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# PROPOSED ESTABLISHMENT OF THE MIDDLEBURG SOLAR PARK 1 EASTERN CAPE PROVINCE

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## CONSTRUCTION & OPERATION DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the Draft Basic Assessment Report  
March 2012

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## PROJECT DETAILS

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## DEFINITIONS AND TERMINOLOGY

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**Alternatives:** Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

**Cumulative impacts:** Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

**Direct impacts:** Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

**'Do nothing' alternative:** The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

**Endangered species:** Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

**Endemic:** An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

**Environment:** the surroundings within which humans exist and that are made up of:

- i. The land, water and atmosphere of the earth;
- ii. Micro-organisms, plant and animal life;
- iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

**Environmental impact:** An action or series of actions that have an effect on the environment.

**Environmental impact assessment:** Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

**Environmental management:** Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

**Environmental management programme:** An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

**Heritage:** That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

**Indigenous:** All biological organisms that occurred naturally within the study area prior to 1800

**Indirect impacts:** Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

**Interested and affected party:** Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

**Photovoltaic cell:** Semiconductors which absorb solar radiation to produce electricity

**Photovoltaic effect:** Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

**Rare species:** Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically

Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

**Red data species:** Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

**Renewable energy feed-in tariff:** REFITs are used to promote renewable energy and have been adopted in over 36 countries worldwide. The establishment of the REFIT in South Africa provides the opportunity for an increased contribution towards the sustained growth of the renewable energy sector, and to promote competitiveness between renewable and conventional energies in the medium and long-term. Under the National Energy Regulator Act (Act No. 40 of 2004), the Electricity Regulation Act (Act No. 4 of 2006), and all subsequent relevant amendment acts, the National Energy Regulator of South Africa (NERSA) has the mandate to determine the prices at and conditions under which electricity must be supplied by licence.

**Significant impact:** An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

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## PURPOSE & OBJECTIVES OF THE EMP

## CHAPTER 1

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An Environmental Management Programme (EMP) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced”<sup>1</sup>. The objective of this EMP is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMP is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the PV plant. An effective EMP is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMP provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, revegetation) and operation.

The EMP has been developed as a set of environmental specifications (i.e. principles of environmental management for the proposed Middleburg Solar Park 1), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation). During its lifecycle, projects journey through four distinctive phases, i.e. construction, rehabilitation, operation, and decommissioning. The EMP is accordingly separated into measures dealing with the various project phases.

The EMP has the following objectives:

- » To outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation, and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the PV Plant.

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<sup>1</sup> Provincial Government Western Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005



- » To ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- » To identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- » To propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
- » To facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the Basic Assessment process.

The mitigation measures identified within the Basic Assessment process are systematically addressed in the EMP, ensuring the minimisation of adverse environmental impacts to an acceptable level.

ACED (Pty) Ltd must ensure that the implementation of the project complies with the requirements of any environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and the implementation of the EMP through its integration into the contract documentation. Since this EMP is part of the Basic Assessment process undertaken for the proposed Middleburg Solar Park 1, it is important that this document be read in conjunction with the Basic Assessment Report, as well as the Environmental Authorisation (once issued). This will contextualise the EMP and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMP for construction and operation activities has been compiled in accordance with Section 33 of the EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project.

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractor's obligations in this regard include the following:

- » Ensuring that employees have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors are given some form of Environmental Awareness Training. This training

must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.

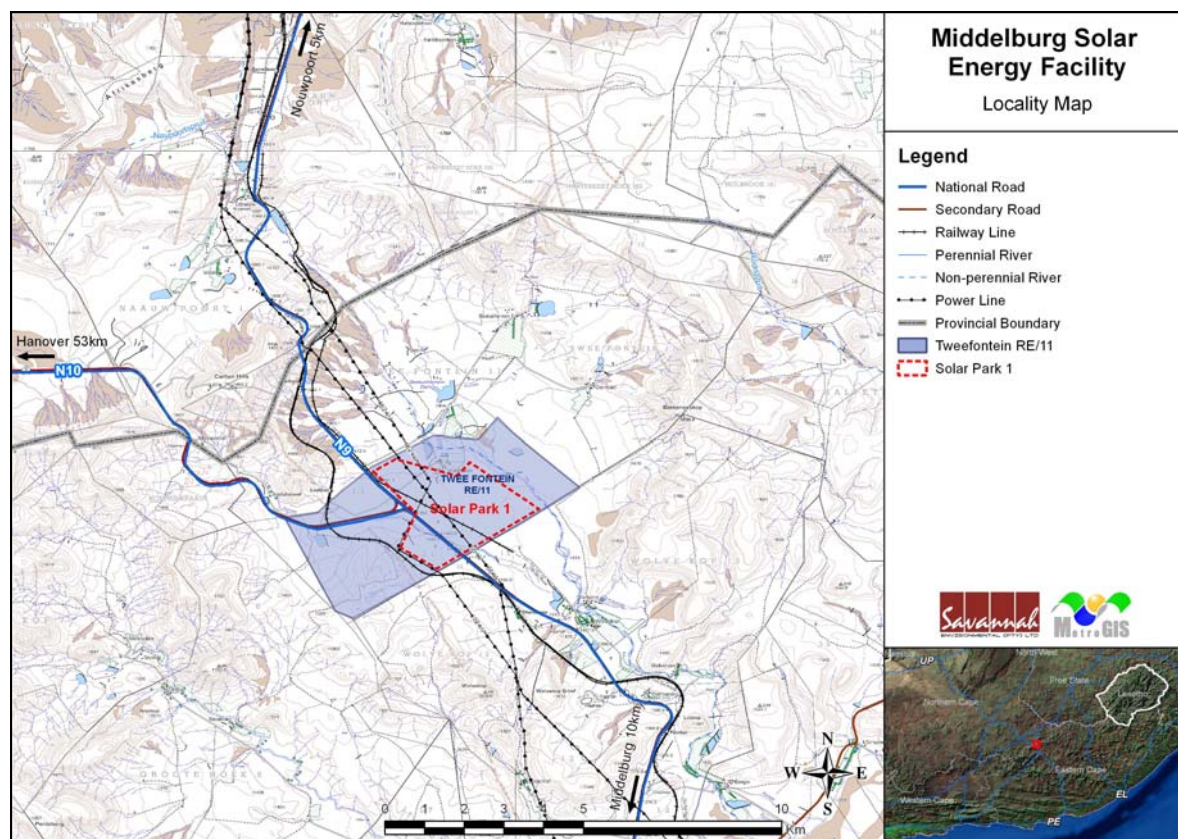
- » Ensuring awareness of any other environmental matters, which are deemed necessary by the Environmental Control Officer (ECO).

The EMP is a dynamic document, which must be updated when required. It is considered critical that this draft EMP be updated to include site-specific information and specifications as required throughout the life-cycle of the facility. This will ensure that the project activities are planned and implemented taking sensitive environmental features into account.

**PROJECT DETAILS**

**CHAPTER 2**

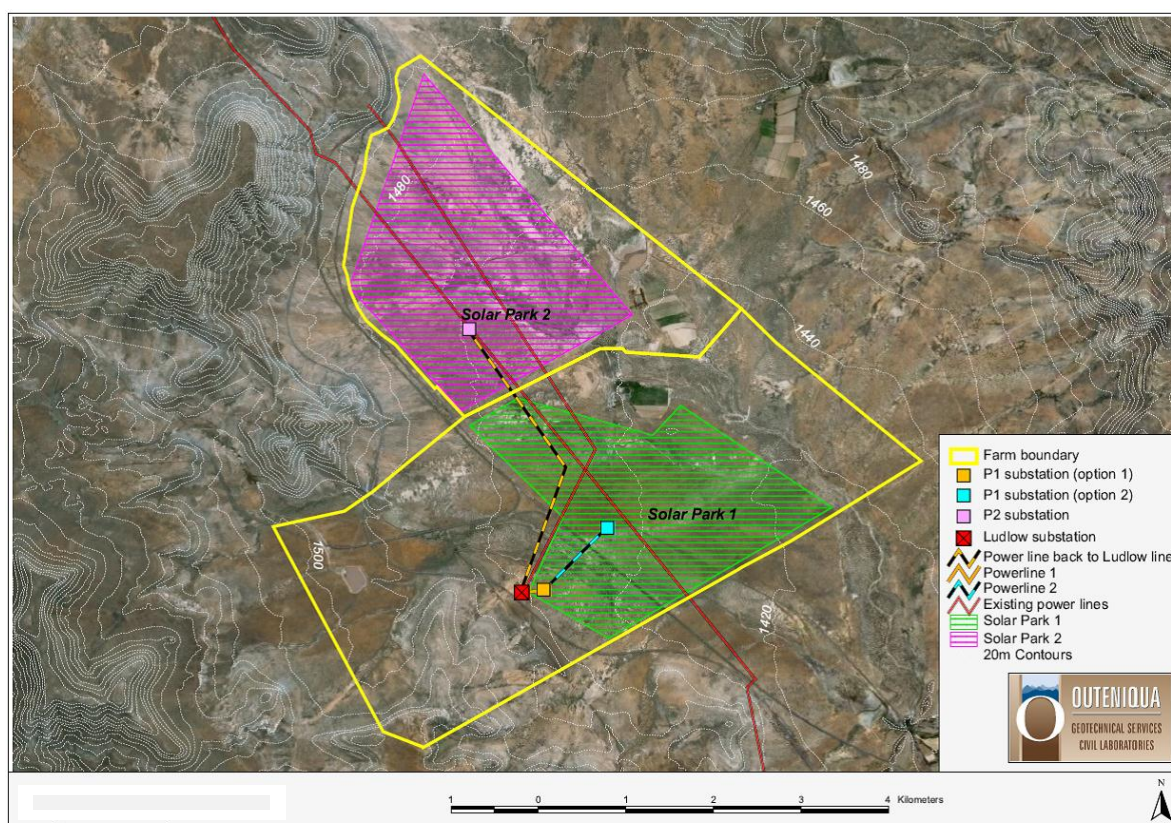
African Clean Energy Developments (Pty) Ltd (ACED) is proposing the development of a commercial Photovoltaic (PV) Solar Energy Facility on a site located approximately 20 km north of Middelburg (Eastern Cape Province) and ~14 km south of Noupoort (Northern Cape Province). The project is referred to as the **Middleburg Solar Park 1**. This site was previously investigated by ACED for the establishment of a wind energy facility (the Flagging Tress project), but has proven to be unfeasible for this technology due to the limited wind resource measured on the site. However, the site has proven to be potentially viable for the development of a PV solar energy facility. . The Middleburg Solar Park 1 will be operated by a Special Purpose Vehicle (SPV) to be established for the project. The Middleburg Solar Park 2 is a separate ACED project which is proposed adjacent to the Middleburg Solar Park 1. Separate Environmental Authorisations and Basic Assessment reports have been prepared for each Solar Park, However, a single public involvement process being undertaken as the sites are adjacent two to one another. ***This draft EMP only deals with the Middleburg Solar Park 1. Solar Pak 2 is dealt with in a separate Basic Assessment Report (DEA Ref. No: 12/12/20/2465/1).***



**Figure 1:** Locality Map showing the Middleburg Solar Park 1

Ancillary infrastructure includes an overhead 132kV power line feeding into the Eskom electricity network via the Ludlow substation, workshop, storage areas as well as a temporary contractor's equipment camp. Two technically feasible grid connection options (refer to **Figure 2**) are being considered, and are as follows

- Grid connection Option 1: This option includes a new substation (132kV) to be located next to the existing Ludlow substation and will have short (~210 m) 132 kV power line running back to Ludlow substation.
- Grid connection Option 2: This option includes 2 new substations (132kV) with a 132 kV lines (~1 km in length) running back to Ludlow.



**Figure 2:** Grid connection options for the site

The preferred grid connection option will be selected based on Eskom's requirements.

Access to the site already exists via the N9. However, internal gravel access roads (3 to 5 metres wide) will be constructed on the site as access servitudes.

Infrastructure associated with each PV facility will include:

- » Arrays of photovoltaic panels (roughly 340-350 PV panels (82 MWp) will be required);
- » Mounting structures to support the PV panels;
- » Cabling between the project components, to be lain underground where practical;
- » Invertors;



- » Building a 132kV substation and up to two 132kV overhead power lines to connect into the existing Ludlow substation which is located on the site.
- » Internal access roads; and
- » Office building / workshop.

These components of the PV Facility are discussed in more detail below:

- » Photovoltaic panels: A photovoltaic (PV) cell is made of silicone which acts as a semiconductor used to produce the photovoltaic effect. Individual PV cells are linked and placed behind a protective glass sheet to form a photovoltaic panel.
- » The Support Structure: The PV panels will be fixed to a support structure set at an angle so to receive the maximum amount of solar radiation. The angle of the panel is dependent on the latitude of the proposed facility and the angles may be adjusted to optimise for summer or winter solar radiation characteristics.
- » Cables between the PV panels: Underground cables from the arrays of panels will feed into the invertors.
- » Inverters: The photovoltaic effect produces electricity in direct current. Therefore an inverter must be used to change it to alternating current. Approximately 132 invertors will be required for the 75 MW facility.
- » Substation (132 kV and 150 x 200m)
- » Two 132kV overhead power lines (servitude width of 35m each)
- » Internal access roads: (between 3- 5m wide)
- » Office / Workshop: The workshop area (13-20m long, 6-12m wide, 3-4m high) will be used for storage and employees during the operational life of the facility.

A summary of the technical specification of the PV Facility is shown below.

<b>PV Technology</b>	<b>mono-axis tracker</b>
Installed capacity	75 MW
Panel Spec	Tier 1 Panels
Panel Dimensions	1665 x 991 x 50 mm (240W)
Number of Panels	341.880 (82 MWp)
Number of inverters	132
Distribution Transformers	66 (1250 kVA)
Main Transformer capacity	80 MVA
Final Height of installed panels from ground level	7 m
Height of inverters	2.15 m
Height of Transformers	2.15 m
Height of Buildings	3.10 m
Height of Fencing	2.20 m
<b>Total area used for the plant</b>	<b>~ 350 Hectares</b>

The entire farm portion will not be used for the PV facility and the actual area to be occupied by the PV Facility will be roughly 37 – 40 % of the farm portion (i.e. 512 hectares of a broader study area of 1392 hectares).

The PV panels are designed to operate continuously for more than 20 years, unattended and with low maintenance.

### **1.1 Construction of a PV Facility:**

In order to construct the proposed PV solar energy facility and associated infrastructure, a series of activities will need to be undertaken. The construction process is discussed in more detail below.

#### ***a) Conduct Surveys***

Prior to initiating construction, a number of surveys will be required including, but not limited to, a geotechnical survey, a site survey and, survey of substation site and road servitudes.

#### ***b) Establishment of Access Roads to the Site***

Access to the site (directly from the N9 onto gravel farm access roads) will be required. Within the site itself, access will be required to the individual facility components for construction purposes (and later limited access for maintenance). Upgrade of access roads within the site will be required and new access roads will be required. Access track construction would normally comprise of compacted rock-fill with a layer of higher quality surfacing stone on top. The strength and durability properties of the rock strata at the proposed site are not known at this stage; this will need to be assessed via a geotechnical study to be conducted by the project proponent. Depending on the results of these studies, it may be possible, in some areas, to strip off the existing vegetation and ground surface and level the exposed formation to form an access track surface. The final layout of the access roads will be determined following the identification of site related sensitivities.

#### ***c) Undertake Site Preparation***

Site preparation activities will include clearance of vegetation at the footprint of each support structure, if required. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.

#### ***d) Transport of Components and Equipment to Site***

The components and equipment required for the construction of the proposed facility will be brought to site in sections by means of national and provincial roads and then proposed internal access road. Some of the components (i.e. transformer) may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)<sup>2</sup> by virtue of the dimensional limitations (i.e. weight).

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<sup>2</sup> A permit will be required for the transportation of these abnormal loads on public roads.

Typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the upgrade of the substation and site preparation.

**e) Establishment of Laydown Areas on Site**

Laydown and storage areas will be required for the typical construction equipment which will be required on site.

**f) Erect PV Cells and Construct Substation & Invertors**

The PV cells will be arranged in arrays. The frames will be fixed onto the ground with the use of concrete / rammed into the ground, depending on the soil conditions, depending on the soil conditions at the site. This will make the installation of the plant less invasive for the territory and facilitate the decommissioning at the end of its production cycle. The height of the PV panel structure will be up to 7 m.

Inverters will be installed to facilitate the connection between the solar energy facility and the Eskom electricity grid via the Ludlow substation (which is located on the site). The position of the inverters within the footprint of the broader site will be informed by the final positioning of the PV components.

**g) Establishment of Ancillary Infrastructure (Power line, office and on-site substation)**

Ancillary infrastructure includes an overhead 132kV power line feeding into the Eskom electricity network via the existing power line which located on the site to feed into the Ludlow substation, workshop, storage areas as well as a temporary contractor's equipment camp. Two feasible grid connection options are being considered, and are as follows

- Grid connection Option 1: This option includes a new substation (132kV) to be located next to the existing Ludlow substation and will have short (~210 m) 132 kv power line running back to Ludlow substation.
- Grid connection Option 2: This option includes 2 new substations (132kV) with a 132 kV lines (~1 km in length) running back to Ludlow.

*Note that the final grid connection will depend on Eskom these two options are both feasible potential connections (these are NOT alternative options).*

The establishment of ancillary infrastructure will require the clearing of vegetation and levelling of the development site and the excavation of foundations prior to construction. A laydown area for building materials and equipment associated with these buildings will also be required.

**h) Undertake Site Rehabilitation**

Once construction is completed and once all construction equipment is removed, the site must be rehabilitated where practical and reasonable. On full commissioning of

the facility, any access points to the site which are not required during the operational phase must be closed and rehabilitated.

### **1.2 Operation Phase**

The electricity that is generated from the PV panels will be stepped up through the on-site inverters and feed into the Eskom Ludlow Substation which is located on the site, via overhead cables.

It is anticipated that a full-time security, maintenance and control room staff will be required on site. Each component within the solar energy facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions or maintenance activities. Maintenance activities for the PV plant will include cleaning of the PV Panel's (using water), trimming of vegetation (underneath the panels) and maintenance of the infrastructure. Water will be required for cleaning the PV panels, as and when needed to remove dust that may collect on the panels. ACED is looking into purchasing water from the relevant Local Municipality to supply water for the cleaning of the panels over the life of the solar park.

### **1.3 Decommissioning Phase**

The solar energy facility is expected to have a lifespan of more than 20 years (with maintenance) and the power plant infrastructure would only be decommissioned once it has reached the end of its economic life. If economically feasible/desirable the decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology/ infrastructure available at that time. However, if not deemed so, then the facility would be completely decommissioned which would include the following decommissioning activities.

#### ***a) Site Preparation***

Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment (e.g. lay down areas) and the mobilisation of decommissioning equipment.

#### ***b) Disassemble Components***

The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

#### ***c) Rehabilitation***

Disturbed area (where infrastructure has been removed) will be rehabilitated, if required, depending on the future land-use of the facility.

In terms of sections 24 and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the EIA Regulations of GN R543 – R546, a Scoping and EIA



process is required to be undertaken for the proposed project. However based on the motivation supplied to the National Department of Environmental Affairs (DEA) in terms of GN R543 20(4), a **downscaling** from a full EIA to a Basic Assessment was approved for the proposed project and therefore a **Basic Assessment process** is being undertaken for the proposed project. The project has been registered with the DEA as the **competent authority** under the following application reference number: **12/12/20/2465/2**.

## 2.1. Summary of Impacts and Finding of the Basic Assessment Report

Savannah Environmental has been appointed as the independent environmental consultants to undertake the Environmental Basic Assessment to identify and assess any potential environmental impacts. As part of these environmental studies, interested and affected parties (I&APs) have been actively involved through a public involvement process.

In terms of the findings of the Basic Assessment, various planning, construction, and operation-related environmental impacts were identified, including:

- » Potential impacts on heritage resources;
- » Social impacts;
- » Potential impacts on soil; and
- » Ecological disturbances.

A summary of the assessment conclusions for the proposed development site is provided below. In doing so, it draws on the information gathered as part of the Basic Assessment process and the knowledge gained by the environmental consultants during the course of the process and presents an informed opinion of the environmental impacts associated with the proposed project, in no particular order:

- » The area is of a **medium-high heritage and cultural sensitivity**. The heritage impacts will be of a medium significance. There are 20 heritage sites / artefacts that have been identified as part of this assessment. These heritage artefacts are from the Stone Age and Middle Stone Age. They have been given a Grade III rating in terms of the NHR Act 25 of 1999, which means mitigation against negative impacts (damage) is required, along with a permit (from SAHRA) for removal of those artefacts which cannot be avoided.
- » **Soil degradation (erosion)** has been identified as potentially significant for this site in the absence of erosion control. The soils on the site are susceptible to erosion and areas of high erosion and erosion control during construction and operational is essential, after which the **impact on soils is rated as a low significance**.

- » The site has been given a ranking of a **medium ecological sensitivity** (in terms of the vegetation, habitats that the site supports currently, animals, drainage areas and soils that occur on the site).
- » The agricultural potential of the site is low and therefore the **impact on existing livestock** grazing on the site **is low, on a regional scale**.
- » Social impacts include both positive (job creation) impacts and negative social impacts (community risks. Enhancement measures to increase positive impacts and mitigation measures to decrease negative impacts have been proposed in this report. **Social impacts** have been rated as having **medium-low significance**. **Visual impacts** mainly from the PV panels and powerline will be of a **moderate significance**, with the recommendation of the use of landscaping and visual screening, where feasible.

The establishment of the facility will have positive benefits as the integration of an additional 75 MW may alleviate the pressure on the local grid to a small extent and would contribute (albeit small) to the national target for renewable energy.

There are no insurmountable environmental or social constraints that prevent the establishment of the proposed Middleburg Solar Park 1. However, several sensitive areas / features were identified on the site, and are contained within this basic assessment report and are highlighted below. The following environmental and/ social features have been identified for the proposed project, which requires specific environmental management action (as part of the EMP), in keeping with the principles of sustainable development, and balancing environmental, social and economic needs (features which could be mapped these features are shown on **Figure 3 -4**).

SENSITIVE FEATURE	IMPLICATIONS FOR PROJECT IMPLEMENTATION TO BE INCLUDED IN EA
1. There are 20 heritage sites / artefacts that have been identified as part of this assessment. These are shown in Figure 3. These heritage artefacts are from the Stone Age and Middle Stone Age. They have been given a Grade III rating in terms of the NHR Act 25 of 1999, which means mitigation against negative impacts (damage) is required, along with a permit for removal of these artefacts (from SAHRA).	<ul style="list-style-type: none"> <li>» A professional archaeologist (with an already authorised collection permit) must be appointed during the various phases of development including vegetation clearing and the excavation activities to monitor and identify possible archaeological material remains and features that may occur below the surface and further make appropriate recommendations on removing and / or protecting the archaeological material remains and features.</li> <li>» A permit from SAHRA is required for the</li> </ul>

SENSITIVE FEATURE	IMPLICATIONS FOR PROJECT IMPLEMENTATION TO BE INCLUDED IN EA
	removal or destruction of heritage artefacts as identified in the basic assessment report.
2. Areas of high soil erosion sensitivity on the site (shown in Figure 4).	Erosion control measures (as contained in the EMP) will have to be implemented during the construction of the PV facility and erosion to be monitored during the operational life of the facility.
3. Watercourses and drainage areas: this represents a number of ecological processes including groundwater dynamics, hydrological processes, nutrient cycling and wildlife dispersal. These are shown in Figure 5.	Areas of high ecological sensitivity require mitigation measures during construction to avoid negative impacts on ecology, and to be contained in the EMP.
4. Potential occurrences of populations of Red List plant species (one plant species of conservation concern that could occur in habitats that are available in the study area and that has been previously recorded nearby is <i>Boophane disticha</i> ) that have been evaluated as having a chance of occurring within remaining natural habitats within the study area. Potential habitats range occur the entire site, with focus on high ecological sensitivity – as Shown in Figure 6.	Areas of high ecological sensitivity (that may provide habitat for <i>Boophane disticha</i> ) require mitigation measures during construction to avoid negative impacts on ecology, and to be contained in the EMP.
5. Visual Impacts on the rural landscape	<ul style="list-style-type: none"> <li>» Consider the use of visual screening.</li> <li>» Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site. This measure will give some distance between the facility footprint and the visual receptors</li> </ul>
6. Job creation during construction and operations / decommissioning.	» Job creation needs to be managed in order to enhance this positive impact, during construction and operations, via various mechanism as proposed in the impact assessment above and EMP.

<b>SENSITIVE FEATURE</b>	<b>IMPLICATIONS FOR PROJECT IMPLEMENTATION TO BE INCLUDED IN EA</b>
	<ul style="list-style-type: none"><li>» Mitigation measures to ensure safety and security of the site, surrounding landowners and properties must be in place, during construction and options of the facility.</li><li>» ACED, should consider the need for the establishment of a Monitoring Forum (MF) for the construction phase.</li></ul>

The construction of the proposed Middleburg Solar Park 1 should be implemented according to this EMP to adequately mitigate and manage potential impacts associated with construction activities. The construction activities and relevant rehabilitation of disturbed areas should be monitored against the approved EMP, the Environmental Authorisation and all other relevant environmental legislation.

The EMP has been developed based on the findings of the Basic Assessment, and must be implemented to protect sensitive on-site and off-site features through controlling construction and operation activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts.

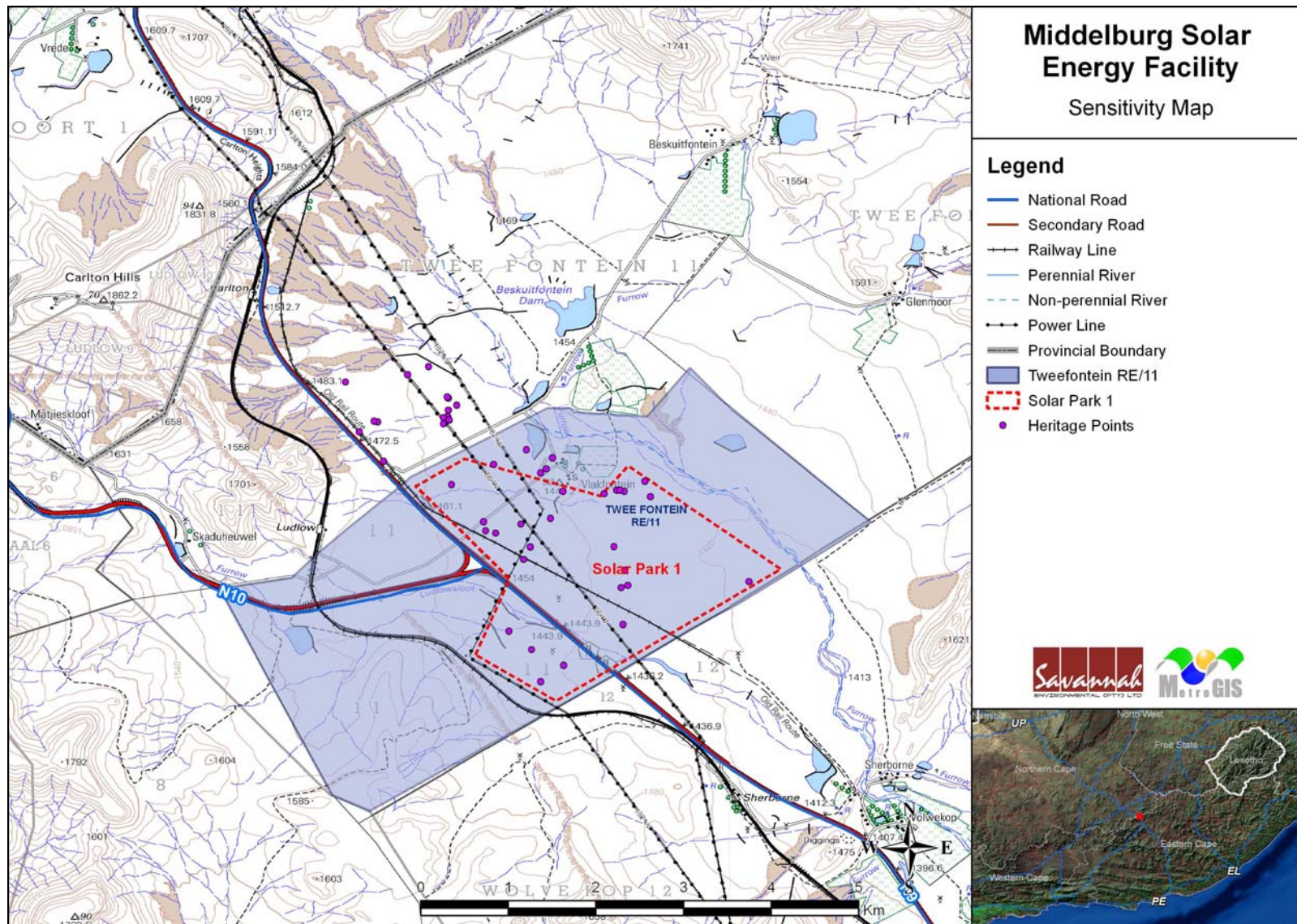


Figure 3: Grade III Heritage Artefacts located on the site



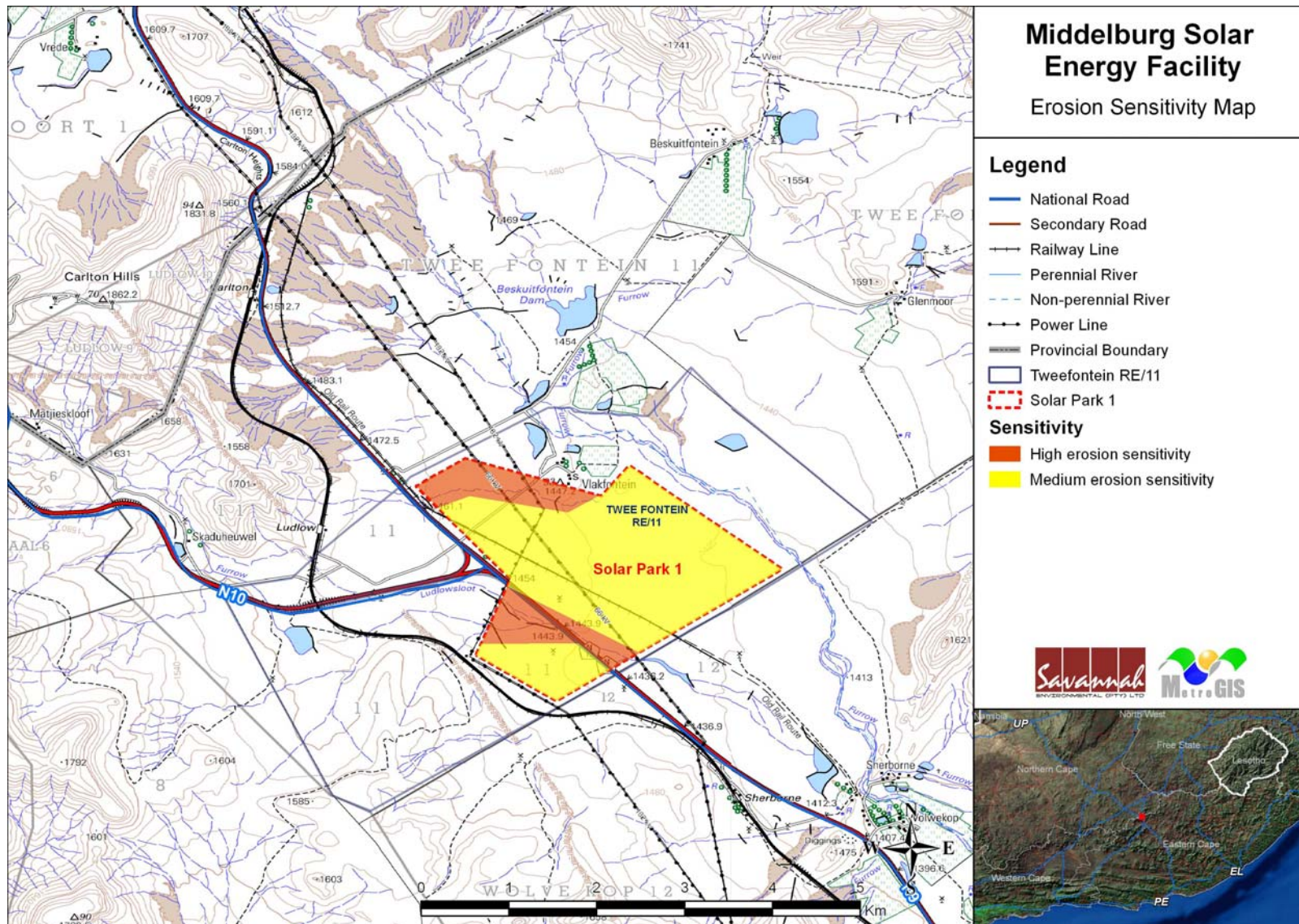
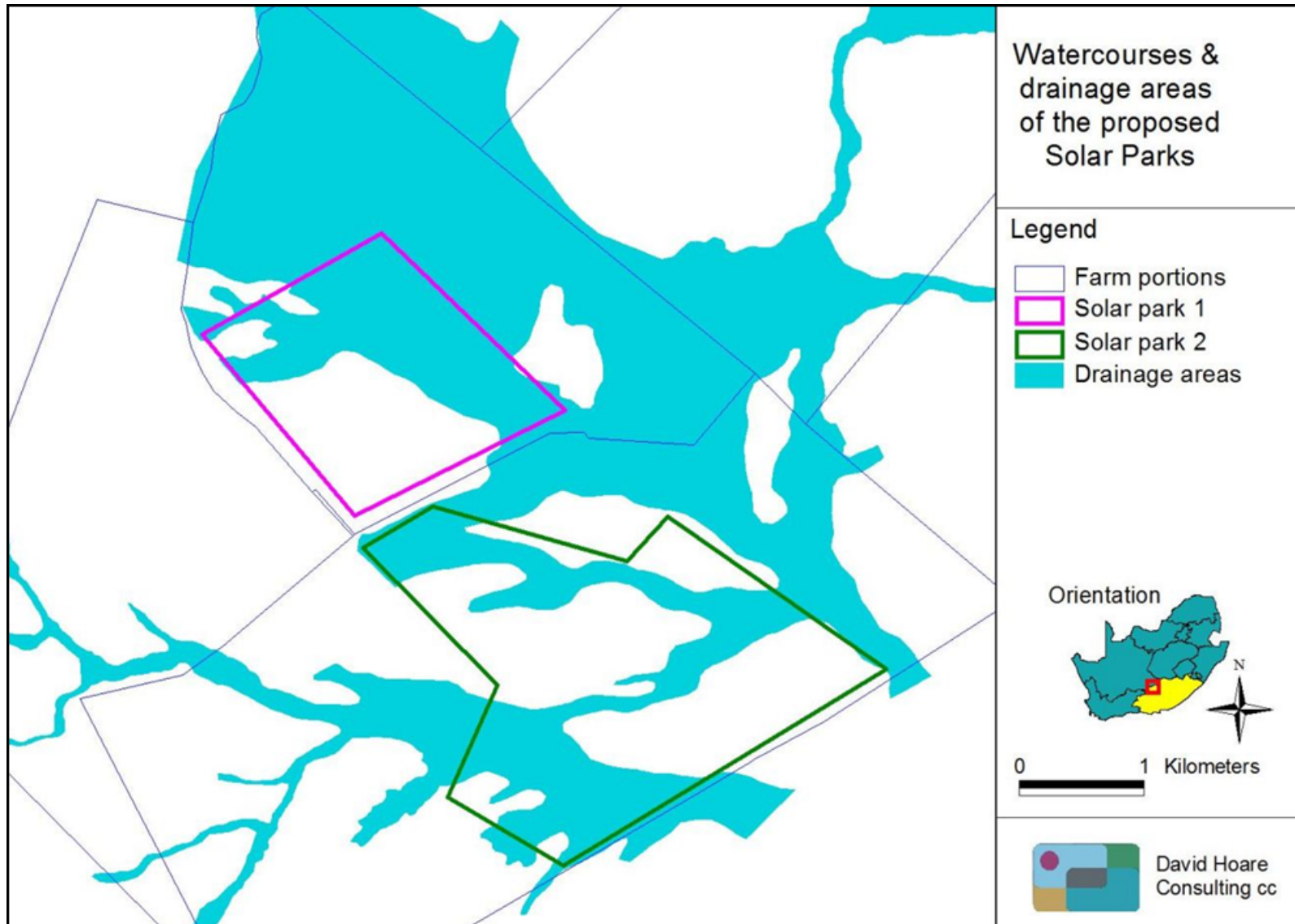
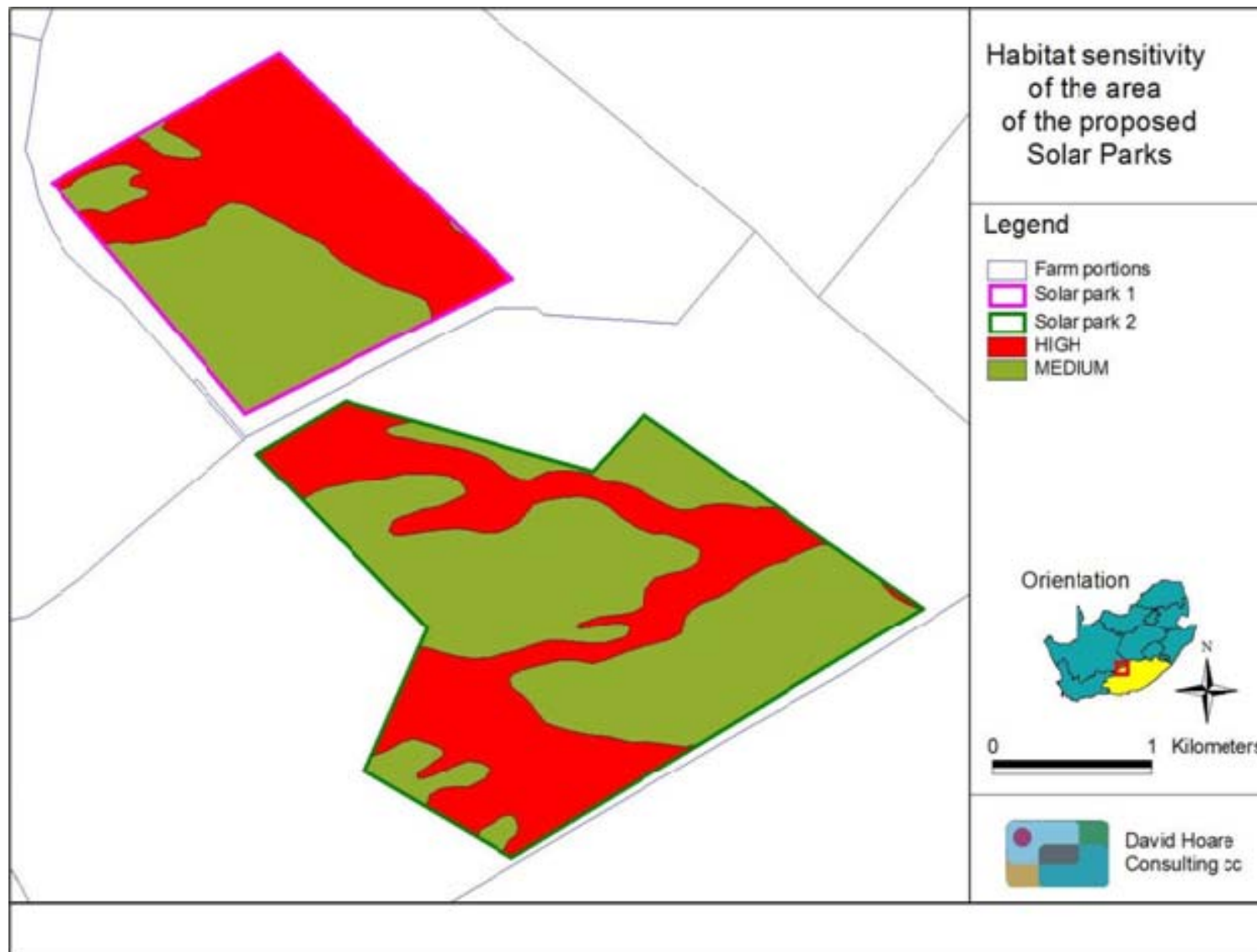


Figure 4: Erosion Sensitivity Map for the site



**Figure 5:** Drainage areas on the site and surrounding / broader study area





**Figure 6:** Ecological Habitat sensitivity of the site



## 2.2 Activities and Components associated with the PV Plant

The main activities/components associated with the Middleburg Solar Park 1 plant are detailed in Table 2.1.

**Table 2.1:** Activities Associated with Planning, Construction, Operation and Decommissioning of the PV Plant

Main Activity/Project Component	Components of Activity	Details
<b>Planning</b>		
Conduct technical surveys	Geotechnical survey by geotechnical engineer: <ul style="list-style-type: none"> <li>» Site survey and confirmation of the infrastructure micro-siting footprint.</li> <li>» Install dust monitors to measure the quantity of fall out dust present in the site</li> </ul>	<ul style="list-style-type: none"> <li>» All surveys are to be undertaken prior to initiating construction.</li> <li>» Dust and weather monitoring to devices will remain on site before and after</li> </ul>
<b>Construction</b>		
Undertake site preparation	<ul style="list-style-type: none"> <li>» Clearance of vegetation at the infrastructure footprints</li> <li>» Where required, some levelling of the land may occur</li> <li>» Excavation of trenches for underground cables.</li> <li>» Establishment of internal access roads (permanent and temporary roads)</li> </ul>	<ul style="list-style-type: none"> <li>» These activities will require the stripping of topsoil, which will need to be appropriately stockpiled for use in rehabilitation.</li> </ul>
Construction of internal access roads	<ul style="list-style-type: none"> <li>» Construct 3 to 5 meter wide gravel roads around the site</li> </ul>	<ul style="list-style-type: none"> <li>» The proposed internal access roads will be comprised of gravel tracks or compacted rock-fill.</li> </ul>
Construct infrastructure foundations and substation	<ul style="list-style-type: none"> <li>» Concrete platforms will be constructed for the invertors and transformers.</li> </ul>	<ul style="list-style-type: none"> <li>» The concrete foundation will be poured and will then be left for up to a week to cure.</li> </ul>
Transport of components and equipment to site	<ul style="list-style-type: none"> <li>» Trucks will be used to transport all components to site:                             <ul style="list-style-type: none"> <li>* The normal civil engineering construction equipment for the civil works (e.g. trucks,</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>» The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.</li> </ul>

Main Activity/Project Component	Components of Activity	Details
	graders, compaction equipment, cement mixers, etc.).	
Establishment of PV panels	<ul style="list-style-type: none"> <li>» PV panels are transported in containers.</li> <li>» The steel structures will be assembled on site.</li> </ul>	<ul style="list-style-type: none"> <li>» The steel mounting structures, manufactured in South Africa, are custom made for the site. They are assembled on site</li> </ul>
Connection of PV panels to the substation	<ul style="list-style-type: none"> <li>» The PV panels will be connected to the onsite substation via underground cabling (where practical).</li> </ul>	<ul style="list-style-type: none"> <li>» The installation of these underground cables will require the excavation of trenches of approximately 400 mm – 1000 mm cm deep within which they can then be laid.</li> </ul>
Connect substation to the grid	<ul style="list-style-type: none"> <li>» The electricity is proposed to be evacuated into the Ludlow substation which is located on the site.</li> </ul>	<ul style="list-style-type: none"> <li>» Underground cables (2m deep) will run to the on-site substation, then via an overhead power line connect into Ludlow substation which is located on the site).</li> </ul>
Undertake site rehabilitation	<ul style="list-style-type: none"> <li>» Remove all construction equipment from the site.</li> <li>» Rehabilitation of temporarily disturbed areas where practical and reasonable.</li> </ul>	<ul style="list-style-type: none"> <li>» On full commissioning of the facility (or a phase thereof), any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.</li> </ul>
<b>Operation</b>		
Operation	<ul style="list-style-type: none"> <li>» PV panels</li> <li>» Associated infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>» The operational phase is proposed to run for a period of approximately 20 - 30 years.</li> <li>» During this time a full time security, maintenance, supervision, and monitoring teams will be required on site.</li> <li>» The PV facility will be operational during daylight hours only but not under circumstances of mechanical breakdown, or maintenance activities.</li> <li>» No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed.</li> </ul>

Main Activity/Project Component	Components of Activity	Details
Maintenance & Security	<ul style="list-style-type: none"> <li>» Maintenance during the life cycle of the facility would include emergency repairs, routine panel maintenance, routine maintenance of medium voltage equipment and maintenance of the site.</li> </ul>	<ul style="list-style-type: none"> <li>» The panels will be cleaned with water.</li> <li>» 24 hour on-site security, 3m high perimeter fencing, CCTV cameras and 5m high lighting to light up the site at night.</li> </ul>
<b><i>Decommissioning</i></b>		
Site preparation	<ul style="list-style-type: none"> <li>» Preparation of the site</li> <li>» Mobilisation of construction equipment</li> </ul>	<ul style="list-style-type: none"> <li>» Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to continue, existing components may be disassembled and replaced with technology/ infrastructure available at that time. However, if the decision is made to decommission the facility the following activities will form part of the project scope.</li> </ul>
Disassemble panels	<ul style="list-style-type: none"> <li>» The panels will be disassembled and removed.</li> </ul>	<ul style="list-style-type: none"> <li>» The components of the plant will be disassembled and removed. Thereafter they will be reused and recycled (where possible) or disposed of in accordance with regulatory requirements.</li> </ul>

## STRUCTURE OF THIS EMP

## CHAPTER 3

The first two chapters provide background to the EMP and the proposed project. The chapters which follow consider the:

- » Planning and design activities
- » Construction activities
- » Operation activities
- » Decommissioning activities

These chapters set out the procedures necessary for ACED to achieve environmental compliance. For each of the phases of implementation for the photovoltaic plant project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions monitoring requirements and performance indicators. A specific environmental management programme table has been established for each environmental objective. The information provided within the EMP table for each objective is illustrated below:

**OBJECTIVE:** Description of the objective, which is necessary in order to meet the overall goals; these take into account the findings of the environmental impact assessment specialist studies

<b>Project component/s</b>	List of project components affecting the objective, i.e.:		
	<ul style="list-style-type: none"> <li>» PV panels</li> <li>» Ancillary infrastructure</li> <li>» Power line</li> </ul>		
<b>Potential Impact</b>	Brief description of potential environmental impact if objective is not met		
<b>Activity/risk source</b>	Description of activities which could impact on achieving objective		
<b>Mitigation: Target/Objective</b>	Description of the target; include quantitative measures and/or dates of completion		
<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>	
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures	for of

<b>Performance Indicator</b>	Description of key indicator(s) that track progress/indicate the effectiveness of the management Programme.
<b>Monitoring</b>	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting.

The objectives and EMP tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

- » Planned activities change (i.e. in terms of the components and/or layout of the facility).
- » Modification to or addition to environmental objectives and targets.
- » Relevant legal or other requirements are changed or introduced.
- » Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

## 6.1. Project Team

This draft EMP was compiled by:

	<b>Name</b>	<b>Company</b>
<b>EMP Compilers:</b>	Ravisha Ajodhapersadh	Savannah Environmental
	Jo-Anne Thomas	Savannah Environmental
<b>Specialists:</b>		
	David Hoare	David Hoare Consulting
	Celeste Booth	Albany Museum
	Rob Gess	Rob Gess Consulting
	Iain Paton	Outeniqua Geotechnical Services
	Lourens Du Plessis	MetroGIS
	Tony Barbour	Tony Barbour Consulting

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes over the past ten (10) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous renewable energy facilities.

## MANAGEMENT PROGRAMME FOR THE PV PLANT: PLANNING & DESIGN

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## CHAPTER 4

### 4.1. Goal for Planning and Design

**Overall Goal for Planning and Design:** Undertake the planning and design phase of the PV plant in a way that:

- » Ensures that the design of the facility responds to the identified environmental constraints and opportunities.
- » Ensures that adequate regard has been taken of any landowner concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the project, including the power line alignment.
- » Enables the photovoltaic plant construction activities to be undertaken without significant disruption to other land uses in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

### 4.2. Objectives

**OBJECTIVE: Ensure that the design of the facility responds to the identified environmental constraints and opportunities**

From the specialist investigations undertaken for the proposed photovoltaic plant development site, no absolute 'no go' areas were identified. However, in terms of environmental constraints/opportunities the following features exist on the site that should be considered during the detailed design or planning phase:

- » There are 20 heritage sites / artefacts that have been identified as part of this assessment. These heritage artefacts are from the Stone Age and Middle Stone Age. They have been given a Grade III rating in terms of the NHR Act 25 of 1999, which means mitigation against negative impacts (damage) is required, along with a permit for removal of these artefacts (from SAHRA).
- » Areas of high soil erosion sensitivity on the site.
- » Watercourses and drainage areas: this represents a number of ecological processes including groundwater dynamics, hydrological processes, nutrient cycling and wildlife dispersal;

- » Potential occurrences of populations of Red List plant species (one plant species of conservation concern that could occur in habitats that are available in the study area and that has been previously recorded nearby is *Boophane disticha*) that have been evaluated as having a chance of occurring within remaining natural habitats within the study area.
- » Visual Impacts on the rural landscape.
- » Job creation during construction and operations / decommissioning.

These environmental and social sensitivities will be addressed in this EMP. However, the detailed design must take into consideration these sensitivities in the layout of the PV facility.

<b>Project component/s</b>	Project components affecting the objective: <ul style="list-style-type: none"> <li>» PV panels</li> <li>» Access roads</li> <li>» Power line</li> <li>» Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	Design fails to respond optimally to the identified environmental considerations
<b>Activities/risk sources</b>	Site layout
<b>Mitigation: Target/Objective</b>	To ensure that the design of the facility responds to the identified environmental constraints and opportunities

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Consider design level mitigation measures recommended by the specialists, especially with respect to Biodiversity, as detailed within the Basic Assessment report and relevant appendices. These recommendations are to be supplemented by information collected during the pre-construction surveys.	Engineering Design Consultant, and ACED	Design phase
A detailed geotechnical investigation is required for the design phase.	ACED	Design phase
Compile a comprehensive stormwater management plan for hard surfaces as part of the final design of the project.	ACED	Design phase
Access roads within the site to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	Engineer	Pre-construction, and construction
Balance technical and financial considerations against environmental constraints and opportunities in finalising the design of key elements.	ACED	Tender design, and design review stage
Consult a lighting engineer in the design and planning	ACED	Planning Stage

Mitigation: Action/control	Responsibility	Timeframe
of lighting to ensure the correct specification and placement of lighting and light fixtures for the facility and the ancillary infrastructure. The following is recommended: <ul style="list-style-type: none"> <li>» Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);</li> <li>» Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;</li> <li>» Making use of minimum lumen or wattage in fixtures;</li> <li>» Making use of down-lighters, or shielded fixtures;</li> <li>» Making use of Low Pressure Sodium lighting or other types of low impact lighting.</li> <li>» Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. ACED/ design consultant Early in the planning phase.</li> </ul>		
Retain a buffer (approximately 30-50m wide) of intact natural vegetation along the perimeter of the development site.	ACED	Planning Stage
If possible, avoidance of drainage lines in the detailed design or apply for a water use licence to DWA.	ACED	Planning Stage

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Design meets objectives and does not degrade the environment.</li> <li>» Design and layouts respond to the mitigation measures and recommendations in the Basic Assessment report.</li> </ul>
<b>Monitoring</b>	Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment report through review of the design by the Project Manager, and ECO prior to the commencement of construction.

<b>Performance Indicator</b>	The design of the facility responds to the identified environmental constraints and opportunities and complies with the requirements of the EMP.
<b>Monitoring</b>	Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment report through review of the design by the Project Manager, and the ECO prior to the commencement of construction.



## MANAGEMENT PROGRAMME FOR PV PLANT: CONSTRUCTION

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## CHAPTER 5

### 5.1. Overall Goal for Construction

**Overall Goal for Construction:** Undertake the construction phase of the PV facility in a way that:

- » Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- » Enables the construction activities to be undertaken without significant disruption to other land uses in the area, in particular concerning farming practices, traffic and road use, and effects on local residents.

### 5.2. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the PV Plant

As the Proponent, ACED must ensure that the implementation of the PV facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMP, and the implementation of the EMP through its integration into the contract documentation. ACED will retain various key roles and responsibilities during the construction of the PV facility. These are outlined below.

**OBJECTIVE:** To establish clear reporting, communication and responsibilities in relation to environmental incident

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Site Manager; Environmental Control Officer and Contractor for the construction phase of this project are as detailed below.

The **Project Manager** will:

- » Ensure that all specifications and legal constraints specifically concerning the environment are highlighted to the Contractor(s) so that they are aware of these.
- » Ensure that ACED and its Contractor(s) are made aware of all stipulations within the EMP.
- » Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.

- » Be fully conversant with the Basic Assessment Report for the project, the EMP, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.

The **Site Manager** (ACED's on-site representative) will:

- » Be fully knowledgeable with the contents of the EIA.
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable with the contents of the Environmental Management Programme.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMP and its implementation.
- » Conduct audits to ensure compliance to the EMP.
- » Ensure there is communication with the Project Manager, the Environmental Control Officer, and relevant discipline Engineers on matters concerning the environment.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- » Confine activities to the demarcated construction site.

The **Environmental Control Officer** (ECO) will be responsible for monitoring, reviewing, and verifying compliance by the Contractor with the environmental specification. Accordingly, the ECO will:

- » Be fully knowledgeable with the contents of the BAR.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
- » Be fully knowledgeable with the contents with the EMP.
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMP is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMP conditions or specifications are not followed then appropriate measures are undertaken to address this.
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- » Ensure that activities on site comply with all relevant environmental legislation.

- » Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMP.
- » Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- » Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- » Ensure that any non-compliance or remedial measures that need to be applied are reported.

**Contractors and Service Providers:** All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- » Ensuring adherence to the environmental management specifications.
- » Ensuring that Method Statements are submitted to the Site Manager, and ECO, for approval before any work is undertaken. Any lack of adherence to this will be considered as non-compliance to the specifications of the EMP.
- » Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
- » Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- » Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
- » Ensuring that a register of all public complaints is maintained.
- » Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMP (i.e. ensure their staff are appropriately trained as to the environmental obligations).

### 5.3. Objectives

In order to meet the goal detailed in Section 5.1 above, the following objectives have been identified, together with necessary actions and monitoring requirements.

#### **OBJECTIVE: Site establishment and securing the site**

Site establishment is the first activity which is to be undertaken within the construction phase. The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable

flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.

<b>Project component/s</b>	Project components affecting the objective: » PV panels and ancillary infrastructure » Power line
<b>Potential Impact</b>	» Hazards to landowners and public » Security of materials
<b>Activities/risk sources</b>	Movement of construction vehicles in the area and on-site
<b>Mitigation: Target/Objective</b>	To secure the site against unauthorised entry To protect members of the public/landowners/residents

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Secure site, working areas and excavations in an appropriate manner, as agreed with the ECO.	Contractor	Erection: during site establishment Maintenance: for duration of contract
Where necessary to control access, fence and secure area.	Contractor	Erection: during site establishment Maintenance: for duration of contract
Fence and secure Contractor's equipment camp.	Contractor	Erection: during site establishment Maintenance: duration of contract
Identify disturbance areas and restrict construction activity to these areas.	ECO / Contractor	Pre-construction, and construction
Establish the necessary ablution facilities with chemical toilets. Provide adequate sanitary facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor	Erection: during site establishment Maintenance: duration of contract
Ablution or sanitary facilities should not be located within 100 m from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100 m, whichever is applicable.	Contractor	During site establishment, construction and maintenance
Supply adequate numbers of waste collection bins in appropriate locations on the site where construction is	Contractor	Erection: during site

Mitigation: Action/control	Responsibility	Timeframe
being undertaken.		establishment Maintenance: for duration of contract within a particular area
All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor	Erection: during site establishment Maintenance: for duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No unnecessary environmental impacts associated with site established.</li> <li>» Site is secure and there is no unauthorised entry.</li> <li>» No members of the public/ landowners injured.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» An incident reporting system will be used to record non-conformances to the EMP.</li> <li>» ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager in terms of non-conformances recorded.</li> </ul>

**OBJECTIVE: Maximise local employment and business opportunities associated with the construction phase**

Employment opportunities could be created during the construction phase as some of the construction activities would entail manual labour such as the erection of the fence, creation of fire breaks, and mount installation.

It is foreseen that it would be possible to make use of local labour for some of the construction activities. Opportunities for SMMEs to be considered for some of the construction activities should be looked at. Employment of locals and the involvement of local SMMEs would enhance the social benefits associated with the project, even if the opportunities are only temporary.

The procurement of local goods could furthermore result in positive economic spin-offs.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» PV panels</li> <li>» Associated infrastructure</li> <li>» Power line</li> </ul>
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<b>Potential Impact</b>	The opportunities and benefits associated with the creation of local employment and business should be maximised where possible.
<b>Activities/risk sources</b>	Contractors who make use of their own labour thereby reducing the employment and business opportunities for locals.
<b>Mitigation: Target/Objective</b>	ACED, should aim to employ a maximum number of the low-skilled workers from the local area where possible. This should also be made a requirement for all contractors.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Employment of local community members should be undertaken where possible.	ACED, and Contractor	Pre-construction
An equitable process should be promoted whereby locals and previously disadvantaged individuals (especially women) are taken into account.	ACED	Pre-construction
Create conditions that are conducive for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	ACED, and Contractor	Pre-construction
Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses, and SMMEs from the local sector.	Project proponent Contractor	Pre-construction
A local labour desk and skills database should be set-up (if not already established) in the beneficiary communities to co-ordinate the process of involving local labour.	ACED	Pre-construction
Communication efforts concerning job creation opportunities should refrain from creating unrealistic expectations.	ACED	Pre-construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities.</li> <li>» Locals and previously disadvantaged individuals (especially women) are taken into account during the hiring process.</li> <li>» SMMEs are awarded with contracts during the construction phase.</li> <li>» Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded with jobs, based on requirements in the Tender Documentation.</li> <li>» The involvement of local labour is promoted.</li> <li>» Reports are not made from members of the local communities regarding unrealistic employment opportunities.</li> </ul>
<b>Monitoring</b>	Project proponent and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

**OBJECTIVE: To minimise the potential impact on safety and security**

Even though no construction workers are expected to be accommodated on site, an inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to “outsiders” being in the area to undertake their criminal activities. Materials and goods would be stored on site in some type of storage facility for the duration of the construction period, and this in itself can lure criminals to the area. The negative impacts associated with the inflow of workers could, however, be limited should a local labour force be used.

Safety at and around the construction site should be ensured by, fencing off the construction area to avoid unauthorised access and by employing security personnel.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» Solar facility.</li> <li>» Associated infrastructure.</li> </ul>
<b>Potential Impact</b>	Outside workers are involved in criminal activities.
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» Safety of individuals and animals are at risk.</li> <li>» Theft of construction material.</li> </ul>
<b>Mitigation: Target/Objective</b>	Employment of local labour should be maximised and strict security measures should be implemented at the construction site.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.	Contractor	Pre-construction
Screening of workers that apply for work could be useful to lessen perceived negative perceptions about the outside workforce.	Contractor	Pre-construction
Construction workers should be easily identifiable by wearing uniforms and even identity tags.	Contractor	Construction
Local community members and property owners should be informed of the presence of the outside workforce, the construction schedule, and movement of workers.	ACED	Construction
Property owners, their workers, as well as local communities should be motivated to be involved in crime prevention and by reporting crimes.	ACED, and local communities	All phases of project
The construction site should be fenced and access to the area controlled.	ACED, and contractor	All phases of project
Develop a Code of Conduct to cover the activities of the		

Mitigation: Action/control	Responsibility	Timeframe
construction workers housed on the site.		

<b>Performance Indicator</b>	No criminal activities and theft are reported to be linked with the construction force.
<b>Monitoring</b>	Project proponent, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

### OBJECTIVE: Management of dust and emissions to air

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles.

<b>Project component/s</b>	Construction and establishment activities associated with the establishment of the PV facility and associated infrastructure.
<b>Potential Impact</b>	Dust and particulates from vehicle movement to and on-site, temporary stockpiles, and vegetation clearing affecting the surrounding residents. Release of minor amounts of air pollutants (for example NO <sub>2</sub> , CO and SO <sub>2</sub> ) from vehicles and construction equipment.
<b>Activities/risk sources</b>	<ul style="list-style-type: none"> <li>» Clearing of vegetation and some topsoil.</li> <li>» Excavation, grading, scraping.</li> <li>» Transport of materials, equipment, and components on access roads.</li> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces.</li> <li>» Fuel burning vehicle engines.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase.</li> <li>» To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.</li> </ul>

Mitigation: Action/control	Responsibility	Timeframe
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust.	Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins.	Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the ECO.	Contractor, and ECO	Duration of contract



Mitigation: Action/control	Responsibility	Timeframe
Disturbed areas must be re-vegetated as soon as practicable once construction is completed in an area.	Contractor	Completion of construction
Construction vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Duration of contract
If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified.	Contractor	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints from affected residents or community regarding dust or vehicle emissions from construction activities.</li> <li>» Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase.</li> <li>» Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</li> <li>» Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.</li> </ul>
<b>Monitoring</b>	<p>Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> <li>» Regular inspections of dust generation by construction activities throughout the construction phase.</li> <li>» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager.</li> <li>» A complaints register must be maintained, in which any complaints from residents/the community will be logged. Complaints will be investigated and, where appropriate, acted upon.</li> <li>» An incident reporting system must be used to record non-conformances to the EMP.</li> </ul>

### OBJECTIVE: Control the establishment and spread of alien invasive plants

Alien invasive plants should be controlled on site throughout the life-cycle of the facility. There are very few concentrations of alien plants on site. The shrub, *Prosopis glandulosa* (honey mesquite), is found in the general area and has the potential to establish in disturbed areas on the site.

<b>Project Component/s</b>	Any infrastructure or activity that will result in disturbance.
<b>Potential Impact</b>	Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.

<b>Activities/Risk Sources</b>	Construction, environmental management.
<b>Mitigation: Target/Objective</b>	There is a target of no alien plants within project control area during the construction and operation phases.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Avoid creating conditions in which alien plants may become established: » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	Contractor	Construction Phase, and operational phase
Establish and implement an ongoing monitoring programme to detect and quantify any alien species that may become established on site and identify the problem species (as per Conservation of Agricultural Resources Act).	Contractor	Construction Phase, and operational phase
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction Phase, and operational phase

<b>Performance Indicator</b>	For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» On-going monitoring of area by ECO during construction.</li> <li>» On-going monitoring of area by environmental manager during operation.</li> <li>» If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. The environmental manager should be responsible for driving this process.</li> </ul>

## OBJECTIVE: Control impacts on Ecology

The site has a medium ecological sensitivity (in terms of the vegetation, habitats that the site supports currently, animals, drainage areas and soils that occur on the site). These areas include areas of soil erosion potential on the site. Watercourses and drainage areas: this represents a number of ecological processes and the habitat for occurrences of a population of red data plant species (*Boophane disticha*) which has been evaluated as having a chance of occurring within remaining natural habitats within the study area.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» PV facility</li> <li>» Power line</li> <li>» Ancillary infrastructure</li> </ul>
<b>Potential Impact</b>	Irreversible habitat alteration of areas of medium-high ecological sensitivity, affecting species of conservation importance, unique habitat.
<b>Activities/Risk Sources</b>	Construction activities, maintenance activities.
<b>Mitigation: Target/Objective</b>	Preventing irreversible impacts within areas of medium-high ecological sensitivity.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Demarcate all areas where no impacts will be allowed. Clearly marking these areas with high visibility signs, and inform all contractors and construction workers to refrain from entering/ affecting these areas.	ECO	Construction, Operational phases
Prevent impacts on any surface water as a result of hazardous materials, contamination, unnecessary crossing by vehicles or personnel, extraction, drinking or other human uses, construction and maintenance activities.	ECO, Contractor, Contractor	Construction, Operational phases
The removal or picking of any protected or unprotected plants shall not be permitted and no horticultural specimens (even within the demarcated working area) shall be removed, damaged, or tampered with unless agreed to by the ECO.	ECO, Contractor	Construction, operational phases
No painting or marking of rocks or vegetation to identify locality or other information shall be allowed as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required.	ECO, Contractor	Construction, operational phases
Make use of existing access roads, ensuring proper upgrade/ construction/ maintenance in order to limit erosion, proliferation of weeds.	Contractor	Construction, operational phases
Use of branches of trees and shrubs for fire making purposes is strictly prohibited.	ECO, Contractor	Construction, operational phases
Prevent open fires; provide demarcated fire-safe zones, facilities, and fire control measures.	ECO, Contractor	Construction, operational phases
Fire fighting equipment shall be made available on all vehicles and at various suitable points within the development site.	ECO, Contractor	Construction, operational phases
No animal may be hunted, trapped, or killed for any purpose whatsoever.	ECO, Contractor	Construction, operational phases

Mitigation: Action/Control	Responsibility	Timeframe
In the event that animals are present that may pose a risk to human safety, a suitable animal handler must be requested to remove the animal in an environmentally responsible manner. This specifically refers to snakes and scorpions.	ECO, Contractor	Construction, operational phases
Identify areas where surface disturbances will occur and remove topsoil to a depth of approximately 0.75m.	Contractor	Construction phase
Ensure immediate surface restoration and resloping in order to prevent erosion, taking cognisance of local contours and landscaping.	ECO, contractor	Construction phase

<b>Performance Indicator</b>	The continued presence of wetland related habitat within the development area and the absence of surface impacts within these parts. The current biodiversity status will be used as an benchmark for future reference
<b>Monitoring</b>	Implement a monitoring programme of which the aims and objectives should be to monitor: <ul style="list-style-type: none"> <li>» Compliance to the approved EMP;</li> <li>» Status of invasive species on site;</li> <li>» Status of impacts within sensitive areas;</li> <li>» Seasonal biodiversity (species richness) surveys;</li> </ul>

### OBJECTIVE: Control runoff and soil erosion & degradation

The soil resource on the site needs to be conserved as far as possible to minimise the cumulative impact on the local environment. Particular attention being given on the areas of high erosion sensitivity (i.e. the extreme northern section of the site and extreme southern section of the site during the construction and operation of the PV facility. A set of strictly adhered to mitigation measures are required to effectively limit the impact on the environment. The disturbance areas where human impact is likely are the focus of the mitigation measures laid out below.

Mitigation: Action/Control	Responsibility	Timeframe
Identify areas of high erosion risk (drainage lines/watercourses, existing problem areas).	ECO/ER	At design stage.
Identify construction areas for general construction work and restrict construction activity to these areas.	ECO/ER/Contractor	At design stage and during construction
Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling).	ECO/ER/Contractor	During construction
Access roads to be carefully planned and constructed	ECO/ER/Contractor	At design stage

Mitigation: Action/Control	Responsibility	Timeframe
to minimise the impacted area and prevent unnecessary degradation of soil. Special attention to be given to roads that cross drainage lines and roads on steep slopes (to prevent unnecessary cutting and filling operations).		and during construction
Dust control on construction site through wetting or covering of cleared areas.	Contractor	Daily during construction
Minimise removal of vegetation which aids soil stability.	ECO/Contractor	Continuously during construction
Rehabilitate disturbance areas as soon as an area is vacated.	Contractor	Continuously during and after construction
Soil conservation - stockpile topsoil for re-use in rehabilitation phase. Protect stockpile from erosion.	Contractor	Continuously during construction
Erosion control measures - run-off control and attenuation on slopes (sand bags, logs), silt fences, stormwater channels and catch-pits, shade nets, soil binding, geofabrics, hydroseeding or mulching over cleared areas.	Contractor/ECO	Erection: Before construction Maintenance: Duration of contract
Where access roads cross natural drainage lines, culverts must be designed to allow free flow. Regular maintenance must be carried out	ECO/ER/Contractor	Before construction and maintenance over duration of contract
Control depth of excavations and stability of cut faces/sidewalls	ECO/ER/Contractor	Before construction and maintenance over duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Acceptable level of soil erosion around site, as approved by ECO.</li> <li>» Acceptable level of increased siltation in drainage lines, as approved by ECO.</li> <li>» Acceptable level of soil degradation, as approved by ECO.</li> <li>» Acceptable state of excavations, as approved by ECO.</li> <li>» No activity in restricted areas.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Ongoing monitoring of area by ECO during construction.</li> <li>» Weekly inspections of the site by ECO.</li> <li>» An incident reporting system will record non-conformances.</li> </ul>

**OBJECTIVE: Protection of sites of heritage value**

There are 20 heritage sites / artefacts that have been identified as part of this assessment. These heritage artefacts are from the Stone Age and Middle Stone Age. They have been given a Grade III rating in terms of the NHR Act 25 of 1999, which means mitigation against negative impacts (damage) is required, along with a permit for removal of these artefacts (from SAHRA).

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» PV facility.</li> <li>» All other infrastructure.</li> <li>» Power line</li> </ul>
<b>Potential Impact</b>	Heritage objects or artefacts found on site are inappropriately managed or destroyed.
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Site preparation and earthworks.</li> <li>» Foundations or plant equipment installation.</li> <li>» Mobile construction equipment movement on site.</li> </ul>
<b>Mitigation: Target/Objective</b>	To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
A professional archaeologist (with an already authorised collection permit) must be appointed during the construction at the identified heritage sites to monitor any impacts on the heritage artefacts or their removal to the nearest museum.	ACED	Construction
If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.	ACED	Construction
Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.	ACED ECO	Construction
New exposures of mudstone resulting from the construction phase should be inspected by a palaeontologist. Any fossil material noticed during construction activities should be reported to SAHRA and a palaeontologist.	ACED ECO Palaeontologist	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Zero disturbance outside of designated work areas.</li> <li>» All heritage items located are dealt with as per the legislative guidelines.</li> <li>» A record is kept of all instances of accidental disturbance of heritage material, as well as post construction review of impacts on landscape</li> </ul>
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	context.
<b>Monitoring</b>	Supervision of all clearing and earthworks by the ECO throughout construction phase.

**OBJECTIVE: Appropriate handling and storage of chemicals, hazardous substances and waste**

The construction phase of the PV facility may involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. The main wastes expected to be generated by the construction of the facility will probably consist of some construction and general solid waste. A guideline for integrated management of construction waste is included as Appendix A of this EMP.

<b>Project component/s</b>	Storage and handling of chemicals, and waste.
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Release of contaminated water from contact with spilled chemicals.</li> <li>» Generation of contaminated wastes from used chemical containers.</li> <li>» Pollution of the surrounding environment through inappropriate waste management practices.</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> <li>» Pollution of water and soil resources.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» PV panel construction activities.</li> <li>» Building construction activities.</li> <li>» Packaging and other construction wastes.</li> <li>» Hydrocarbon use and storage.</li> <li>» Spoil material from site preparation.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons.</li> <li>» Ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.</li> <li>» Comply with waste management guidelines.</li> <li>» Minimise production of waste.</li> <li>» Ensure appropriate waste handling, storage, and disposal.</li> <li>» Avoid environmental harm from waste disposal.</li> </ul>

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of	Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.		
In the event of a major spill or leak of contaminants, the relevant authorities should be notified as per the notification of emergencies/incidents, as per the requirements of NEMA.	Contractor	Duration of contract
Spilled cement/concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not take place on-site outside of designated areas (except for emergencies). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	Contractor	Duration of contract
All stored fuels to be maintained within a bunded area and on a sealed surface.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with MSDS files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be complied with.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management method statements to deal with all waste streams.	Contractor	Pre-construction
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	Contractor	Duration of contract
Where possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed	Contractor	Duration of contract



Mitigation: Action/control	Responsibility	Timeframe
contractors.		
No waste may be buried or burnt on site	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials and waste.	Contractor	Completion of construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No chemical spills outside of designated storage areas.</li> <li>» No water or soil contamination by spills.</li> <li>» No complaints received regarding waste on site or indiscriminate dumping.</li> <li>» Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately.</li> <li>» Provision of all appropriate waste manifests for all waste streams.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase.</li> <li>» A complaints register must be maintained, in which any complaints from the community will be logged.</li> <li>» Complaints will be investigated and, if appropriate, acted upon.</li> <li>» Observation and supervision of waste management practices throughout construction phase.</li> <li>» Waste collection to be monitored on a regular basis.</li> <li>» Waste documentation completed.</li> <li>» A complaints register will be maintained, in which any complaints from the community will be logged.</li> <li>» An incident reporting system will be used to record non-conformances to the EMP.</li> </ul>

**OBJECTIVE: Ensure disciplined conduct of on-site contractors and workers**

In order to minimise impacts on the surrounding environment, Contractors must be required to adopt a certain Code of Conduct and commit to restricting construction

activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation (once issued), the BA Report, and this EMP, as well as the requirements of all relevant environmental legislation.

<b>Project component/s</b>	All components and activities occurring during the construction phase.
<b>Potential Impact</b>	Pollution/contamination of the environment. Disturbance to the environment.
<b>Activity/risk source</b>	Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment.
<b>Mitigation: Target/Objective</b>	To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
The terms of this EMP and the Environmental Authorisation (once issued) must be included in all Contractors contracts.	ACED	Tender process
An ECO must be permanently on site during any construction close to drainage lines and wetlands and at other times should visit the site at least once a week.	ACED	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no abluting will be permitted outside the designated area. These facilities must be regularly serviced by appropriate contractors.	Contractor, and sub-contractors	Duration of contract
Cooking/meals must take place in a designated area; no firewood or kindling may be gathered from the site or surrounds.	Contractor, and sub-contractors	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Contractor, and sub-contractors	Duration of contract
No one other than the ECO or personnel authorised by said individual may disturb flora or fauna outside of the demarcated construction area/s.	Contractor, and sub-contractors	Duration of contract
Contractors must ensure that all workers are informed at the outset of the construction phase about the consequences of stock theft and trespassing on adjacent farms.	Contractor, and sub-contractors	Construction

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Compliance with specified conditions of Environmental Authorisation, (once issued), EIA report, and the EMP.</li> <li>» No complaints regarding contractor behaviour or habits.</li> </ul>
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	<ul style="list-style-type: none"><li>» Code of Conduct drafted before commencement of construction phase.</li><li>» Briefing session with construction workers held at outset of construction phase.</li></ul>
<b>Monitoring</b>	<ul style="list-style-type: none"><li>» Observation and supervision of Contractor practices throughout construction phase.</li><li>» A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</li><li>» An incident reporting system will be used to record non-conformances to the EMP.</li></ul>

#### 5.4. Detailing Method Statements

**OBJECTIVE: Ensure all construction activities/practices/procedures are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMP**

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMP will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as “a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able 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 must cover applicable details with regard to:

- » Construction procedures;
- » Materials and equipment to be used;
- » Getting the equipment to and from site;
- » How the equipment/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, and
- » Any other information deemed necessary by the Site Manager.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

#### 5.5. Awareness and Competence: Construction Phase of the PV Plant

**OBJECTIVE: Ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm**

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended some form of Environmental Awareness Training. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Awareness of any other environmental matters, which are deemed necessary by the ECO.
- » Ensuring that appropriate communication tools are used to outline the environmental "do's" and "don'ts" (as per the environmental awareness training course) to employees.
- » Records must be kept of those that have completed the relevant training.

## 5.6. Monitoring Programme: Construction Phase of the PV Plant

**OBJECTIVE: Monitor the performance of the control strategies employed against environmental objectives and standards**

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, ACED will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- » Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- » Ensure adequate and appropriate interventions to address non-compliance.
- » Ensure adequate and appropriate interventions to address environmental degradation.
- » Provide a mechanism for the lodging and resolution of public complaints.
- » Ensure appropriate and adequate record keeping related to environmental compliance.
- » Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- » Aid communication and feedback to authorities and stakeholders.

The ECO will ensure compliance with the EMP, and will conduct monitoring activities. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks. The ECO will report non-compliances to the Site Manager and/or any other monitoring body stipulated by the regulating authorities.

**MANAGEMENT PROGRAMME FOR THE PV PLANT:  
 REHABILITATION OF DISTURBED AREAS**

**CHAPTER 6**

**6.1. Overall Goal for the Rehabilitation of Disturbed Areas**

**Overall Goal for the Rehabilitation of Disturbed Areas:** Undertake the rehabilitation measures in a way that:

- » Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

**6.2. Objectives**

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

**OBJECTIVE:** Ensure appropriate rehabilitation of disturbed areas following any executions such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» PV facility</li> <li>» Internal access roads (i.e. those not required for operation and maintenance).</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.</li> </ul>
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Temporary access roads/tracks.</li> <li>» Other disturbed areas/footprints.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure and encourage site rehabilitation of disturbed areas.</li> <li>» Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.</li> </ul>

Mitigation: Action/control	Responsibility	Timeframe
All temporary facilities, equipment, and waste materials must be removed from site as soon as practically possible after construction is complete.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase.	Contractor, and rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	ACED, and rehabilitation specialist	Post-rehabilitation
Ongoing alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	ACED, and rehabilitation specialist	Post-rehabilitation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities.</li> <li>» Topsoil replaced on all areas and stabilised.</li> <li>» Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites.</li> <li>» Completed site free of erosion and alien invasive plants.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented.</li> <li>» On-going alien plant monitoring and removal should be undertaken on an annual basis.</li> </ul>

## MANAGEMENT PROGRAMME FOR THE PV PLANT: OPERATION

## CHAPTER 7

### 7.1. Overall Goal for Operation

**Overall Goal for Operation:** To ensure that the operation of the PV plant does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action is taken in all cases. In order to address this goal, it is necessary to operate the PV facility in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Ensures the operation activities are undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents and other receptors in terms of visual impacts.

### 7.2. Objectives

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

#### OBJECTIVE: Minimise soil degradation and erosion

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Area infrastructure</li> <li>» Power line</li> <li>» Access roads.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Soil degradation.</li> <li>» Soil erosion.</li> <li>» Increased deposition of soil into drainage systems.</li> <li>» Increased run-off over the site.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Poor rehabilitation of cleared areas.</li> <li>» Rainfall - water erosion of disturbed areas.</li> <li>» Wind erosion of disturbed areas.</li> <li>» Concentrated discharge of water from construction activity.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Ensure rehabilitation of disturbed areas is maintained.</li> <li>» Minimise soil degradation (i.e. wetting).</li> <li>» Minimise soil erosion and deposition of soil into drainage lines.</li> <li>» Ensure continued stability of embankments/excavations.</li> </ul>



Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	ACED	Operation
Ensure dust control on site: wetting of denuded areas or the use of an appropriate dust suppression measure.	ACED	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	ACED	Operation
Control depth of excavations and stability of cut faces/sidewalls.	ACED	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Acceptable level of soil erosion around site, as determined by the environmental manager.</li> <li>» Acceptable level of increased siltation in drainage lines, as determined by the environmental manager.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Inspections of site on a bi-annual basis.</li> <li>» Water management plan</li> </ul>

#### OBJECTIVE: Minimise dust and air emissions

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicles).

Windy conditions and the movement of vehicles on site may lead to dust creation.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Hard engineered surfaces</li> <li>» On-site vehicles</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Dust and particulates from vehicle movement to and on-site.</li> <li>» Release of minor amounts of air pollutants (for example NO<sub>2</sub>, CO and SO<sub>2</sub>) from vehicles and the augmentation plant.</li> </ul>
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from unsealed roads and surfaces.</li> <li>» Fuel burning vehicle and construction engines.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» To ensure emissions from all vehicles are minimised, where possible.</li> <li>» To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.</li> </ul>

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure	ACED	Site

Mitigation: Action/Control	Responsibility	Timeframe
that nuisance to the community from dust is not visibly excessive.		establishment and construction
Appropriate dust suppressant must be applied to the roads as required to minimise/control airborne dust.	ACED	Duration of contract
Speed of vehicles must be restricted, as defined by the Environmental Manager.	ACED	Duration of contract
Vehicles and equipment must be maintained in a road-worthy condition at all times.	ACED	Duration of contract

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints from affected residents or community regarding dust or vehicle emissions.</li> <li>» Dust suppression measures implemented for where required.</li> <li>» Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Environmental Manager.</li> <li>» A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.</li> <li>» An incident reporting system must be used to record non-conformances to the EMP.</li> </ul>

**OBJECTIVE: Ensure the implementation of an appropriate fire management plan during the operation phase**

A fire management plan must be implemented during the construction and operational phase of the project.

<b>Project Component/s</b>	» Operation and maintenance of the solar energy facility and associated infrastructure.
<b>Potential Impact</b>	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the solar energy facility infrastructure.
<b>Activities/Risk Sources</b>	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
<b>Mitigation: Target/Objective</b>	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire fighting equipment on site.	ACED	Operation
Provide fire-fighting training to selected operation and maintenance staff.	ACED	
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	ACED	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	ACED	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	ACED	Operation
Contact details of emergency services should be prominently displayed on site.	ACED	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» Fire fighting equipment and training provided before the construction phase commences.</li> <li>» Appropriate fire breaks in place.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» ACED must monitor indicators listed above to ensure that they have been met.</li> </ul>

**OBJECTIVE: Maximise local employment and business opportunities**

The proposed facility is expected to require approximately 20 permanent employees including security personnel who would be on site on a permanent basis.

Therefore, long-term direct job opportunities for locals could exist, although limited. However, in an area with such high unemployment figures, these limited opportunities should still be seen as a positive impact on the quality of life of those benefiting from the employment.

Some local procurement of goods, materials and services could occur which would result in positive economic spin-offs. These opportunities for local service providers to render services to the proposed facility could include maintenance of the guardhouse, gardening at the guardhouse, cleaning services, security services and maintenance or replacement of general equipment

<b>Project</b>	» Operation and maintenance of the facility.
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<b>Component/s</b>	
<b>Potential Impact</b>	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
<b>Activities/Risk Sources</b>	<ul style="list-style-type: none"> <li>» Locals are not employed where the skills exist.</li> <li>» Local procurement is not undertaken if possible.</li> <li>» Local businesses are not supported.</li> </ul>
<b>Mitigation: Target/Objective</b>	» Maximise the appointment of local employees.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Local labourers should be employed where applicable and the employment of outsiders during the operational process should not be pursued.	ACED	Operation
Appoint as many local employees as would be feasible and possible.	ACED	Operation
Should locals with applicable skills not be available, ACED should embark on a skills development process during the construction phase to allow locals to be employable for the operational phase	ACED	Operation
Implement training and capacity building programmes for the workers throughout the operational period of the PV facility.	ACED	Operation
Local sourcing of materials, goods and services should be undertaken where possible to assist in providing more economic and employment opportunities for the local people	ACED	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» An employee list drawn up indicating the percentage of locals employed.</li> <li>» Local procurement is undertaken.</li> </ul>
<b>Monitoring</b>	» ACED should be able to demonstrate that the above indicators are implemented.

**OBJECTIVE: Minimise the potential impact on farming activities and on the surrounding landowners**

Once operational, the impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site on a daily basis is anticipated to have minimal negative social impacts in this regard.

Individuals leaving their existing full time employment positions at farms in the area to obtain work at the facility could result in possible negative impacts on the farming community. Employing outsiders on the other hand and accommodating them at the planned accommodation facility on site could also affect the community's social dealings with each other as well as the traditional character of the area. In worst cases it could result in social conflict between the various groupings. The recruitment and employment process would thus have to be sensitively dealt with to limit any possible negative impacts on the daily living patterns of the existing farming community and other community members.

The operations at the facility, however is not anticipated to have severe negative impacts on the neighbouring farmers' living and movement patterns, apart from a limited increase in the movement of people to and from the site, as well as the presence of these employees on-site on a permanent basis. Concerns about rental agreements should be considered.

Vehicle movement to and from the site (e.g. transportation of workers and goods) could influence road users' daily movement patterns, although it is anticipated that this impact would only materialise intermittently.

<b>Project Component/s</b>	» Possible negative impacts of activities undertaken on site on the activities of surrounding property owners.
<b>Potential Impact</b>	» Possible limited intrusion impact on surrounding land owners. » Possible phasing out of cattle farming.
<b>Activities/Risk Sources</b>	» Increase in traffic to and from site could affect daily living and movement patterns of surrounding residents.
<b>Mitigation: Target/Objective</b>	» Effective management of the facility. » Mitigation of intrusion impacts on property owners.

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Effective management of the facility and accommodation facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	ACED	Operation

<b>Performance Indicator</b>	» No environmental pollution occurs (i.e. waste, water, and sanitation). » No intrusion on private properties and on the activities undertaken on the surrounding properties. » Continuation of farming activities.
<b>Monitoring</b>	» Developer should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met.

**OBJECTIVE: Appropriate handling and management of hazardous substances and waste**

The operation of the solar energy facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and liquid waste.

<b>Project Component/s</b>	<ul style="list-style-type: none"> <li>» Substation.</li> <li>» Operation and maintenance staff.</li> </ul>
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Inefficient use of resources resulting in excessive waste generation.</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> <li>» Contamination of water or soil because of poor materials management.</li> </ul>
<b>Activity/Risk Source</b>	<ul style="list-style-type: none"> <li>» Transformers and switchgear – substation.</li> </ul>
<b>Mitigation: Target/Objective</b>	<ul style="list-style-type: none"> <li>» Comply with waste management legislation.</li> <li>» Minimise production of waste.</li> <li>» Ensure appropriate waste disposal.</li> <li>» Avoid environmental harm from waste disposal.</li> <li>» Ensure appropriate storage of chemicals and hazardous substances.</li> </ul>

<b>Mitigation: Action/Control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Hazardous substances (such as used/new transformer oils, etc.) must be stored in sealed containers within a clearly demarcated designated area.	ACED	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	ACED	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	ACED	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	ACED	Operation and maintenance
Spill kits must be made available on-site for the	ACED	Operation and

Mitigation: Action/Control	Responsibility	Timeframe
clean-up of spills and leaks of contaminants.		maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	ACED / waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	ACED / waste management contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority » Waste must be stored and handled according to the relevant legislation and regulations	ACED	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	ACED	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	ACED	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	ACED	Operation

<b>Performance Indicator</b>	<ul style="list-style-type: none"> <li>» No complaints received regarding waste on site or indiscriminate dumping.</li> <li>» Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately.</li> <li>» Provision of all appropriate waste manifests.</li> <li>» No contamination of soil or water.</li> </ul>
<b>Monitoring</b>	<ul style="list-style-type: none"> <li>» Waste collection must be monitored on a regular basis.</li> <li>» Waste documentation must be completed and available for inspection</li> <li>» An incidents/complaints register must be maintained, in which any complaints from the community must be logged.</li> <li>» Complaints must be investigated and, if appropriate, acted upon.</li> <li>» All appropriate waste disposal certificates accompany the monthly reports.</li> </ul>

## OBJECTIVE: Maintenance of rehabilitated areas and protection of vegetation

In order to ensure the long-term environmental integrity of the site following construction, maintenance the areas rehabilitated post-construction must be undertaken

until these areas have successfully re-established. Fire breaks should be established, where appropriate, to limit both incoming and outgoing veld fires.

<b>Project component/s</b>	<ul style="list-style-type: none"> <li>» PV facility.</li> <li>» Ancillary buildings.</li> </ul>
<b>Potential Impact</b>	Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
<b>Activity/risk source</b>	<ul style="list-style-type: none"> <li>» Foundations.</li> <li>» Other disturbed areas.</li> </ul>
<b>Mitigation: Target/Objective</b>	Ensure and encourage site rehabilitation of disturbed areas.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
Fire breaks should be established and maintained, where appropriate.	ACED	Duration of contract
Maintenance of erosion control measures	ACED	Operation
Enaction of a storm water management plan	ACED	Operation
Appoint an environmental manager during operation whose duty it will be to minimise impacts on surrounding sensitive habitats.	ACED	Operation

<b>Performance Indicator</b>	Successful rehabilitation of disturbed areas.
<b>Monitoring</b>	On-going alien plant monitoring and removal should be undertaken on an annual basis.

**Other requirements for the PV facility:**

- » Should ground water be abstracted from the site, a water use licence must be obtained from the Department of Water Affairs. The storage of



**MANAGEMENT PROGRAMME FOR THE PV PLANT:  
 DECOMMISSIONING**

**CHAPTER 8**

The infrastructure which will be utilised for the proposed PV facility is expected to have a lifespan of up to 30 years (with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the infrastructure with more appropriate technology/infrastructure available at that time.

**8.1. Site Preparation**

Site preparation activities will include confirming the integrity of the access to the site, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

**8.2 Disassemble and Replace Existing Infrastructure**

All components will be reused, recycled, or disposed of in accordance with regulatory requirements.

**OBJECTIVE: To avoid and or minimise the potential impacts associated with the decommissioning phase**

<b>Project component/s</b>	Decommissioning phase of the PV facility.
<b>Potential Impact</b>	<ul style="list-style-type: none"> <li>» Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life, stress, depression etc.</li> <li>» The number of people affected is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.</li> </ul>
<b>Activity/risk source</b>	Decommissioning of the PV facility.
<b>Mitigation: Target/Objective</b>	To avoid and or minimise the potential social impacts associated with decommissioning phase of the PV facility.

<b>Mitigation: Action/control</b>	<b>Responsibility</b>	<b>Timeframe</b>
ACED should ensure that retrenchment packages are provided for all staff that stand to lose their jobs when the facility is decommissioned. Retrenchments should comply with South African Labour legislation of the day.	ACED	Decommissioning.

<b>Performance Indicator</b>	South African Labour legislation at the relevant time.
<b>Monitoring</b>	Retrenchments should comply with South African Labour legislation of the day.