastal zone.
2003 to 2006	Environmental Control Officer	<b>Film and Events Industry, Western Cape, South Africa:</b> Numerous (approximately 130 in total) Environmental Control Officer assignments on both Stills and Commercial Productions. Responsible for monitoring compliance with permit conditions, as well as the EMP for the shoot, if applicable. Served as the ECO Coordinator for Amathemba Environmental Management Consulting CC, during this time period, responsible for the management and allocation of the requisite human resources to meet the obligations of bookings by film companies. Responsibilities also included marketing of the firm to the Film and Events Industry.

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### 3) Lecturing:

2006 to date	Assistant Lecturer	<b>University of the Western Cape, Cape Town, Western Cape, South Africa:</b> Responsible for annually co-lecturing a module on Environmental Management, as well as conducting a practical field excursion to a construction site for the post graduate students within the Geography Department.
2008	Assistant Lecturer	<b>Cape Peninsula University of Technology, Cape Town, Western Cape, South Africa:</b> Responsible for giving a lecture on Construction Phase EMP's, the Construction Management students as part of their Environmental module.
2009 to date	Guest Lecturer	<b>University of Cape Town, Cape Town, Western Cape, South Africa:</b> Responsible for annually co-presenting a lecture on Environmental Management Programs, to post-graduate Landscape Architect students as part of their Environmental Management module.

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### 4) Other Environmental Work:

2005 to 2010	Project Staff	<b>Off Road Vehicle Permitting and Capacity Building for Marine and Coastal Management, South Africa:</b> Member of the external consulting team assisting MCM in the review and processing of applications for authorization for vehicle use in the coastal zone, in terms of the National Environmental Management Act, Off Road Vehicle regulations. Additional responsibilities include capacity building, and training of MCM staff.
2008 to 2012	Field Assistant	<b>Table Mountain Group Aquifer Project, Western Cape, South Africa:</b> Field assistant for the freshwater specialist investigation into the potential impact of the proposed supplementation of the water supply to the City of Cape Town, and surrounding areas, via harvesting of water from the Table Mountain Group aquifer, on freshwater ecosystems. Responsibilities included assistance with water quality sampling (water chemistry) as well as invertebrate sampling, and algal sampling in various headwater streams and wetlands within the study area.

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2007	Field Assistant	<b>Proposed Worcester Island Residential Development, Worcester Dam, Western Cape, South Africa:</b> Field assistant for the specialist investigation into the potential impact of the proposed residential development on freshwater ecosystems. Responsibilities included assistance with water quality sampling (water chemistry) as well as invertebrate sampling.
2007	Field Assistant	<b>Proposed Upgrade of the Waste Water Treatment Works at Spier, Western Cape, South Africa:</b> Field assistant for the specialist investigation into the potential impact of the proposed WWTW upgrade on freshwater ecosystems. Responsibilities included assistance with water quality sampling (water chemistry) as well as invertebrate sampling.
2000 - 2002	Senior Image Processing Analyst and Project Manager	<b>The Millenium Map Project, United Kingdom:</b> The project entailed the ortho-rectification, and creation of seamless mosaics, from various datasets of aerial imagery in order to create an updated, hi resolution, seamless aerial map of the United Kingdom. Responsible for managing individual projects, liaison with clients, quality assurance, management of staff and resources, attendance at production meetings and maintaining forward load/ project progress information.

## COUNTRIES OF WORK EXPERIENCE:

South Africa ; United Kingdom ; Lesotho ; Botswana

## EDUCATION:

- BSc (Environmental and Geographical Science and Economics), University of Cape Town, South Africa, 1997.
- BSc (Hons) (Environmental and Geographical Science), University of Cape Town, South Africa, 1998.
- MSc (Environmental and Geographical Science), University of Cape Town, South Africa, 2000.
- The Framework Programme for Education & Training in Water. Certificates of competence held with distinction, in "Water Quality" and "Aquatic Ecology", University of Cape Town, South Africa, 2007.
- Green Star SA Accredited Professional Course and Exam, Green Building Council of South Africa, 2010.

## EMPLOYMENT RECORD:

2003 to date	Self employed t/a Holland & Associates Environmental Consultants and free lance sub-contractor to the environmental consulting industry.
2002 - 2003	Franchised, DSA Approved, Professional Driving Instructor working through Britannia Driving School, Wimbledon, London, United Kingdom
2000 - 2002	Project Manager and Senior Applications Analyst, working on various mapping projects, Geosense Limited, Cape Town, South Africa
1998 - 2000	Tutor & Demonstrator for the following courses; ERT 100, EGS101, EGS212 & EGS 314, University of Cape Town, Cape Town, South Africa
1997	Volunteer Parliamentary Monitor, monitoring working committees on Agriculture, Environmental Affairs, Water & Forestry, Parliamentary Monitoring Group, Cape Town, South Africa
1995 – 1998	Short term contractor to Mossgas (PTY) Ltd (now PetroSA) undertaking various internal environmental audit investigations on a contract basis

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## LANGUAGES:

	<b>Speaking</b>	<b>Reading</b>	<b>Writing</b>
<b>English</b>	Excellent	Excellent	Excellent
<b>Afrikaans</b>	Fair	Good	Good

## PUBLISHED PAPERS:

J. Boardman, A. J. Parsons, R. Holland, P. J. Holmes and R. Washington (2003). Development of badlands and gullies in the Sneeuberg, Great Karoo, South Africa. *Catena* Volume 50, Issues 2-4, Pages 165-184

## AWARDS:

SAAF Museum/ Royal Air Forces Association (South Africa Area) (Sept. 2000)  
*Meritorious Service Award*. Awarded in recognition of outstanding and devoted service.

York High School (1992)  
*Top Ten Award*. Awarded in recognition of academic excellence.

## Curriculum vitae: Mrs K DE BRUYN

Name : DE BRUYN, KAREN  
 Date of Birth : 12 December 1987  
 Profession/Specialisation : Environmental studies/management  
 Years with Firm : 2  
 Nationality : South African  
 Years experience : 3

### Key qualifications

Mrs de Bruyn is currently employed as an Environmental Practitioner at Aurecon, where she assists with Basic Assessment Reports (BARs), Environmental Management Reports (EMRs), and Environmental Impact Assessments (EIAs).

Mrs de Bruyn's previous work experience includes working as a Junior Environmental Assessment Practitioner (EAP), focusing mainly on waste management and renewable energy projects.

Mrs de Bruyn holds a BSc Conservation Ecology and MPhil in Environmental Management both obtained from the University of Stellenbosch. The aim of her thesis was to evaluate whether desalination technology is the solution to water shortages along the coastal towns of South Africa.

### Employment record

03/2011 - Date Aurecon, Environmental Assessment Practitioner (EAP)  
 02/2010 - 02/2011 Anèl Blignaut Environmental Consultants, Junior Environmental Assessment Practitioner (EAP)

### Experience record

**Proposed photovoltaic solar energy facilities near De Aar (Northern Cape Province, South Africa) 09/2011 - Date.** *Environmental Assessment Practitioner (EAP).* Mulilo Renewable Energy proposed to construct three photovoltaic solar energy facilities near De Aar, which would enable them to be taken into consideration as an Independent Power Producer (IPP). The Integrated Resource Plan (IRP) 2010 allows for an additional 14 749MW of renewable energy in the electricity mix in South Africa by 2030, and Mulilo wanted to participate in this programme. The proposed facilities would be able to generate 169MW collectively. Responsible for compiling the scoping reports, the Basic Assessment Report (BAR), conducting the Public Participation Process (PPP) and liaising with all stakeholders. Involved for 4 person-months. (Mulilo Renewable Energy (Pty) Ltd).

**Cost estimates for solid waste management for the Knysna, Cape Agulhas and Prince Albert Municipalities (Western Cape Province, South Africa) 06/2011 - 08/2011.** *Environmental Assessment Practitioner (EAP).* Many of South African municipalities do not properly manage the waste generated in their jurisdiction, and few comply with the National Environmental Management Waste Act (NEMA). In order to identify non-compliance activities in the waste management systems of the Prince Albert, Phokwane, Cape Agulhas and Kannaland Municipalities, a site visit was undertaken and a cost estimates compiled. The cost estimates allowed these municipalities to budget for the necessary environmental processes, upgrades, decommissioning of sites and the establishment of new sites. Responsible for site visits, compiling cost estimates to enable the municipalities to secure necessary budgetary requirements for sound solid waste management, fieldwork, report writing and identifying a way forward for these municipalities in terms of the required environmental processes. Involved for 3 person-months. (Mubesko Africa).

**Operational phase management plan of the Sandown Shoprite Checkers in Parklands (Western Cape Province, South Africa) 04/2011 - 05/2011.** *Environmental Assessment Practitioner (EAP).* As a prerequisite to get the building plans for the Sandown Shoprite Checkers approved, an Operational Environmental Monitoring Programme (OEMP) had to be submitted to the City of Cape Town. The OEMP addressed key issues of on-site stormwater management, landscaping and management of a portion of public open space and a retention pond containing floating islands. Responsible for compiling an Operation phase management plan. Involved for 1 person-month. (Shoprite Checkers).

**Basic assessment process for the upgrade of Stokery Road in Wellington (Western Cape Province,**



**South Africa) 04/2011 - Date.** *Environmental Assessment Practitioner (EAP).* Drakenstein Municipality was aiming to upgrade a 1.4km section of Stokery Road, starting 200m from the intersection with Main Road 27, Champagne Street, up to the intersection with Main Road 219, Main Street. The geometric layout was upgraded from a 9.2m surfaced road to a 14.8m surfaced road, with 1.8m surfaced sidewalks. This allows for two 3.4m lanes per direction to accommodate the left and right turning of heavy vehicles, and for safer pedestrian usage. The stormwater system upgrade included a concrete culvert to replace the current unlined channel on the western side. Responsible for completing the application form, the Basic Assessment Report (BAR) and the Environmental Management Plan (EMP). Involved for 3 person-months. (Drakenstein Local Municipality).

**Borrow pit inspection in Oudtshoorn (Western Cape Province, South Africa) 03/2011 - 03/2011.** *Environmental Assessment Specialist (EAP).* The project entailed assisting with the screening evaluation of potential borrow pit sites in the Oudtshoorn Municipal District. The three potential borrow pit sites were assessed in a high level screening process according to suitability from an environmental perspective to take it to the next level of geological investigation. Responsible for assisting the team leader with the compilation of the feedback/screening report of the potential sites that were investigated, and assisting with field work. Involved for 0.5 person-months.

### Education

2011 : MPhil Environmental Management, University of Stellenbosch, South Africa  
 2009 : BSc Conservation Ecology, University of Stellenbosch, South Africa

### Professional affiliations

Associate Member, Institute of Waste Management of Southern Africa (IWMSA)  
 Member, International Association for Impact Assessments South Africa (IAIASA)  
 Certified Natural Scientist, South African Council for Natural Scientific Professions (SACNSP)

### Languages

	<b>Reading</b>	<b>Writing</b>	<b>Speaking</b>
English	Excellent	Excellent	Excellent
Afrikaans	Excellent	Excellent	Excellent

### Referees

<b>Company</b>	<b>Contact Person</b>	<b>Telephone nr.</b>
Anèl Blignaut Environmental Consultants	Anèl Blignaut	+27 82 751 9596 anel@dpeng.co.za

By my signature below I certify the correctness of the information above and my availability to undertake this assignment.

\_\_\_\_\_  
Signature of Staff Member

\_\_\_\_\_  
Date

## Curriculum vitae: Ms K Versfeld

Name : **VERSFELD, KAREN**  
 Date of Birth : 26 March 1980  
 Profession/Specialisation : Environmental Practitioner  
 Years with Firm : 03  
 Nationality : South African  
 Years' experience : 07  
 South African ID number : 8003260060088  
 Marital Status : Single  
 Personnel Number : 6109  
 Date of joining firm : 01 November 2008  
 Start date of Experience : 01 September 2004

### Key qualifications

Ms Versfeld is a Senior Environmental Practitioner with a Master of Science Degree in Water Resource Management from the University of Pretoria. Karen has over 7 years' experience in the Environmental Management and Water Resource Management fields and has compiled and managed numerous Environmental Impact Assessments, Environmental Management Plans, and Environmental Management Programmes on various projects. In addition, she has experience as a surface water quality specialist and has compiled and managed numerous water use authorization processes.

### Employment record

03/2009 - Date	Aurecon (previously Ninham Shand), South Africa, Water Resource Scientist
11/2008 - 02/2009	Ninham Shand, South Africa, Water Resource Scientist
02/2008 – 11/2008	Environmental Scientist, ARCUS GIBB (Pty) Ltd
11/2005 – 01/2008	Environmental Scientist, ILISO Consulting (Pty) Ltd
03/2005 – 10/2005	Project Coordinator, Hartbeespoort Water Action
09/2004 – 02/2005	GIS Consultant, CPH <sub>2</sub> O

### Experience record

***Environmental Impact Assessment for the construction of the Bulk Water Supply Scheme at Aussenkehr town, Southern Namibia. 03/2012 to date.*** Appointed by Namibia Water Corporation Ltd to manage a comprehensive and multi-disciplinary EIA process for the proposed construction of the bulk water supply scheme for the town of Aussenkehr.

***Strandfontein School Integrated Waste Management Plan (IWMP). 01/2012 to date.*** Appointed by the Western Cape Education Department to compile an IWMP for the rehabilitation of Erf 14927.

***EIA Process for the proposed Photovoltaic (solar) Energy Plan on Badenhorst Dam Farm, Paarde Valley Farm, and Annex Du Plessis Dam Farm, near De Aar, Northern Cape. 11/2011 to date.*** Appointed by Mulilo Renewable Energy (Pty) Ltd to manage two EIA processes and one Basic Assessment for the proposed construction of three photovoltaic energy facilities and associated infrastructure.

***Pretoria Portland Cement Company Limited (PPC) Proposed Upgrade to the existing Cement Manufacturing Plant and associated operations in Riebeeck West, Western Cape. 07/2011 to date.*** Appointed by PPC to manage a comprehensive and multi-disciplinary EIA process for the upgrade of an existing cement manufacturing plan and associated infrastructure.

***Khanyisa Power Station (South Africa). 09/2010 to 01/2012. Task Leader: Surface Water Impacts Assessment.*** This project entails applying for environmental authorisation for the proposed Khanyisa Power Station. Responsible for assessing the surface water quality impacts associated with the proposed development. Involved for 0.65 person-months. (Ministry of Irrigation and Water Development).

***Newton Pipeline (South Africa). 02/11 to date. Task Leader: Water Use Authorisation.*** This project entails the construction of a potable water pipeline to supply water to the residents of Newton, Wellington, and Paarl. Responsible for the preparing the documentation in support of the water use authorisation and liaison

with the Department of Water Affairs. Involved for 0.24 person-months. (Drakenstein Municipality).

**Establishment of Water Monitoring Systems (Malawi) 11/2008 to 08/2011.** *Project Coordinator and Task Leader.* The project involves establishing a network and MIS for groundwater, surface water, and water quality monitoring systems. Responsible for coordinating the various sub-consultants, compilation of project documentation, and review of all reports before submission to the Client. Involved for 6.5 person-months. (Ministry of Irrigation and Water Development).

**Development of the Catchment Management Strategy for the Breede-Overberg Water Management Area (South Africa) 11/2008 to 07/2011.** *Project Scientist.* The project entailed developing a Catchment Management Strategy for the Breede-Overberg WMA. Aurecon was appointed as a technical sub-consultant to provide input to the water resource component of the CMS. Responsible for the compilation of a report on the status of water resources and water resource management strategies. Involved for 0.8 person-months. (Pegasys).

**Development of Reconciliation Strategies for Large Bulk Water Supply Systems: Greater Bloemfontein Area (South Africa) 11/2008 to date.** *Project Scientist.* The objective of the Reconciliation Strategy Study is to develop a strategy that will set out a course of action to ensure adequate and sustainable reconciliation of future water requirements in the Greater Bloemfontein Area for a horizon of at least 25 years. Responsible for managing the sub-consultants, compilation of the reports, and project administration (scheduling of meetings and minute taking). Involved for 1.2 person-months. (Department of Water Affairs).

**Development of Reconciliation Strategies for the Algoa Water Supply Area (South Africa) 11/2008 to 06/2011.** *Project Scientist.* The project entailed developing strategies to reconcile the water supply available from the AWSS with the water requirements up to 2035. Responsible for compilation of the reports, and project administration (scheduling of meetings and minute taking). Involved for 1.5 person-months. (Department of Water Affairs).

**Project scientist for the compilation of the Integrated Waste and Water Management Plan for Elitheni Coal in support of a Water Use Licence (South Africa) 11/2008 to 06/2011.** *Project Scientist.* The project involved undertaking specialist studies and preparing the technical Reports in support of the Integrated Water Use Licence Application. Responsible for compiling the Water Use Licence Technical Report. Involved for 0.6 person-months. (Elitheni Coal (Pty) Ltd).

**Compilation of the Volunteer Water Quality Training Manual, the Communication Structures Manual, and the Training Needs Manual for the Adopt-a-River Programme. Phase II: Development of an Implementation Plan (South Africa) 11/2008 to 02/2011.** *Project Scientist.* The aim of the Adopt-a-River Programme is to create awareness and an understanding amongst all South Africans of the need to care for our scarce water resources and to facilitate their participation in the protection and management these resources in an integrated manner. Responsible for developing the training manual for setting up a Water Quality Monitoring Programme. Involved for 0.4 person-months. (Department of Water Affairs).

**Surface Water Quality Impact Assessment for the proposed Ferrochrome Smelter located outside of the Brits Industrial Area (South Africa) 11/2008 to 02/2011.** *Project Scientist.* The project comprised of assessing the surface water impacts associated with establishing a ferrochrome smelter and developing baseline and operational water quality monitoring programmes. Responsible for the surface water impact assessment and developing the water quality monitoring programmes. Involved for 1.1 person-months. (Quanto Environmental Solutions cc).

**Drakenstein River Management Plan – Assessment of the urban reaches of rivers within Drakenstein Municipality (South Africa) 11/2008 to 02/2011.** *Project Scientist.* The project involved assessing the urban reaches of selected rivers from an environmental and engineering perspective to guide the development of a practical River Management Plan. Responsible for the river assessment. Involved for 0.1 person-months. (Drakenstein Municipality).

## **ARCUS GIBB**

**EIA and EMP for the proposed Transmission Lines for a conventional nuclear power station and associated infrastructure at the Bantamsklip site in the Western Cape (Nuclear 1) (South Africa) 02/2008 – 11/2008.** *Project Scientist.* The project involved undertaking the EIA for the proposed transmission line from the Bantamsklip site. Responsible for identifying possible routes and associated impacts for the transmission line. (Eskom).

**Environmental compliance audits of Eskom's Gourikwa and Atlantis Gas Turbine Power Stations (South Africa) 02/2008 – 11/2008.** *Project Scientist.* The project entailed auditing the construction sites in terms of the EMP. Responsible for compliance auditing on a quarterly interval. (Eskom).

**Water Use Authorisation process for identified Water Uses at the Portland Cement Company's Jupiter Cement Plant in terms of the National Water Act (South Africa) 02/2008 – 11/2008.** *Project Scientist.* The project involved applying for a water use authorisation for the Jupiter Cement Plant. Responsible for compilation of the technical reports in support of the water use licence application. (PPC).

## ILISO CONSULTING

**Evaluation of the Water Use Licence Application for Palabora Mining Company, Twickenham Platinum Mine, Sasol Nitro and Xstrata Alloys in terms of the National Water Act (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project entailed assessing water use licence applications on behalf of the Department of Water Affairs. Responsible for drafting of the water use licence and record of decision. (Department of Water Affairs & Forestry, Mpumalanga region).

**Gautrain Rapid Rail Link (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project involved applying for a water use licence for the water use activities triggered by the Gautrain Rapid Rail Link. Responsible for the preparing the technical report in support of Section 21 (i) and (c) water uses. (Gauteng Department of Public Transport, Roads and Works).

**Evaluation of the various Water Use Licence Applications in terms of the National Water Act (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* Responsible for preparing the technical report in support of Section 21 (i) and (c) water uses. (Department of Water Affairs & Forestry, Gauteng region).

**Assessment of the water use licence backlog and the evaluation of the various Water Use Licence Applications in terms of the National Water Act (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* Responsible for preparing the technical report in support of Section 21 (i) and (c) water uses. (Department of Water Affairs & Forestry, Head Office).

**The development of a reconciliation strategy for the Crocodile West Water Supply System: Water Quality Assessment Report (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* Responsible for preparing the technical report in support of Section 21 (i) and (c) water uses. (Department of Water Affairs and Forestry).

**Upgrading of the Khutsong Sewage Treatment Works (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project involved applying for Environmental Authorisation for the proposed upgrade of the Khutsong WWTW. Responsible for the Environmental Impact Assessment. (Merafong City Local Municipality).

**Construction of the Kokosi Sewage Treatment Works (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project involved applying for Environmental Authorisation for the proposed upgrade of the Kokosi WWTW. Responsible for the Environmental Impact Assessment. (Merafong City Local Municipality).

**Upgrade of expansion of the Zeekoegat Sewage Treatment Works (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project involved applying for Environmental Authorisation for the proposed upgrade of the Zeekoegat WWTW and applying for the Water Use Licence in terms of the National Water Act (Act 36 of 1998). Responsible for the Environmental Impact Assessment. (City of Tshwane).

**Construction of the Sewage Treatment Works for Nolukhanyo (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project entailed applying for Environmental Authorisation for the proposed Nolukhanyo WWTW. Responsible for the Environmental Impact Assessment. (Ndlambe Municipality).

**Construction of the poultry facility for Bontsi Poultry (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project involved applying for Environmental Authorisation for the proposed development of a poultry farm. Responsible for the Environmental Authorisation. (Bontsi Poultry (Pty) Ltd).

**Gautrain Rapid Rail Link: Diversion of a tributary of the Hennops River (South Africa) 11/2005 – 01/2008.** *Environmental Scientist.* The project entailed applying for an amendment of the Gautrain Water Use Licence to include the proposed diversion of a tributary of the Hennops River. Responsible for applying

for authorization from the Department of Water Affairs & Forestry. (Gauteng Department of Public Transport, Roads and Works).

**Environmental Management Plan and Environmental Auditing of the New Durban Stadium construction site for the duration of the construction period (South Africa) 11/2005 – 01/2008.** *Environmental Auditor.* The project entailed compiling of an Environmental Management Plan and undertaking monthly audits. Responsible for compiling the EMP and undertaking monthly audits. (Ibhola Lethu Consortium).

**Environmental Auditing of the construction of erosion control structures along the Jukskei River (South Africa) 11/2005 – 01/2008.** *Environmental Auditor* The project entailed undertaking bi-weekly audits during the construction phase and submitting environmental compliance reports to the Client. Responsible for Environmental Auditing and compilation of Audit Reports. (Johannesburg Roads Agency).

**Countries of work Experience:** South Africa, Namibia, and Malawi

### Education

2004 : MSc (Water Resource Management), University of Pretoria, South Africa  
 2002 : Honours, University of Cape Town, South Africa  
 2001 : BSc (Microbiology and Plant Pathology), University of Kwa Zulu Natal

### Career enhancing courses

2012 : Project Management: Principles and Methods for use in Business (23 February 2012 – 24 May 2012). University of Cape Town: Faculty of Engineering and the Built Environment  
 2012 : Aurecon Project Management Course (February 2012 – April 2012). Presented by the Project Support Office (Aurecon)  
 2010 : Climate Change and Integrated Water Resource Management (IWRM). Presented by the University of the Western Cape, UNESCO Chair of Hydrology in collaboration with the Water Research Commission.  
 2010 : Legal Training Course: How our business is impacted on by legal matters and the things we need to be aware of and do to take care of these risks. Presented by Aurecon: Legal Services  
 2009 : Catchment Management Strategy Development for the Breede Water Management Area. Presented by FETWater.  
 2007 : Environmental Law for Environmental Managers. Presented by the Center for Environmental Management, North-West University, Potchefstroom Campus  
 2006 : Environmental Impact Assessment: The National Environmental Management Act (Act 107 of 1998) Regulations: A Practical Approach. Presented by the Center for Environmental Management, North-West University, Potchefstroom Campus

### Professional Affiliations

2007 : Candidate Member, South African Council of Natural Scientists (Member number 100005/07)

### Languages

	<b>Reading</b>	<b>Writing</b>	<b>Speaking</b>
English	Excellent	Excellent	Excellent
Afrikaans	Fair	Fair	Fair

### Referees

<b>Company</b>	<b>Contact Person</b>	<b>Telephone nr.</b>
Aurecon	Dr Chris von Holdt	+27 (0)21 526 5793
Aurecon	Andries van der Merwe	+27 (0)44 805 5427



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## ENVIRONMENTAL AWARENESS COURSE

Based on the City of Cape Town's Environmental Awareness Course

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## LE YICOURSE EJONGENE NOLONDOLOZO NDALO

Based on the City of Cape Town's Environmental Awareness Course

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## ONGEWINGS BEWUSTHEIDSKURSUS

Based on the City of Cape Town's Environmental Awareness Course

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### WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe
- Buildings, cars and houses



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### YINTONI LENTO IYINDALO?

- Mhlaba
- Amanzi
- Izityalo
- Abantu
- Izilwanyana
- Umoya esiwuphefumlayo
- Izindlu, imoto ne zakhiwo



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### WAT IS DIE OMGEWING?

- Grond
- Water
- Plante
- Mense
- Diere
- Lug wat ons inasem
- Geboue, voertuie en huise



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## WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
  - We have a right to a healthy environment
  - Compliance with the Environmental Management Plan
- 

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## YINTO INJONGO YOLONDOLOZO NDALO?

- Ichaphazela wonke ubani ndawonye nezizukulwana
  - Sinelungelo kwimpilo elungileyo
  - Compliance with the Environmental Management Plan
- 

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## HOEKOM MOET ONS VIR DIE OMGEWING SORG?

- Dit raak ons almal sowel, as ons nageslagte.
  - Ons het die reg tot 'n gesonde omgewing.
  - Compliance with the Environmental Management Plan
- 

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## HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP



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## SINGAYI LONDOLOZA NJANI INDALO?

- Yazisa yonke into eyonakalayo kwi supervisor/foreman
- Ukusebenzisana njenqabasebenzi
- Landela imigaqo ekwi EMP



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## HOE MOET ONS VIR DIE OMGEWING SORG?

- Rapporteer enige probleme aan u toesighouer/voorman.
- Spanwerk.
- Volg die reëls van die OBP.





## WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times



## INDAWO EKUSETYENZWA KUYO

Abasebenzi kunye nezixhobo abasebenza ngazo mazingaphumi ngaphaya kwesayithi



## WERK AREAS

Werkers en gereedskap moet ten alle tye binne die terreingrense bly.



## ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site



## IZILWANYANA

- Sukwenzakalisa okanye ubulale izilwanyana esayitini
- Cela isupervisor okanye imanager ukuba kususwe esosilwanyana sisesayintini



## DIERE

- Moenie enige diere op die terrein beseer of dood nie.
- Vra u toesighouer of Kontrakbestuurder om diere van die terrein te verwyder.



## TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers
- Do not walk on area under rehabilitation



## IMITI KUNYE NEENTYATYAMBO

- Ungonakalisi okanye ugawule imithi nezityalo ngaphandle kwemvume
- Sukukha izityalo ngaphandle kwemvume
- Do not walk on area under rehabilitation



## BOME EN BLOMME

- Moenie enige plante of bome sonder toestemming beskadig of afsny nie.
- Moenie blomme pluk nie.
- Do not walk on area under rehabilitation



## SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission



## UKUTSHAYA NEMILILO

- Cima icigarette uyilahle emgqomeni
- Sukutshaya kufuphi negesi ipeyintini nepetroli
- Zazi izicimamilo ukuba zihlalaphi
- Xela xakukho umlilo ovuthayo
- Sukubasa umlilo ngaphandle kwemvume
- Sukutshisa inkunkuma ngaphandle kwemvume



## ROOK EN VURE

- Gooi sigaretstompies in 'n asblik.
- Moenie rook naby gas, verf of petrol nie.
- Moenie enige vure maak sonder toestemming nie.
- Weet waar brandbestrydings-toerusting is.
- Rapporteer alle vure.
- Moenie vullis of plante sonder toestemming verbrand nie.



## PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed



## PETROLI, OYILE NE DIZILI

- Sebenzisa ezi zinto zingentla endaweni yazo
- Yazisa abaphetheyo xa zithe zachithakala
- Faka isitya sokungqanda ukuvuza ngaphantsi komatshini
- Chitha esositya emva kwenvula uchithe kwindawo oyalelweyo



## PETROL, OLIE EN DIESEL

- Werk slegs in gemerkte gebiede met petrol, olie en diesel.
- Meld alle petrol, olie en diesel lekkasies onmiddelik aan.
- Gebruik 'n drupbak onder voertuie en masjienerie.
- Maak drupbakke leeg na reën, volgens instruksie.



## DUST

- Try to avoid producing dust -
- Use water to make ground & soil wet



## UTHULI

- Sukwenza uthuli xa usebenza
- Sebenzisa amanzi ukwenza ufumise indawo



## STOF

- Probeer om nie stof te maak
- Nie en gebruik water om droë grond nat te maak.



## NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles



## INGXOLO

- Sukwenza ingxolo xa usebenza
- Ripota okanye kulungiswe ingxolo leyo



## GERAAS

- Moenie harde geluide maak op die konstruksierrein nie, veral naby skole en huise.
- Rapporteer of herstel raserige voertuie.



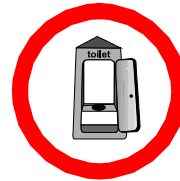
## TOILETS

- Use the toilets provided
- Report full or leaking toilets



## I TOILETS - IZINDLU ZANGASESE

- Sebenzisa izindlu zangasese hayi ityholo
- Yazisa xa kukho eyonakeleyo okanye ezeleyo



## TOILETTE

- Gebruik die voorsiene toilette.
- Rapporteer vol of lekkende toilette.



## EATING

- Only eat in demarcated eating areas
- Put packaging & leftover food into rubbish bins



## INDAWO YOKUTYELA

- Tyela kwindawo ezenzelwe oko
- Galela yonke inkunkuma wakugqiba ukutya emgqomeni



## EET

- Eet slegs in gemerkte gebiede.
- Gooi verpakking en orige kos in vullisdromme.



## RUBBISH

- Do not litter - put all rubbish (especially cement bags) into the bins provided
- Report full bins to your supervisor
- The responsible person should empty bins regularly



## INKUNKUMA

- Galela yonke inkunkuma ngakumbi iingxowa zesamente emgqomeni
- Xela xa imigqomo izele kwi foreman yakho
- Umntu onxulumene nokuchithwa kwenkunkuma kufanele ayichithe



## VULLIS

- Moenie rommelstrooi nie - plaas vullis (veral sement-sakke) in vullishouers.
- Rapporteer vol vullishouers aan u toesighouer.
- Vullishouers moet gereeld leeg gemaak word.



## TRUCKS AND DRIVING

- Always keep to the speed limit
- Drivers - check & report leaks and vehicles that belch smoke
- Ensure loads are secure & do not spill



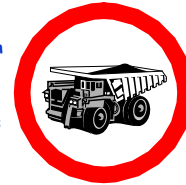
## IZITHUTHI NABAQHUBI BAZO

- Gcina isantya
- Baqhubi zikhangeleni izinto ezonakeleyo
- Qinisekisa ukuba umthwalo ukhuselekile, kwaye ingachitheki



## TROKKE EN BESTUUR

- Moet nooit die spoedgrens oorskry nie.
- Bestuurders moet voertuie nagaan en enige lekkasies of rokerige voertuie aanmeld.
- Maak seker dat alle vragte stewig is en nie mors nie.



## PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!



## IINGXAKI - KUFUNEKA WENZENI?

- Ripota xa kuqhekeziwe, isiphango, umlilo, ukuvuza ukwenzakala kuforeman
- Buza xa kukho into ongayiqondiyo



## PROBLEME - WAT OM TE DOEN!

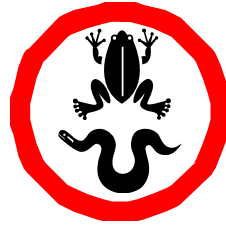
- Rapporteer alle brekasies, vure, lekkasies en beserings aan u toesighouer.
- Vra vrae!



# ENVIRONMENTAL AWARENESS ON SITE



STAY INSIDE WORKING AREAS  
INDAWO EKUSETYENZWA KUYO  
BLY BINNE DIE TERREINGRENSE



DO NOT INJURE OR KILL ANY ANIMALS  
SUKWENZAKALISA OKANYE UBULALE  
IZILWANYANA ESAYITINI  
MOENIE ENIGE DIERE BESEER OF  
DOOD NIE



TREES AND FLOWERS  
IMITI KUNYE NEENTYATYAMBO  
BOME EN BLOMME



SMOKING AND FIRE  
UKUTSHAYA NEMILILO  
ROOK EN VURE



PETROL, OIL AND DIESEL  
PETROLI, OYILE NE DIZILI  
PETROL, OLIE EN DIESEL



DUST  
UTHULI  
STOF



NOISE  
INGXOLO  
GERAAS



USE TOILETS PROVIDED  
SEBENZISA IZINDLU  
ZANGASESE HAYI ITYHOLO  
GEBRUIK DIE VOORSIENDE  
TOILETTE



ONLY EAT IN DEMARKATED EATING  
AREAS  
TYELA KWINDAWO EZENZELWE OKO  
EET SLEGS IN GEMERKTE GEBIEDE



RUBBISH  
INKUNKUMA  
VULLIS



TRUCKS AND DRIVING  
IZITHUTHI NABAQHUBI BAZO  
TROKKE EN BESTUUR



PROBLEMS - WHAT TO DO!  
IINGXAKI - KUFUNeka WENZENI?  
PROBLEME - WAT OM TE DOEN!





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14 Seaton Street  
Plumstead  
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7800

## **Du Plessis Solar PV4**

### **ADDENDUM TO SPECIALIST STUDY OF FEBRUARY 2012 ENTITLED "CONSTRUCTION OF THREE PHOTOVOLTAIC ENERGY FACILITIES NEAR DE AAR, NORTHERN CAPE"**

#### **Clarification of breeding seasons and monitoring programme**

##### **Brief**

Based on communication from Holland and Associates (R. Holland *in litt*) and information contained in my Avifaunal Impact Assessment report (Harebottle 2012), I was asked to clarify the interpretation and implications of the extent of overlapping breeding season for priority species and the likely impact of this on the envisaged construction period for the PV facility<sup>1</sup>. In addition, clarification around the proposed monitoring programme was also requested to stipulate the frequency of pre- and post-construction monitoring visits in light of a request from Mulilo to consider restricting monitoring to a single monitoring session.

##### **Breeding seasons for priority species**

For PV4, four of the 19 priority species were observed during the field visit on 22 December 2012: Secretary bird, Lesser Kestrel, Blue Crane and Northern Black Korhaan (Harebottle 2012). Only the Lesser Kestrel breeds extralimally, the remaining three species all breed in South Africa and known to breed regularly in central South Africa. Although these species were observed during their documented breeding seasons during the field visit (combined seasons from July-April, refer to Table 3 in Harebottle 2012), I did not record any confirmed breeding activity within the impact zone or site boundary of the PV facility. This is not to say that these species do not breed within the PV locations or in adjacent areas, but that there is no evidence based on a short impact assessment site visit or any other data sources to confirm this. It was based on this information, that I applied the precautionary approach when considering pre-construction mitigation for priority species that could potential breed on site.

In my opinion and based on my field experience, it is probably highly unlikely that there will be any intensive breeding of any of the three species listed above in the PV impact zone or site boundary. Blue Cranes and Secretary birds would definitely use areas for breeding where disturbance would be minimal or zero, and as such they would probably only make use of the farm for foraging. In addition, I don't recall there being any sufficiently large flat-crowned trees on the farm that Secretary birds would make use of as nesting sites. The Northern Black Korhaan is a common terrestrial Karoo breeding species and although they may potentially use the site as breeding habitat normal farm operations and livestock movement would have probably excluded them from breeding

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<sup>1</sup> Due to the extent of overlap of breeding seasons of avifaunal species listed in Appendix 3 of the February 2012 report (Harebottle 2012), the data presented could have been interpreted as precluding construction from occurring at any time of the year.

on site. There is sufficient additional habitat in adjacent areas to support breeding pairs and I would assume that they would find suitable areas in these habitats in which to breed.

Based on the above there should be no disturbance and therefore impact to potentially breeding priority species. This said, there are likely to be non-priority Karoo species breeding (e.g. Rufous-eared Warbler, Eastern Clapper Lark, Spike-heeled Lark) at some time during construction and commission stages (i.e. October – February) but it is most likely that, by that stage, these birds would have moved (due to construction disturbance) to adjacent neighbouring habitat where suitable breeding habitat is available.

However, in light of a lack of evidence for any breeding I would strongly recommend that prior to actual construction (i.e. before roads are constructed, fence-lines erected) that a survey be carried out (by an avifaunal specialist) to assess any breeding activity and make final recommendations and mitigation recommendations, particularly if any priority species are found to be breeding. Although mitigation measures would need to be assessed based on the particular species breeding, location of the nest site and the knowledge and experience of the avifaunal specialist, these could include (a) at the very least demarcating the nest site with a buffer of at least 150 m to make construction workers aware of the breeding activity and to minimise disturbance caused by construction activities, and/or (b) postponing construction until breeding has finished (i.e. the chick or chicks have fledged and all birds have vacated the area); it will be important that the buffer zone allocation and postponement of construction (if required) be done in consultation with the avifaunal specialist, the EAP and the client. If no priority species are found to be breeding then construction can proceed without further mitigation.

#### **Pre- and post-construction monitoring**

At the time of writing my report (Harebottle 2012), best practice guidelines for assessing the impacts of solar power developments on birds (see Smit 2013) were not yet published and as such I made use of the wind energy best practice guidelines that were available (Jenkins *et al.* 2011). Subsequently best practice guidelines have been published for birds and solar energy developments (Smit 2012, Jenkins *et al.* 2015) with detailed recommendations for pre- and post-construction monitoring protocols. These state that pre- and post-construction monitoring for solar developments be based on the size of the development site, the potential impacts of the facility on the avifauna (especially priority species), and the sensitivity of the avifauna to potential impacts. They suggest that smaller, low-impact sites may require shorter survey periods (1-2 days) while larger, high-impact sites may require multi-day surveys, where more intensive monitoring takes place. For the latter they recommend four surveys over a period of twelve months in order to capture seasonal variation and for the potential to overlap with good rainfall events.

Jenkins and Du Plessis (2014) carried out pre-construction avifaunal surveys for Du Plessis Dam PV4 between May 2013 and March 2014 during which they conducted three, two-day surveys over a 10-month period to capture seasonal variation in occurrence and abundance of the avifauna within the impact zone. Their study included Martial Eagle, Ludwig's Bustard and Blue Crane as priority species, but also highlighted the need for monitoring after significant rainfall events as these act as stimuli for influxes of certain species (e.g. larks and sparrow-larks). Such episodic events could then assume a worse-case impact scenario and provide a baseline for future climatic and environmental conditions affecting bird populations in the area (Jenkins and Du Plessis 2014). They recommended that post-construction monitoring be carried out at the same frequency and intensity as the pre-construction monitoring.

The February report (Harebottle 2012) describes the overall impact of impacts of Du Plessis PV4 Solar as being of 'Medium' magnitude where there is likely to be some impact on bird populations

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but with low-medium risk to the general avifaunal community. Based on this, and the size of the PV footprint, any additional pre-construction and post-construction monitoring at Du Plessis PV4 Solar need not cover multi-day surveys. Jenkins and Du Plessis's (2014) report stipulates that post-construction surveys should duplicate their pre-construction monitoring in order to properly assess the 'before and after' scenario and as such this would allow for two-day survey periods.

Given the list of priority species for PV4, the results from Jenkins and du Plessis (2014) and general lack of information on potential impacts of PV solar farms on birds, I would suggest the following pre- and post-construction monitoring protocol for Du Plessis PV4 Solar:

- Carry out a survey in May 2016, if possible, to compare with May 2013 results obtained from Jenkins and Du Plessis (2014). This would serve as a final 'ad-hoc' pre-construction survey before commencement of construction of the PV facility.
- Conduct three post-construction surveys to align with the recommendations in Jenkins and Du Plessis (2014) where surveys take place at the same time of year and carried out by the same observers; this would be the preferred option and would mean that surveys would then be carried out in May 2017, August 2017 and March 2018. However, given the timeframes for construction of the PV4 facility (R. Holland *in litt.*), and impact magnitude, I would suggest reducing the post-construction monitoring to two surveys, one during winter 2017 (sometime between May-July) followed by a summer survey in 2018 (sometime between January-March). This would still allow comparisons to be made with Jenkins and Du Plessis (2014) and provide sufficient data for an adequate pre- and post-analysis. I would, however, strongly suggest that these recommendations be discussed with Andrew Jenkins and Johan Du Plessis before any final decisions are taken since they conducted the pre-construction monitoring and would be more familiar with the site, landscape elements and the avifauna.
- All surveys, regardless of the frequency, should be carried out/replicated based on field and analytical methods described in Jenkins and Du Plessis (2014).

**NOTE:** Should the May 2016 survey be logistically impossible to carry out, then I would further recommend that the preferred option of three post-construction surveys be adopted to align with the recommendations of Jenkins and Du Plessis (2014).

## References

- Harebottle D.M. 2012. Construction of three photovoltaic energy facilities near De Aar, Northern Cape. Avifaunal Impact Assessment. Unpublished report to Aurecon (Pty) Ltd.
- Jenkins, A.R., van Rooyen, C.S., Smallie J.J., Anderson M.D. and Smit, H. 2011. Best practice guidelines for monitoring and impact mitigation at wind energy development sites in southern Africa. Endangered Wildlife Trust/BirdLife South Africa, Johannesburg.
- Jenkins, A.R. and Du Plessis J. 2014. Du Plessis Dam Solar PV Development Area: Pre-construction bird monitoring. Unpublished report. Avisense Consulting, Cape Town.
- Jenkins, A.R., Ralston S. and Smit-Robinson, H. 2015. Birds and Solar Energy: Best practice guidelines.
- Smit H.A. 2013. Guidelines to minimise the impact on birds of Solar Facilities and associated infrastructure in South Africa. Birdlife South Africa, Johannesburg.
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D. M. Harebottle

Dr Doug Harebottle

28 March 2016

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## **METHOD STATEMENT**

**CONTRACT:**                      **DATE:** \_\_\_\_\_

**PROPOSED ACTIVITY** (give title of method statement and reference number from the EMP):

**WHAT WORK IS TO BE UNDERTAKEN** (give a brief description of the works):

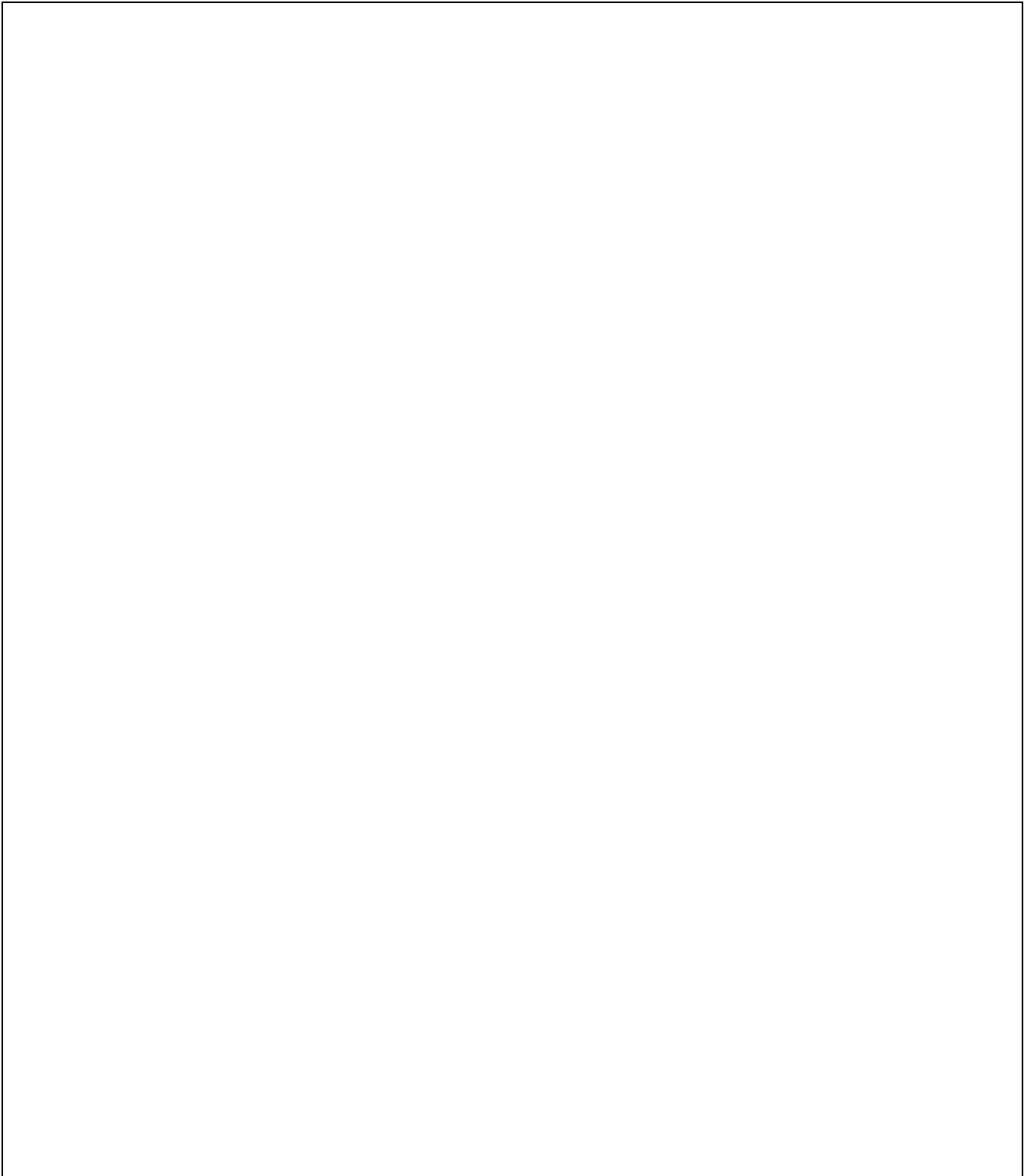
**WHERE ARE THE WORKS TO BE UNDERTAKEN** (where possible, provide an annotated plan and a full description of the extent of the works):

**START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:**

Start Date:

End Date:

**HOW ARE THE WORKS TO BE UNDERTAKEN** (provide as much detail as possible, including annotated maps and plans where possible):



**Note:** please give too much information rather than too little. Please ensure that issues such as emergency procedures, hydrocarbon management, wastewater management, access, individual responsibilities, materials, plant used, maintenance of plant, protection of natural features etc are covered where relevant

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## DECLARATIONS

### 1) RESPONSIBLE OFFICER (ECO/ ESO)

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

\_\_\_\_\_  
(signed) (print name)

Dated: \_\_\_\_\_

### 2) PERSON UNDERTAKING THE WORKS (Contractor)

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the ECO/ ESO will audit my compliance with the contents of this Method Statement. I understand that this method statement does not absolve me from any of my obligations or responsibilities in terms of the Contract.

\_\_\_\_\_  
(signed) (print name)

Dated: \_\_\_\_\_

### 3) EMPLOYER (*i.e.* Developer/ Owner/Project manager)

The works described in this Method Statement are approved.

\_\_\_\_\_  
(signed) (print name) (designation)

Dated: \_\_\_\_\_