

Annex K

Environmental  
Management Programme  
(EMP)

## CONTENTS

1	<b>ENVIRONMENTAL MANAGEMENT PROGRAMME</b>	1
1.1	<b>INTRODUCTION</b>	1
1.2	<b>ROLES AND RESPONSIBILITIES</b>	2
1.2.1	<b>AES</b>	2
1.2.2	<b>Environmental Control Officer</b>	4
1.2.3	<b>Contractors and Site Personnel</b>	5
1.3	<b>ALLOCATION OF RESOURCES</b>	5
1.4	<b>TRAINING AND HSE AWARENESS</b>	5
1.5	<b>DOCUMENTATION AND RECORD KEEPING</b>	6
1.6	<b>AUDITING AND REPORTING</b>	6
1.7	<b>REVISION OF THE EMPR</b>	7
1.8	<b>SUBSIDIARY PLANS AND POLICIES</b>	7
1.9	<b>STAKEHOLDER ENGAGEMENT</b>	8
1.9.1	<b>Grievance Procedure</b>	8
2	<b>PERMIT REQUIREMENTS</b>	10
2.1	<b>HERITAGE</b>	10
2.2	<b>WATER USE</b>	12
2.3	<b>ABNORMAL VEHICLE LOADS</b>	12
2.4	<b>FLORA</b>	12
3	<b>BIOLOGICAL MONITORING</b>	13
3.1	<b>INTRODUCTION</b>	13
3.2	<b>PRE-CONSTRUCTION PHASE</b>	13
3.2.1	<b>Ecological Monitoring</b>	13
3.2.2	<b>Avifauna Monitoring</b>	14
3.3	<b>CONSTRUCTION PHASE</b>	14
3.3.1	<b>Ecological Monitoring</b>	14
3.4	<b>OPERATIONAL PHASE</b>	16
3.4.1	<b>Ecological Monitoring</b>	16
3.4.2	<b>Avifauna Monitoring</b>	17
4	<b>MITIGATION AND COMPLIANCE MONITORING MEASURES</b>	20
4.1	<b>PRE-CONSTRUCTION PLANNING PHASE</b>	20
4.2	<b>CONSTRUCTION PHASE</b>	29
4.3	<b>CONSTRUCTION PHASE</b>	ERROR! BOOKMARK NOT DEFINED.
4.4	<b>OPERATIONAL PHASE</b>	35
4.5	<b>DECOMMISSIONING PHASE</b>	40
5	<b>GENERAL CONTRACTOR COMPLIANCE STANDARDS</b>	41
5.1	<b>OPERATIONAL PHASE</b>	55

## 1.1

## INTRODUCTION

An Environmental Management Programme (EMP) is a set of guidelines and actions aimed at ensuring that construction and/or installation activities, and subsequent management of facilities, are undertaken in a manner that minimises environmental risks and impacts.

The following EMP has been prepared by ERM Southern Africa (Pty) Ltd, for AES Solar Energy Ltd, hereafter referred to as AES, for the proposed construction and operation of a 190 MW Solar Power Plant planned for Olyven Kolk Farm. In the event of the project being taken over by another party, that party would assume the responsibilities and conditions of this EMP. This EMP addresses potential impacts associated with the installation/construction, operation and decommissioning phases of the project.

The EMP is required in order to:

- assist in ensuring continuing compliance with South African legislation and AES's Environmental Health and Safety Policy (this policy is currently being developed);
- provide a mechanism for ensuring that measures identified in the EIR designed to mitigate potentially adverse impacts, are implemented;
- provide a framework for mitigating impacts that may be unforeseen or unidentified until construction is underway;
- provide assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met; and
- provide a framework for compliance auditing and inspection programs.

The EMP will remain a draft document until after it has been updated with the conditions stipulated in the environmental authorisation.

The EMP specifies the following:

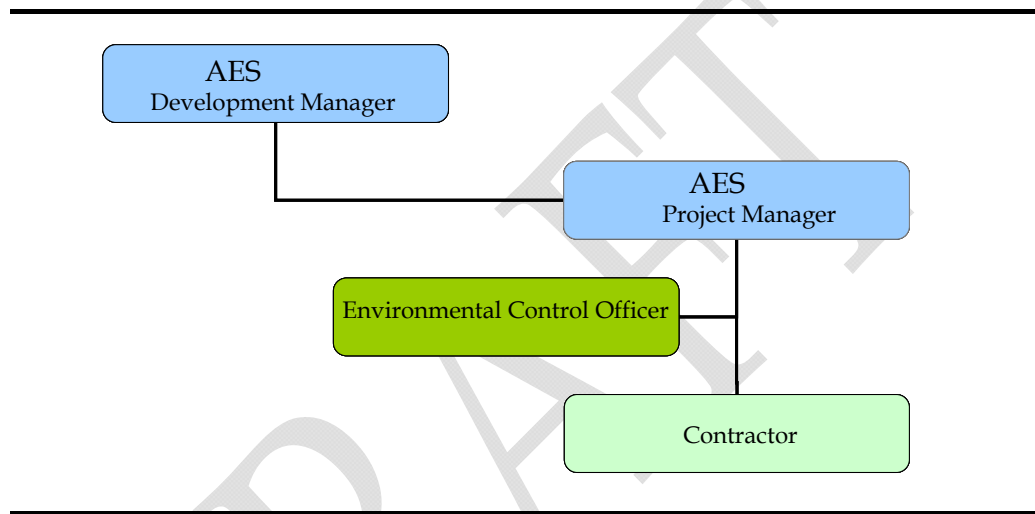
- roles and responsibilities for implementation of the EMP (*Section 1.2*);
- subsidiary plans and policies (*Section 1.8*);
- stakeholder engagement (*Section 1.9*);
- permit requirements (*Section 2*);
- biological monitoring requirements for pre-construction, construction and operation (*Section 3*);

- mitigation and compliance monitoring measures (*Section 4*); and
- contractor compliance standards (*Section 5*)

## 1.2 ROLES AND RESPONSIBILITIES

The following section outlines the roles and responsibilities of those involved in the proposed installation, operation and decommissioning of the solar power plant. An organogram showing reporting structures is provided in *Figure 1.1*.

**Figure 1.1** *Reporting Structures*



### 1.2.1 AES

#### *Development Manager*

AES's Development Manager will have the ultimate responsibility for ensuring the measures outlined in the EMP are delivered and that the measures are implemented by their contractors and subcontractors. In this respect the Development Manager will review and approve contractor plans for delivery of the actions contained in the EMP during construction and ensure that during operation performance will be evaluated through monitoring and auditing.

The Development Manager's responsibilities will encompass the following:

- Liaison with the project engineers to ensure that the solar power plant is designed to meet all the specified environmental parameters and legal requirements as specified in the EMP and Environmental Authorisation;
- Authority to stop works in emergency situations;
- Approval of method statements; and
- Liaison with authorities.

The Project Manager <sup>(1)</sup>, or any other person appointed to the role, is responsible for the implementation of the EMP, and will report directly to the Development Manager on environmental, health and safety matters.

#### *Project Manager*

The Project Manager <sup>(2)</sup>, is the designated person responsible for the implementation of the EMP and therefore the person responsible for managing the environmental issues that arise during the construction phase of the project.

The Project Manager's main role is to regularly inspect and manage the construction activities on site in order to ensure compliance with the EMP. The Project Manager will liaise with the Environmental Control Officer (ECO) and Contractor and report to the Development Manager.

The Project Manager's responsibilities will encompass the following:

- Training of contractors on environmental matters;
- Inspect the site at least once every two weeks for the duration of the construction phase;
- Management of the contractors in terms of the EMP;
- Review of contractor method statements and ensure alignment with the EMP;
- Reporting on environmental problems to the Development Manager;
- Record keeping of:
  - environmental incidents;
  - contractors non-compliance to the EMP; and
  - contractor fines and penalties.
- Making recommendations or implementing actions relating to a contractor's failure to comply with the EMP, which may include enforcement of penalties and even contract termination and removal of contractor from the site;
- Recommend the suspension of work activities where such activities contravene the EMP requirements; and
- The authority to stop works in emergency situations when the Development Manager is not available and construction activities seriously threaten the environment.

The Project Manager will also be responsible for implementing the community engagement plan. The Project Manager will be required to participate in community meetings that will be held in affected communities prior to, during and upon completion of construction.

(1) Yet to be appointed to the role.

(2) Yet to be appointed to the role.

During the construction phase an Environmental Control Officer (ECO) will be responsible for ensuring the overall environmental and socio-economic objectives of the EMP are met. When working on site, the ECO will report to the Project Manager.

### 1.2.2 *Environmental Control Officer*

AES will appoint an independent Environmental Control Officer (ECO) prior to commencement of construction and throughout the construction phase of the project until such time as rehabilitation is complete and the site is ready for operation. The ECO shall hold a relevant environmental degree or diploma and have a few years of experience in ECO work.

The primary role of the ECO will be to monitor the construction activities and ensure that the mitigation measures of the EMP and Environmental Authorisation (EA) are implemented.

The ECO's responsibilities will encompass the following:

- Brief the Contractor on EMP requirements and site layout;
- Retain a copy of the EMP and EA and all records relating to monitoring and auditing on site, and keep these available for inspection;
- Visit the site at least once a day, particularly for the following activities:
  - Site clearance;
  - PV array and structures arrival, assembly and placement;
  - Establishment of all works areas including latrines and wash areas.
- Specific tasks of the ECO will include ensuring:
  - Sensitive areas are demarcated and cordoned off;
  - Activities are restricted to demarcated works areas;
  - No sensitive features are damaged or disturbed;
  - Any notifiable features (eg fossils or other heritage remains) are recorded and work stopped or redirected to avoid such areas, and the appropriate authorities informed;
  - All incidents are recorded in a logbook and appropriate remedial action taken;
  - Site visit reports are kept and feedback provided to the Project Manager and other senior management, as required; and
  - Liaise with DEA regarding implementation of the EMP, if and when required.

The ECO will be expected to be contactable telephonically in case of emergencies at all times.

### 1.2.3

#### *Contractors and Site Personnel*

During site preparation and construction, the contractor will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and socio-economic mitigation measures specified in the EMP. The contractor is also responsible under the contract for managing the potential environmental, socio-economic, safety and health impacts of all contracted activities whether these are undertaken by themselves or by their subcontractors. The contractor has overriding responsibility for the activities of all direct staff and subcontractors.

Adherence to the provisions of the EMP will be a condition of contract with the contractor. The contractor will need to demonstrate to AES's satisfaction how compliance with the requirements of the EMP will be met. The contractor will also be expected to demonstrate commitment to the EMP at all levels in the contractor's management structure and will be required to identify individuals responsible for overall environment, socio-economic, safety and health management.

The contractor will be required to undertake regular environmental and socio-economic inspections and provide reports to AES to monitor and evaluate performance against the measures and objectives established in the EMP. In this regard, the contractor's performance in complying with the EMP will be monitored and audited by the ECO, Project Manager and Development Manager.

### 1.3

#### *ALLOCATION OF RESOURCES*

Financial and personnel resources must be allocated to the implementation of the EMP, including provisions for contractor training and environmental awareness, contingencies to deal with environmental emergencies, monitoring and auditing. Such resources must be available during the operational and closure, as well as the construction phase.

Environmental requirements requiring cost allocation must be clearly identified the terms of reference for contractors and suppliers to ensure these service providers budget effectively.

### 1.4

#### *TRAINING AND HSE AWARENESS*

Training and awareness raising around HSE issues is essential for ensuring that the EMP is effectively implemented and that unforeseen HSE incidents are managed timeously and appropriately. The ultimate responsibility for environmental training and awareness raising rests with AES. It is suggested that the following be included in the approach to training and awareness raising:

- Induction course/briefing for all contractors including a description of AES's expectations, specific responsibilities of workers with regard to HSE issues. The briefing will usually take the form of an on site talk and demonstration by the ECO. The education / awareness programme should be aimed at all levels of personnel within the contractor team;
- Refresher courses as and when required;
- Focused training sessions in relation to specific tasks, such as the erection of solar arrays; and
- Toolbox talks to alert workers to particular HSE concerns associated with their tasks for the day/period and to encourage generally responsible behaviour on site.

Courses should be provided by a qualified person and in a language and medium understood by contractors/employees.

### **1.5 DOCUMENTATION AND RECORD KEEPING**

All documentation relevant to the implementation of the EMP during construction, operation and closure must be maintained on site in a structured and ordered manner. These documents should be distributed in a controlled manner to affected personnel and must also be made available for public / authority inspection, if requested.

The type of documents that should be managed and retained include, at minimum:

- Method statements;
- Policies and plans;
- Project specific HSE audit reports;
- Training material and records of attendance;
- Incident reports;
- Emergency preparedness and response procedures;
- Monitoring reports; and
- Minutes of key meetings with service providers and project team members.

### **1.6 AUDITING AND REPORTING**

Auditing by an external, independent auditor should be undertaken at the end of both the construction and rehabilitation phases, as well as regular audits thereafter during operation, subject to DEA requirements. After each audit a report should be submitted to the DEA and other relevant authorities. The audit must cover compliance with any specific conditions included in the Environmental Authorisation as well as specific management actions included



in this EMP. The completed audit reports must be accurately dated and form part of the document control system.

A monthly audit should be undertaken by the independent ECO during construction and the resultant independent audit reports will be communicated with senior management within AES and sent to the DEA and other relevant authorities as required.

## **1.7 REVISION OF THE EMP**

This EMP has been formulated in draft so as to allow for appropriate changes and modifications subject to inclusion of final requirements as per the EA. The EMP should be subject to review by senior management responsible for the project at the following stages of the project:

- Prior to the initiation of the construction phase to ensure that all relevant management actions have been included;
- Following the construction phase and after the start of operation, to capture additional and unforeseen mitigation measures that are identified during these activities, and would be relevant to the operational phase; and
- Prior to final decommissioning.

## **1.8 SUBSIDIARY PLANS AND POLICIES**

Environmental and socio-economic management issues at various stages in the life of the project from detailed design through to decommissioning, are governed or guided by a number of standards, including:

- those contained in South African legislation;
- those required by AES policy or manufactures specifications;
- those within relevant international standards (e.g. World Bank environmental guidelines, IFC Performance Standards, World Health Organisation, International Labour Organisation); and
- commitments made in the EIA.

Prior to construction a number of subsidiary plans, policies and monitoring programmes will be required to manage various activities or potential risks. These are summarised in *Box 1.1*.

**Policies, Plans and programmes to be developed**

- Environmental Policy
- Recruitment Policy
- Local Procurement Policy
- Health and Safety Policy
- Human Resources Policy
- Code of Conduct
- Emergency Preparedness and Response Plan
- Health and Safety Plan
- Traffic Management Plan
- Waste Management Plan
- Community Engagement Plan (CEP)

**1.9****STAKEHOLDER ENGAGEMENT**

AES will continue to engage with stakeholders throughout project construction and operation. Communication with local communities and other local stakeholders will be a key part of this engagement process and will require AES and the contractor to work closely during the construction period. Development of a Community Engagement Plan (CEP) will be important to facilitate this communication.

The objectives of communication and liaison with local communities are the following.

- To provide residents in the vicinity of the solar power plant (e.g. neighbouring landowners/ farmers) and other interested stakeholders, with regular information on the progress of work and its implications.
- To monitor implementation of mitigation measures and the impact of construction on communities via feedback from those affected in order to ensure that mitigation measures are implemented and the mitigation objectives achieved.
- To manage any disputes that may arise between AES, the contractors and local people.

**1.9.1*****Grievance Procedure***

AES should develop a grievance procedure to ensure fair and prompt resolution of problems that may arise from the project. The grievance procedure should be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders.
- Seek to resolve all grievances timeously.
- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with AES and its contractors. The ECO should ensure that the grievance procedure is made accessible to the local community and other relevant stakeholder.

Activities undertaken during site preparation, construction and operation may require additional permits, over and above the Environmental Authorisation. AES is responsible for ensuring that the necessary permits are in place in order to comply with national and local regulations. Additional permit requirements are described below.

## 2.1

**HERITAGE**

The protection and management of South Africa's heritage resources is controlled by the National Heritage Resources Act (NHRA), 1999 (Act No. 25 of 1999). The objective of the NHRA is to introduce an integrated system for the management of national heritage resources.

*Archaeology, Palaeontology and Meteorites*

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act, palaeontological heritage impact assessments (PIAs) and archaeological impact assessments (AIAs) are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period. Depending on the sensitivity of the fossil and archaeological heritage, and the scale of the development concerned, the palaeontological, and archaeological impact assessment required may take the form of (a) a stand-alone desktop study, or (b) a field scoping plus desktop study leading to a consolidated report. In some cases these studies may recommend further palaeontological and archaeological mitigation, usually at the construction phase. *Table 2.1* outlines when a permit is required depending on the sensitivity of the heritage resources.

**Table 2.1*****Permitting requirements for fossil, built environment and Stone Age archaeology***


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**PERMIT APPLICATION SECTION 35 - FOSSILS, BUILT ENVIRONMENT FEATURES, SHIPWRECKS & STONE AGE ARCHAEOLOGY (Ref : NHRA 1999: 58):**


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- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
  - (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
  - (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite.
-

## *Burial Grounds and Graves*

A Section 36 permit application is made to the South African Heritage Resources Agency (SAHRA) which protects burial grounds and graves that are older than 60 years, and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the conditions listed in *Table 2.2*.

**Table 2.2** *Permitting requirements for burial grounds and graves older than 60 years to historic burials to the South African Heritage Resources Agency (SAHRA)*

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**PERMIT APPLICATION SECTION 36 - BURIAL GROUNDS & GRAVES  
(REF: NHRA 1999 : 60)**

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- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves
  - (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
  - (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals
  - (d) SAHRA or a provincial heritage resources authority may not issue a permit for The destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant
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**Table 2.3** *Permitting requirements for heritage resources management*

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**PERMIT APPLICATION SECTION 38 (Ref: NHRA 1999 : 62)**

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- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
  - (b) the construction of a bridge or similar structure exceeding 50 m in length;
  - (c) any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent; or
    - (ii) involving three or more existing erven or subdivisions thereof; or
    - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
  - (d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
  - (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.
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## 2.2 WATER USE

Given the minimal volumes of water required for the plant's operations, it is unlikely that a water use licence will be required. The Department of Water Affairs (DWA) have stipulated that projects of this nature take necessary measures to ensure that water needs are adequately catered for by a usage assessment. In the event that a water usage licence is required, this will be processed only once the Power Purchase Agreement has been awarded.

## 2.3 ABNORMAL VEHICLE LOADS

Solar power technology components will be delivered to site using road transport and due to the large volume of the components, the vehicles used to deliver the components will be considered abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989). A permit for a vehicle carrying an abnormal load must be obtained from the relevant Provincial Authority. The vehicle must comply with the Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, issued by the Department of Transport, 2009.

## 2.4 FLORA

Two plant species observed on site require a permit obtainable from DENC should the develop require the removal or cause destruction or disturbance of these species, *Hoodia gordonii* and *Aloe claviflora*. Any individuals of these species falling within areas that will need to be cleared for the development, should be located, marked and translocated within the site to an area outside the development footprint. Prior to commencement of construction activities, AES should apply with the consent of the landowner for such a permit and the translocation of plants should take place under the supervision of an ecologist or someone else with experience in this regard.

### 3.1 INTRODUCTION

Specific biological monitoring requirements that are required to be undertaken through the various phases of the Olyven Kolk Solar Power Plant are identified in this section. Biological monitoring is required during the pre-construction and construction phases of the project.

Table 3.1 provides a summary of what monitoring is required at the various phases of the development. AES is responsible for ensuring that all monitoring measures described in this section are undertaken by appointing the relevant specialists where necessary.

**Table 3.1 Monitoring Requirements**

	Ecology	Avifauna
Pre-construction	X	X
Construction	X	X
Operation	X	X

### 3.2 PRE-CONSTRUCTION PHASE

Pre-construction monitoring is an essential requirement prior to construction in order to validate within reason that the arrangement of the arrays and project infrastructure, as well as mitigation and management measures as included in this EMP, will minimize potential impacts on ecological components.

#### 3.2.1 Ecological Monitoring

##### *Monitoring Impacts on Rare or Endangered Plant Species*

The primary concern in terms of endangered plant species at the site is the potential impact on *Hoodia gordonii* and *Aloe claviflora*. The following monitoring action is recommended during the pre-construction phase:

Prior to construction the areas planned for installation of solar arrays or associated infrastructure should be searched for *Hoodia gordonii* and *Aloe claviflora* as well as any other plant species of conservation concern that may occur in the area. All individuals located should be marked and translocated to similar habitat outside the development footprint under the supervision of an ecologist or someone with experience in plant translocation. As indicated in Section 2.4, a permit will be required to relocate listed plant species.

### 3.2.2 *Avifauna Monitoring*

#### *Monitoring protocols: Avian densities before and after*

A set of at least 10 walk-transect routes, each of at least 250 m in length, should be established in areas representative of all the avian habitats present within a 2 km radius of centre of the Olyven Kolk site. Each of these should be walked at least once every two months over the six months preceding construction, and at least once every two months over the same calendar period, at least six months after the PV plant is commissioned. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison

#### *Monitoring protocols: Bird activity monitoring*

Monitoring of bird activity in the vicinity of the solar power plant should be done over a single day at least every two months for the six months preceding construction, and at least once per quarter for a full calendar year starting at least six months after the solar power plant is commissioned. Each monitoring period should involve full-day counts of all species flying over or past the PV plant impact area (see passage rates below).

### 3.3 **CONSTRUCTION PHASE**

Mammals, reptiles and amphibians are most likely to be exposed to impacts during the construction phase of the solar power plant primarily through loss of habitat and impacts associated with construction vehicles and workforce. This section describes the biological monitoring measures that should be undertaken during the construction phase.

#### 3.3.1 *Ecological Monitoring*

In general, during the construction phase, monitoring should be used to ensure that the development takes place within the guidelines provided by this document to ensure that construction minimises or avoids impacts on adjacent natural vegetation, fauna and ecosystems. This monitoring could be undertaken by the ECO.

#### *Monitoring Loss of Habitat and Habitat Fragmentation*

Habitat loss and fragmentation is primarily a concern during the construction phase since this is when the majority of disturbance will take place. Specific areas that should be monitored include:

- Any deviations from the final construction plan, including the location, extent and nature of vegetation impact and transformation.



- Any inadvertent or otherwise unintended destruction of natural vegetation and the remediation steps taken to encourage the recovery of the impacted areas.
- Monitoring frequency would need to be high, at least weekly during the construction phase.

#### *Monitoring Impacts on Sensitive Environments*

The sensitive environments at the site require specific attention to avoid and mitigate negative impacts to these areas. Sensitive areas include the drainage areas. These areas will be particularly vulnerable to negative impact during the construction phase while the project infrastructure associated with the development is laid down. During the construction phase, monitoring should largely be directed towards enforcement to ensure that these areas are not negatively impacted. As such monitoring of these aspects should be on a continuous basis.

Recommendations include:

- Where internal gravel compacted roads traverse drainage lines, the sites should be monitored to ensure that the presence of the road does not result in changes to the morphology such as erosion. Monthly monitoring during the construction phase would be adequate.

#### *Monitoring Impacts on Rare or Endangered Plant Species*

As mentioned in *Section 3.2*, the primary concern in terms of endangered plant species at the site, is the potential impact on *Hoodia gordonii* and *Aloe claviflora*. The measures identified for pre-construction should be undertaken during the construction phase. In particular the following monitoring actions are relevant during construction:

- The relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

#### *Monitoring Direct Faunal Impacts*

Direct faunal impacts, particularly of listed reptile species, are of concern during the construction phase as a result of habitat clearance and road kills by construction vehicles, and possibly collection or death by construction workers. Construction phase monitoring should monitor the extent of human-animal interactions and to identify additional measure that can help to minimize such impacts. Specific recommendations include:

- The traffic on the access and internal gravel compacted service roads poses a significant risk to many animals, particularly during the construction phase when traffic volumes on the roads are likely to be heavy. Any fauna

accidentally killed during construction should be reported and a log of such mortalities maintained. Where possible the species killed should be collected and frozen by the ECO and shown to an ecologist periodically for identification. Species identified should be recorded. Monitoring should be on an ad-hoc basis, as incidents occur.

- The activities of construction staff should be monitored to ensure that undesirable activities such as hunting, illegal collecting of plants, seeds or any other biological material does not occur, and that fires are not made outside of the designated and demarcated areas. Any incidents or transgressions relating to these aspects should be logged, as well as the remedial steps taken to rectify the situation.

### 3.4 OPERATIONAL PHASE

This section describes the monitoring measures to be undertaken during the operational phase of the solar power plant.

#### 3.4.1 Ecological Monitoring

During the operational phase, monitoring should be focused on ensuring that there are no residual impacts such as soil erosion and alien plant invasion resulting from the construction phase, and on reducing the day to day impact of the solar power plant.

Operational monitoring can be undertaken by the ECO on a monthly basis throughout the first year after construction (or more frequently after storm or extended rainfall events to check for erosion). After the first year, monitoring of rehabilitation measures could be checked twice annually for the next two years, and thereafter construction monitoring could be restricted to annual checks.

Specific aspects to be monitored during operation by the ECO would include:

*Disturbance of sensitive habitat during maintenance:*

Habitat damage caused by movement of vehicles and equipment during infrastructure maintenance activities.

*Erosion*

Erosion has been identified as one of the major risks to the terrestrial ecology associated with the development, and therefore construction monitoring of the development should focus on checking the presence and persistence of erosion at the site, and identifying additional erosion control measures. Erosion on the site may result from inadequate drainage measures along the roads or base of the solar arrays. The site should be checked for erosion at

least quarterly during the first three years and after major storm events or extended rainfall periods. Monitoring should continue until all erosion-related problems are rectified; vegetative cover restored, and the drainage measures functioning effectively. Photographs and a record of erosion measures and interventions should be logged.

#### *Alien Plant Invasion*

The large amount of disturbance at the site is likely to render it highly vulnerable to alien plant invasion, particularly in the first few years post-construction. Monitoring for aliens should include the following:

- An alien monitoring system should be set up which allows for the occurrence, persistence and treatment of alien plants to be monitored in a manner which allows the data to be interrogated in a GIS.
- Monitoring for alien plants could be done simultaneously with erosion monitoring and at a similar interval.
- The system should record the species present, their location, the control measures used and their success rate.

### 3.4.2

#### *Avifauna Monitoring*

##### *Monitoring protocols: Bird flight behavior and activities around solar arrays*

Bird traffic over and around the solar power plant should be conducted from suitable vantage points (selected and used to provide coverage of avian flights in relation to all areas of the solar plant). Once in position at the selected count station, the observer should record (preferably on a specially designed data sheet) the date, count number, start-time and conditions at start - extent of cloud cover, temperature, wind velocity and visibility - and proceed with the count. The counts should detail all individuals or flocks of the stipulated priority bird species, all raptors, and any additional species of particular interest or conservation concern, seen flying within 200 m of the envisaged or actual periphery of the solar power plant. Each record should include the following data: time, updated weather assessment, species, number, mode of flight (flapping, gliding, soaring), flight activity (commuting, hunting other), direction of flight and, for post construction monitoring, notes on any obvious evasive behaviour or flight path changes observed in response to the solar power plant. The time and weather conditions should again be noted at the end of each count. These observations should also detail (time, species, nature, location, duration) all direct interactions between birds and the solar panels (e.g. perching, hunting, displaying, nest-building).

##### *Monitoring of avian collisions*

Collision monitoring should have two components: (i) experimental assessment of search efficiency and scavenging rates of bird carcasses on the

site, and (ii) regular searches of the vicinity of the solar power plant for collision casualties.

*Monitoring of avian collisions: Assessing search efficiency and scavenging rates*

The value of surveying the area for collision victims only holds if some measure of the accuracy of the survey method is developed (Morrison 2002). To do this, a sample of suitable bird carcasses (of similar size and colour to the priority species – e.g. Egyptian Goose *Alopochen aegyptiacus*, domestic waterfowl and pigeons) should be obtained and distributed randomly around the site without the knowledge of the surveyor, some time before the site is surveyed. This process should be repeated opportunistically (as and when suitable bird carcasses become available) for the first two months of the monitoring period, with the total number of carcasses not less than 10. The proportion of the carcasses located in surveys will indicate the relative efficiency of the survey method.

Simultaneous to this process, the condition and presence of all the carcasses positioned on the site should be monitored throughout the initial two-month period, to determine the rates at which carcasses are scavenged from the area, or decay to the point that they are no longer obvious to the surveyor. This should provide an indication of scavenge rate that should inform subsequent survey work for collision victims, particularly in terms of the frequency of surveys required to maximize survey efficiency and/or the extent to which estimates of collision frequency should be adjusted to account for scavenge rate (Osborn *et al.* 2000, Morrison 2002). Scavenger numbers and activity in the area may vary seasonally so, ideally, scavenge and decomposition rates should be measured twice during the monitoring year, once in winter and once in summer.

*Monitoring of collisions: Collision victim surveys*

The area within a radius of at least 20 m of each solar panel, the area on and under the panel itself, and the area within 5 m on either side of any new lengths of power line, should be checked regularly for bird casualties (Anderson *et al.* 1999, Morrison 2002). The frequency of these surveys should be informed by assessments of scavenge and decomposition rates conducted in the initial stages of the monitoring period (see above), but they should be done at least weekly for the first two months of the study. All suspected mortality incidents should be comprehensively documented, detailing the apparent cause of death, precise location (preferably a GPS reading), date and time at which the evidence was found, and the site of the find should be photographed with all the evidence *in situ*. All physical evidence should then be collected, bagged and carefully labeled, and refrigerated or frozen to await further examination. If any injured birds are recovered, each should be contained in a suitably-sized cardboard box, and the local conservation authority should be notified and requested to transport casualties to the nearest reputable veterinary clinic or wild animal/bird rehabilitation centre.

These surveys should also include detailing (location, extent, size, number) of all bird products (e.g. faeces, pellets, nest structures etc) found on the solar panels

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Mitigation and compliance monitoring measures required to be undertaken by the developer, AES or the ECO, are presented in this section under the following headings:

- Pre-Construction Planning Phase;
- Construction Phase; and
- Operational Phase.

Mitigation and compliance monitoring measures listed in this section must be implemented by AES during the various phases of the project. These measures are based on best practice to minimise impacts on the Olyven Kolk site.

A separate document, containing Contractor Compliance Standards has been drafted (Section 5) in order to clearly identify the roles and responsibilities of contractors appointed during the various phases of the project. These standards should be included as part of the contract documentation between AES and the contractor, and AES is responsible for ensuring the Contractor Compliance Standards are fully implemented by the contractor.

#### 4.1 *PRE-CONSTRUCTION PLANNING PHASE*

In order to ensure compliance with environmental legislation and best practice guidelines the following actions are applicable to the pre-construction planning phase for the solar power plant. The persons responsible for implementation of the actions are listed in the table below, the majority of which are the responsibility of AES.

Key activities during the pre-construction planning phase will include:

- Pre-construction monitoring (see *Section 3.2*);
- Notification of DEA of final layout (if required) and additional mitigation / management measures, where needed;
- Drafting of subsidiary plans, policies and procedures;
- Developing with the contractor the following:
  - A Site Layout Plan
  - Method Statements

These activities are described in more detail in the matrix below.

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
1.	Stakeholder engagement	Notify all registered Interested and Affected Parties of Environmental Authorisation (EA).	1.1	Notify all registered I&APs and key stakeholders of the Environmental Authorisation opportunity and appeal procedure.	Notices sent to relevant parties on the stakeholder database. List of those to whom it was sent on file	ERM	Within 5 days from the issuing of the Environmental Authorisation.
2	Permit Requirements	Ensure compliance with legal and other permitting requirements.	2.1	Ensure that all relevant legal requirements have been met.	Permits	AES	Prior to construction
3	Finalisation of EMP and Contractor Compliance Standards	Update EMP with EA conditions and other mitigation measures from monitoring	3.1	Incorporate additional mitigation measures specified by DEA in the EA into the EMP and Contractor Compliance Standards.	EMP and Contractor Compliance Standards	AES	Prior to construction
			3.2	Contractor to keep copy of EMP and Contractor Compliance Standards on site and to provide ECO with a copy.			
4	Notification to DEA: Director of Compliance Monitoring	Ensure that DEA are notified of commencement date.	4.1	Notify DEA prior to commencement of construction.	Proof of communication.	AES	14-days in advance of commencement of construction.
		Keep DEA informed of any aspects of non-compliance with EMP or ES	4.2	Notify DEA with reasons if any provisions of the EMP or EA cannot be implemented, and provide alternative	DEA notification	AES	Prior to construction
		Keep DEA informed of current contact details of applicant	4.3	Notify DEA of any change of contact details of the applicant	DEA notification	AES	Prior to construction
		Provide Site Layout Plan to DEA	4.4	Submit the detailed Site Layout Plan (see section 5.1 below) to DEA prior to construction	DEA notification	AES	Prior to construction
		Keep DEA informed of contact details of ECO	4.5	Submit the name and contact details of the appointed ECO prior to construction	DEA notification	AES	Prior to construction
		Submit copies of all permits to DEA	4.6	Copies of all permits and written approvals obtained by relevant authorities should be submitted to DEA and shall include but not necessarily limited to: <ul style="list-style-type: none"> <li>Removal of protected plants</li> <li>Approval from SAHRA relating to disturbance of heritage features</li> </ul>	DEA notification	AES	Prior to construction
5.	Site Layout Plan	Ensure final site layout minimises environmental and social risks and complies	5.1	Prepare a detailed Site Layout Plan that demarcates the following:	Site Layout Plan	AES	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
		with EMP		<ul style="list-style-type: none"> <li>• Solar arrays, cables, temporary buildings, access and internal compacted gravel roads, etc</li> <li>• Stormwater drainage measures</li> <li>• Waste disposal and storage areas</li> <li>• Offices, works areas and ablutions</li> <li>• Storage of materials and equipment</li> <li>• Vehicle maintenance and storage</li> </ul>			
6.	Subsidiary plans	Develop Subsidiary Plans to minimise environmental and social risks	6.1	<p>The following subsidiary plans will be required prior to construction:</p> <ul style="list-style-type: none"> <li>• Health and Safety Plan</li> <li>• Traffic Management Plan</li> <li>• Transport Study</li> <li>• HIV Policy and Awareness Plan</li> <li>• Rehabilitation Plan</li> <li>• Policy for assessing all damages and losses</li> <li>• Recruitment Policy</li> <li>• Procurement Policy</li> <li>• Code of Conduct</li> <li>• Grievance Procedure</li> </ul> <p>These are referred to below, where relevant.</p>	Subsidiary plans	AES	Prior to construction
7.	Health and Safety	Ensure the health and safety of site personnel during construction.	7.1	<p>A Health and Safety Plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This shall include:</p> <ul style="list-style-type: none"> <li>• Safety zones from residences, roads, right of way.</li> <li>• Chemical ablution facilities.</li> </ul>	Health and Safety Documentation	AES	Prior to construction
8	Procurement of Services and Tender Procedures	Ensure that procurement of local, regional and national services is maximised:	8.1	Establish a procurement policy which sets reasonable targets for the procurement of goods and services from South African residents /suppliers, particularly local residents as far as possible.	Procurement policy	AES	Prior to construction
			8.2	Procurement should advertise tenders in local	Local and national advertisements		



PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			8.3	and national newspapers. Procurement processes should identify and invite bids from local suppliers.	Invited bids from local suppliers		
			8.4	Adopt transparent adjudication process for local suppliers.	Demonstrate transparent process of adjudicating tenders		
9	Employment & Recruitment	Ensure that employment of local people is maximised	9.1	Work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and is maximised and stipulate this as part of contractors contract.	Meeting minutes	AES	Prior to construction
			9.2	All skill requirements to be communicated to the local communities via appointed people prior to the commencement of the construction phase.	Meeting minutes / advertisements		
			9.3	Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project.	Training material and records of training		
			9.4	No employment will take place at the entrance to the site. Only formal channels for employment will be used.			
			9.5	AES to work closely with the suppliers to provide the requisite training to the workers. The training provided will focus on development of local skills			
10	Good community relations	Minimise raised expectations in local community and limit social disruption	10.1	Information boards: containing background information on the construction activity and the relevant contact details for complaints shall be erected near the entrance to the site.	Large info board erected at the site and correct information provided (contact details)	Contractor	Prior to construction
			10.2	Notification of onset of construction: Notify	Proof of notification of onset of construction to AES, relevant authorities and local community		

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			10.3	<p>Employer, relevant authorities and local community in writing as well as verbally of the onset of construction activities, including contact details for complaints.</p> <p>Community liaison assistants to inform the local community members of the recruitment process and onset of construction and schedule.</p>	Recruitment records of community liaison assistance		
11	Social Ills and disruption	To limit, where possible, social ill brought about by the construction and operation of the renewable energy facility	11.1	Develop an induction programme, including a Code of Conduct, for all workers.	Code of Conduct	AES	Prior to construction
			11.2	All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal.	Code of Conduct		
			11.3	A grievance procedure will be established whereby complaints are recorded and responded to.	Grievance Procedure		
			11.4	A HIV Policy and Awareness Plan must be developed and implemented.	HIV Policy		
			11.5	Ensure contractor does not undertake recruitment to be done at the project site (to avoid workers camping and queuing at the site)			
12.	Property Prices and Desirability of Property	Minimise the negative impacts on property prices.	12.1	Design site layout in a manner that limits the footprint of the facility and all associated infrastructure.	Site Layout Plan	AES	Prior to construction
			12.2	Prepare a site Rehabilitation Plan that will be implemented post construction and as part of the decommissioning phase.	Rehabilitation Plan		
			12.3	All directly affected and neighbouring farmers will be able to lodge grievances with AES using the Grievance Procedure.	Grievance Procedure		

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
13.	Traffic Impact	Minimise negative effects associated with the increase in traffic.	13.1	A Transport Study must be undertaken prior to construction to determine the most appropriate route from port to site.	Transport Study	AES	Prior to construction
			13.2	AES will develop a Traffic Management Plan including strict controls over driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures.	Traffic Management Plan		
			13.3	AES will liaise with Transnet to mitigate or minimise disturbance or impacts to the Sishen-Saldanha railway.	Policy		
			13.4	AES will develop a policy and procedure for assessing all damages and losses (e.g. damage to property, injury or death of people or livestock) resulting from project vehicles.	Permits		
			13.5	All necessary transportation permits will be applied for at this stage and obtained from the relevant authorities, including permits for abnormal loads if relevant. Oversee development of permits required by contractors.			
14.	Damage or Destruction of Cultural Heritage Interests	Avoid damage or destruction of cultural heritage aspects	14.1	Palaeontological fossils preserved within alluvial sediments will be largely safeguarded by avoiding the drainage areas on site.	Site Layout Plan	AES	Prior to construction
15.	Waste and effluent	Prevent soil and/or groundwater contamination from waste and effluent.	15.1	A suitable area for waste skips must be selected, away from drainage lines, and included in the site layout plan.	Waste Management Plan	AES	Prior to construction
16.	Soil compaction and erosion	Minimise soil compaction and erosion	16.1	Workers are to use existing farm tracks as far as possible. If vehicles must leave the road, they should utilize a single track and should not take multiple paths.	Site Layout Plan	AES	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			16.2	Appropriate erosion control and water diversion structures should be constructed at the same time as the vegetation is cleared so that the loosened soil is not left vulnerable to erosion.			
			16.3	Formalise the drainage paths found onsite by excavating channels and thus permitting narrower drainage corridors to be kept open. Widths of the order of 25 m ought to suffice under such conditions. Erosion protection of these channels will be required in places.			
			16.4	Maintain adequate breadth and width below panels and supports so as not to trap debris. Protect disturbed surfaces against erosion.			
17.	Loss of Vegetation	Minimise impacts associated with vegetation loss	17.1	Mow the vegetation down to the required height rather than using destructive clearing methods where possible.	Appropriate contractor for monitoring Site Layout Plan	AES	Prior to construction
			17.2	Avoid placing solar infrastructure in close proximity to drainage lines.			
			17.3	The development footprint area should be searched for listed plant species ( <i>Hoodia gordonii</i> and <i>Aloe claviflora</i> ) by an ecologist or similarly qualified person. All individuals located should be marked and translocated to similar habitat outside the development footprint under the supervision of an ecologist or someone with experience in plant translocation. A permit will be required to relocate listed plant species.	Botanist		
			17.4	If topsoil must be removed, it should be replaced or used as soon as possible elsewhere as it will contain seed of local species which will aid the natural recovery of the vegetation.			
			17.5	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion			

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
				potential. 17.6 No natural vegetation should be transformed for temporary activities. 17.7 Restricting service roads and underground cabling to previously disturbed lands, avoiding natural vegetation.			
18.	Faunal Impacts	Minimise impacts to onsite fauna	18.1	Measures of habitat loss above should be implemented to minimise impacts to fauna.	Site Layout Plan	AES	Prior to construction
			18.2	Security fencing surrounding the site should be constructed so as to allow the free movement of animals, especially during the construction phase when animals may need to leave the site. Strand fencing is highly preferable to mesh fencing in this regard.			
			18.3	The design of the solar power plant and associated infrastructure must be bird-friendly.			
19.	Bird Impacts	Minimise impacts on birds through habitat loss, destruction and displacement	19.1	Exclude development within a 1 km radius of the Martial Eagle nest site	Site Layout Plan	AES	Prior to commencement of construction.
			19.2	Exclude development within a A 500 m radius of the Lanner Falcon nest site			
20.	Visual Impacts	Minimise visual impacts	20.1	The final layout should be reviewed by ERM and the visual specialists, prior to the commencement of construction activities.	Site Layout Plan and building designs	AES	Prior to commencement of construction.
			20.2	Surface disturbance for internal compacted gravel roads and construction camp should be minimized and erosion control and dust suppression undertaken to minimize exposed			

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
				soil.			
			20.3	Disturbance of areas of indigenous vegetation should be minimized and disturbed areas should be prioritized for construction facilities.			
			20.4	No advertising billboards will be permitted and any signs limited to those informing the public on solar power plants.			

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In order to ensure compliance with environmental legislation requirements and NEMA best practise the following actions are applicable to the construction phase and are the responsibility of AES. Standard construction phase compliance standards that need to be implemented by the contractor are contained in section 5.

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CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Compliance with EMP and EA	Confirm AES commitment to adherence to EMP and Contractor Compliance Standards	1.1	Ensure that the EMP; Contractor Compliance Standards and EA are available at the site throughout construction and implemented by the contractor.	Copy of signed EMP and EA with subcontractor	AES	Prior to construction
		Auditing of compliance with EMP and EA	1.2	An audit report must be undertaken by an independent auditor at the end of the construction phase, and shall be submitted to DEA.	Audit report and proof of submission to DEA	AES	End of Construction
			1.3	The audit report shall indicate the date of the audit, name of auditor; and outcome of audit in terms of compliance with the environmental authorisation and conditions of the EMP.			
2.	Health and Safety	Ensure the health and safety of subcontractors and site users	2.1	A Health and Safety Plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This plan must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.	Signed Health and Safety Plan	AES	During construction
			2.2	Appropriate Personal Protective Equipment (PPE) must be worn by all construction personnel. This shall include the use of ear protection in areas where the 8-hour ambient noise levels exceed 75dBA.	Signed Health and Safety Plan	Contractor	
			2.3	No smoking to be allowed near the fuel storage area and notices depicting "No Smoking", "No Naked Lights" and "Danger" to be erected at the fuel storage site.	Signed Health and Safety Plan	Contractor	
3.	Dust and emissions	Limit fugitive dust and exhaust emissions	3.1	Dust abatement should be implemented especially during windy conditions and in areas prone to generation of airborne dust. This shall include spraying of water and covering of stockpiled and transported materials.	ECO records	AES	During construction
			3.2	AES Project Manager to keep records of any complaints regarding dust.	Grievance procedure documentation/logbook		
4.	Noise pollution	Avoid disturbing surrounding land-users	4.1	Vehicles must to adhere to speed limits on site, and not exceed 40km/hr	Signage on site	AES	During construction



CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			4.2	A grievance procedure will be established whereby complaints are recorded and responded to.	Grievance procedure logbook	Contractor	
			4.3	Construction workers and personnel must wear hearing protection equipment when the 8-hour ambient noise levels exceed 75dBA.			
5.	Vegetation loss	Prevent unnecessary disturbance and damage to natural vegetation and topsoil loss	5.1	Educate all contractors as to the importance of the undisturbed conservations areas and prohibitions on fires, and collection of plant material.	Training materials and records of attendance	AES	On appointment of contractor
			5.2	Contractors are to use existing farm tracks as far as possible. If vehicles must leave the road, they should utilize a single track and should not take multiple paths.			
			5.3	If topsoil must be removed, it should be replaced or used as soon as possible elsewhere as it will contain seed of local species which will aid the natural recovery of the vegetation.			
			5.4	Areas to be cleared should be clearly demarcated.			
			5.5	Vegetation should only be cleared when and where absolutely necessary. If possible a vegetative cover should be left in place. It is preferable to mow the vegetation down to the required height than to use other more destructive clearing methods			
			5.6	Any individuals of protected species observed within the development footprint during construction, should be translocated under the supervision of the ECO.			
			5.7	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion potential.			
			5.8	Remove alien vegetation from disturbed areas.			
			5.9	Soil disturbance should be kept to an absolute minimum			
6.	Traffic Impact	Mitigate traffic impacts	6.1	The traffic management plan will be adhered to including adherence to speed limits and 'rules of the road'.	Traffic Management Plan	AES	During construction
			6.2	All directly affected and neighbouring farmers and local	Grievance Procedure		

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			6.2	residents will be able to lodge grievances with AES using the Grievance Procedure regarding dangerous driving or other traffic violations that could be linked to the Project.  During construction, arrangements and routes for abnormal loads (if required) must be agreed in advanced with the relevant authorities and the appropriate permit must be obtained for the use of public roads.			
			6.3	A grievance procedure will be established whereby any complaints by neighbours or affected parties are recorded and responded to.			
7.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	7.1	Heritage Northern Cape to be notified immediately if a burial/human remains is uncovered during the construction of the solar power plant.	ECO Report & SAHRA response	AES	Prior to and throughout construction
			7.2	All directly affected and neighbouring farmers will be able to lodge grievances with AES using the Grievance Procedure.	Grievance procedure and logbook		
			7.3	Trenches and excavations should be inspected by a palaeontologist	Palaeontologist Report and HNC Response		
8.	Socio-cultural issues	Minimize impacts associated with influx of jobseekers.	8.1	AES code of conduct developed prior to the construction phase must be adhered to.	Code of conduct must be available on site.	AES	During construction
			8.2	The HIV Policy and Awareness Plan developed prior to the commencement of construction must be adhered to by AES employees.	HIV policy must be available on site.		
			8.3	A grievance procedure will be established whereby complaints are recorded and responded to.			
9.	Faunal Impacts	Mitigate impacts on fauna	9.1	Poaching or hunting should be strictly forbidden.	ECO Report and photographic evidence	AES	During construction
			9.2	Fauna must have 'right of way' on internal roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.	Road signage and ECO reports & grievance logs		
			9.3	All vehicles must stick to designated and prepared internal roads and a speed limit (up to 40 km/hr) must be enforced.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			9.4	No harvesting or collecting of plants, seeds, animals or their parts to be allowed.	Worker training & awareness records		
			9.5	It should be mandatory for staff of AES to attend an environmental briefing and training session with respect to the guidelines outlined in this EMP.	Training material and records of training		
10.	Visual Impacts	Minimise visual impacts	10.1	Measures to control wastes and litter should be included in the contract specification documents.	Evidence in contract specification documents.	AES	Throughout construction
11.	Loss of agricultural land	Minimise the loss of agricultural land	11.1	AES to minimise the damage to farmland caused by construction activities by ensuring strict compliance with construction plans to minimise the development footprint and to implement a 'Code of Conduct' governing workers.		AES	
			11.2	AES to design the infrastructure layout in a manner that limits the project footprint and allow for continued grazing on the land.			
			11.3	AES's Community Development Fund will seek to increase the extent of farming or the intensity of farming practice in order to counter the effects of agricultural land loss.			
			11.3	AES to minimise the damage caused by construction activities to the farmland by ensuring strict compliance with construction plans and worker 'Code of Conduct'.			
12	Waste and Effluent	Minimise generation of waste and effluent	12.1	All waste must be separated into skips for recycling, reuse and disposal. Recycled waste will be removed by an appropriate contractor, as per the EMP recommendations.	Site inspection and photographic evidence	Contractor	Throughout construction phase
			12.2	Vegetative material will be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation.			
			12.3	Effluent from concrete washings etc will be contained within a bunded area.			
			12.4	All hazardous and liquid waste materials e.g. fuel for generators, including any contaminated soils will be stored in a bunded area and disposed of by a licensed contractor.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			12.5	Effluent and stormwater run-off will be discharged away drainage lines.			
			12.6	Materials that cannot be re-used or recycled will be placed in a skip and removed from site to a licensed disposal facility.			
13	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater	13.1	Soil stockpiles will be protected from wind or water erosion through placement, vegetation or appropriate covering.	Site inspection and photographic evidence	Contractor	Throughout construction phase
			13.2	Proper drainage controls such as culverts, cut-off trenches will be used to ensure proper management of surface water runoff to prevent erosion.			
			13.3	Cleared or disturbed areas will be rehabilitated as soon as possible to prevent erosion.			
			14.4	Fuel, oil and used oil storage areas will have appropriate secondary containment (ie bunds).			
			13.5	Spill containment and clean up kits will be available onsite and clean-up from any spill will be appropriately contained and disposed of to a licensed landfill by a licensed operator.			
			13.6	Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.			
			13.7	Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into drainage channels.			
14	Loss of topsoil, Soil Compaction and Erosion	Minimise impacts and loss of topsoil	14.1	If topsoil must be removed, it should be replaced or used as soon as possible elsewhere as it will contain seed of local species which will aid the natural recovery of the vegetation.	Site inspection Photographic evidence ECO Report	Contractor	During Construction
15	Bird Impacts	Minimise impacts on birds through habitat loss, destruction and displacement	15.1	Timing construction to avoid sensitive times (e.g. Martial Eagle pre-breeding, incubation and small nestling seasons from March/April to June/July).		Bird specialist	Prior to construction
			15.2	Relocate both the eagle nest structures to more distant pylons			

In order to ensure compliance with environmental legislation requirements and recommendations specified by the EIR Team during the EIR process, the following generic and specific requirements are applicable during the operational phase of the Olyven Kolk Solar Power Plant. It is likely that DEA will require a separate operational EMP prior to the start of operation which should be informed by pre-construction and construction monitoring results and other new information from geotechnical studies or technological improvements. The operational mitigation and monitoring measures specified here provide a foundation for further development of the Operational EMP.

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Visual impacts	Minimize the visual impacts during the operation phase.	1.1	Signage related to the solar power plant must be discrete and confined to entrance gates. No advertising will be permitted.	Photographic evidence	AES	Throughout operation
			1.2	Footprint of the facilities, as well as parking and vehicular circulation, should be clearly defined.			
2.	Health and Safety	Maintain health and safety standards	2.1	Regular maintenance of solar infrastructure, cables and buildings must be undertaken to ensure optimal functioning.	Inspection records	AES	Throughout operation
3.	Dust and emissions	Limit fugitive dust and exhaust emissions.	3.1	Vehicles travelling on internal unpaved or gravel roads should not exceed a speed of 40 km/hr.	Signage	AES	Throughout operation
4.	Waste and Effluent	Prevent soil and groundwater pollution	4.1	Used oil stored on site must be stored in an impervious container, within a bunded area.	Photographic evidence	AES	Throughout operation
			4.2	General waste must be removed from site by a licensed contractor.	Waste manifest documents		
			4.3	Areas disturbed during construction will be re-vegetated with indigenous vegetation to prevent erosion.	Photographic evidence		
5.	Traffic	Minimise traffic impacts	5.1	All internal and access roads that will be used by AES during the operational phase of the project will be maintained by AES throughout the life of the Project.	Permits	AES	Throughout operation
6.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	6.1	Prevent access of workers to any areas identified as sensitive in a cultural heritage context during per-construction to ensure sites are not vandalized	Monitoring data	AES	Throughout operation
7.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion	7.1	Long-term monitoring to be undertaken (see <i>Section 3</i> ).	Monitoring reports and photographic evidence	AES	Biannually
			7.2	Erosion control measures should be initiated as soon as signs of erosion problems become apparent.			
			7.3	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion potential.			
8.	Loss of Vegetation	Minimise impacts associated with loss of vegetation	8.1	Vegetation that needs to be reduced in height should be mowed or brush-cut to an acceptable height, and not to ground level except where necessary.	Monitoring reports and photographic evidence	AES	Throughout operation

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			8.2	On-site employees and visitors to the site will be educated about the conservation of vegetation. This will include strict guidelines for remaining on existing roads while on site to avoid unnecessary destruction or damage to undisturbed and rehabilitated vegetation.	Signage		
			8.3	A Fire Management Policy and guidelines will be developed to ensure that the operation of the solar power plant is compatible with the long-term fire ecology of the site.			
			8.4	Remove alien vegetation from any disturbed areas.			
			8.5	Workers are to use existing farm tracks as far as possible. If vehicles must leave the road, they should utilize a single track and should not take multiple paths.			
			8.6	When alien plants are detected, these should be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur.			
			8.7	No herbicides to be used at the site.			
9.	Fauna	Minimise impacts to fauna on site	9.1	Poaching or hunting should be strictly forbidden and control poaching by banning dogs on site and enclosing worker compounds.	ECO reports and photographic evidence	AES	Throughout operation
			9.2	Fauna must have 'right of way' on the internal gravel compacted roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.			
			9.3	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr) must be enforced.			
			9.4	No harvesting or collecting of plants, seeds, animals or their parts to be allowed.			
					Training material and records of training		

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			9.5	It should be mandatory for staff of AES to attend an environmental briefing and training session with respect to the guidelines outlined in this EMP.			
			9.6	The large burrow systems of aardvark, porcupines and other similar medium-sized mammals should not be disturbed or leveled as the animals are likely to be retreated into the burrows during the day time. If such burrows occur within areas that need to be cleared, then this should take place when it is certain that the animals are not within their burrows			
			9.7	Any security or other fencing surrounding the site should be constructed so as to allow the free movement of animals (i.e include animal crossings at appropriate intervals), especially during the construction phase when animals may need to leave the site. Strand fencing is highly preferable to mesh fencing in this regard			
			9.8	Electrified fencing can cause high mortality of tortoises; therefore no electrified strands should be placed within 20 cm of the ground on any fence within or surrounding the site. Most other animals should be able creep or dig under the electrified strand if it is not less than 20 cm off the ground			
10	Loss of agricultural land	minimise the loss of agricultural land	10.1	AES to minimise the damage to farmland caused by construction activities by ensuring strict compliance with construction plans to minimise the development footprint and to implement a 'Code of Conduct' governing workers.			
			10.2	AES to design the infrastructure layout in a manner that limits the project footprint and allow for continued grazing on the land.			
			10.3	AES's Community Development Fund will seek to increase the extent of farming or the intensity of farming practice in order to counter the effects of agricultural land loss.			
			10.4	AES to minimise the damage caused by construction activities to the farmland by ensuring strict compliance with construction plans and worker 'Code of Conduct'.			



OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
11	Traffic Impact	Mitigate traffic impacts	11.1	During operation, if abnormal loads are required for maintenance, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.	Traffic Management Plan	AES	During operation
			11.2		Grievance Procedure		
12	Bird Impacts	Minimise impacts on birds through habitat loss, destruction and displacement	12.1	Maintenance activities should be scheduled to avoid disturbances to sensitive areas (identified through operational monitoring) during breeding season. These sensitive areas will apply particularly to Lanner Falcon and Martial Eagle nest sites.	Bird monitoring plan	AES	During operation

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A detailed decommissioning and rehabilitation plan should be developed prior to decommissioning of the solar power plant. This plan should include, but should not be limited to, conditions regarding removal of solar arrays and supporting structures and other infrastructure, management of waste and/or contaminated soil, dust suppression and re-vegetation.

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The following Contractor Compliance Standards have been drafted for use by any contractors appointed by AES during the construction of the Olyven Kolk Solar Power Plant. Guidelines for Contractors developed for the Cape Metropolitan Council by Ninham Shand (2002) and relevant to the expected construction phase of solar power plant were extracted and modified as the basis for this schedule of Contractor Compliance Standards. The Contractor appointed will use these as a basis for guiding all construction activities. AES will retain overall responsibility during all stages of any construction activity and ensure that all construction activities are in compliance with the EMP. The contractors shall with due care and diligence execute and complete the works in accordance with the provisions of the Contractor Compliance Standards and any other requirements set out by AES.

Identification of targets helps to identify the desired outcome of implementing the management measure can assist in deriving an audit report.

As far as possible, the contractor compliance standards are set out in accordance with the following phasing, typical of a construction project:

- Pre-Construction Planning;
- Construction; and
- Post-Construction.

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
1.	Stakeholder engagement	Notify all registered Interested and Affected Parties of Environmental Authorisation (EA).	1.1	Notify all registered I&APs and key stakeholders of the Environmental Authorisation opportunity and appeal procedure.	Notices sent to relevant parties on the stakeholder database. List of those to whom it was sent on file	ERM	Within 5 days from the issuing of the Environmental Authorisation.
1.	EMP and Contractor Compliance Standards legally binding on contractor	Contractor compliance with EMP	1.1	Contractor requirement to implement the EMP and Contractor Compliance Standards is legally binding through the contract with AES.  Contractor to keep copy of EMP and Contractor Compliance Standards on site and to provide ECO with a copy.	EMP provisions relevant to contractor	Contractor	Prior to construction
2.	Notification to DEA: Director of Compliance Monitoring	Ensure that DEA are notified of commencement date.	2.1	Notify DEA prior to commencement of construction.	Proof of communication.	AES	14-days in advance of commencement of construction.
		Keep DEA informed of any aspects of non-compliance with EMP or ES	2.2	Notify DEA with reasons if any provisions of the EMP or EA cannot be implemented, and provide alternative	DEA notification	AES	Prior to construction
		Keep DEA informed of current contact details of applicant	2.3	Notify DEA of any change of contact details of the applicant	DEA notification	AES	Prior to construction
		Keep DEA informed of contact details of ECO	2.4	Submit the name and contact details of the appointed ECO prior to construction	DEA notification	AES	Prior to construction
3.	Subsidiary plans	Develop Subsidiary Plans to minimises environmental and social risks	3.1	The following subsidiary plans may be required prior to construction:  <ul style="list-style-type: none"> <li>• Health and Safety Plan</li> <li>• Traffic Management Plan</li> <li>• HIV Policy and Awareness Plan</li> <li>• Rehabilitation Plan</li> <li>• Policy for assessing all damages and losses</li> <li>• Recruitment Policy</li> <li>• Procurement Policy</li> <li>• Code of Conduct</li> <li>• Grievance Procedure</li> </ul> These are referred to below, where relevant.	Subsidiary plans	AES	Prior to construction
4.	Procurement and	Ensure that procurement	4.1	Establish a Procurement Policy which sets reasonable targets for the	Procurement Policy	Contractor	Throughout

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
	Tender	of local, regional and national services is maximised		procurement of goods and services from South African residents /suppliers, particularly local residents as far as possible.			construction
			4.2	Procurement should advertise tenders in local and national newspapers.	Local and national advertisements		
			4.3	Procurement processes should identify and invite bids from local suppliers.	Invited bids from local suppliers		
			4.4	Adopt transparent adjudication process for local suppliers.	Demonstrate transparent process of adjudicating tenders		
5.	Employment & Recruitment	Ensure that employment of local people is maximised	5.1	No employment will take place at the entrance to the site. Only formal channels for employment will be used.	Recruitment Policy	Contractor	Prior to construction
			5.2	All skill requirements to be communicated to the local communities via appointed people prior to the commencement of the construction phase.	Evidence of recruitment		
			5.3	AES to work closely with the suppliers to provide the requisite training to the workers. The training provided will focus on development of local skills.  Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the project.	Training material and records of training		
6.	Good community relations	Minimise raised expectations in local community and limit social disruption	6.1	Information boards: containing background information on the construction activity and the relevant contact details for complaints shall be erected near the entrance to the site.	Large info board erected at the site and correct information provided (contact details)	Contractor	Prior to construction
			6.2	Notification of onset of construction: Notify Employer, relevant authorities and local community in writing as well as verbally of the onset of construction activities, including contact details for complaints.	Proof of notification of onset of construction to AES, relevant authorities and local community		
			6.3	Community liaison assistants to inform the local community members of the recruitment process and onset of construction and schedule.	Recruitment records of community liaison assistance		
7.	Social Ills and disruption	To limit, where possible, social ills brought about by	71	Develop an induction programme, including a Code of Conduct, for all workers. All workers will agree to the Code of Conduct and be aware	Code of Conduct	Contractor	Prior to construction

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
		the construction and operation of the renewable energy facility	7.2	that contravention of the Code could lead to dismissal. HIV Policy and Awareness Plan developed by AES must be adhered to	HIV Policy and Awareness Plan		
8.	Traffic Impact	Minimise negative effects associated with the increase in traffic.	9.1	All necessary transportation permits will be applied for at this stage and obtained from the relevant authorities, including permits for abnormal loads (if applicable).	Permits	Contractor	Prior to construction
9.	Soil compaction and erosion	Minimise soil compaction and erosion	9.1	Workers are to use existing farm tracks as far as possible. If vehicles must leave the road, they should utilize a single track and should not take multiple paths.	Site Layout Plan	Contractor	Prior to construction
			9.2	Appropriate erosion control and water diversion structures should be constructed at the same time as the vegetation is cleared so that the loosened soil is not left vulnerable to erosion.			
			9.3	Formalise the drainage paths found onsite by excavating channels and thus permitting narrower drainage corridors to be kept open. Widths of the order of 25 m ought to suffice under such conditions. Erosion protection of these channels will be required in places.			
			9.4	Maintain adequate breadth and width below panels and supports so as not to trap debris. Protect disturbed surfaces against erosion.			
10.	Waste and effluent	Prevent soil and/or groundwater contamination from waste and effluent.	10.1	A suitable area for waste skips must be selected, away from drainage lines, and included in the site layout plan.	Waste Management Plan	Contractor	Prior to construction
11.	Loss of Vegetation	Minimise impacts associated with vegetation loss	11.1	During maintenance, mow the vegetation down to the required height rather than using destructive clearing methods where possible.	Site Layout Plan	Contractor	Prior to construction
			11.2	Restricting service roads and underground cabling to previously disturbed lands, avoiding natural vegetation.			
			11.3	The development footprint area should be searched for listed plant species ( <i>Hoodia gordonii</i> and <i>Aloe claviflora</i> ) by an ecologist or similarly qualified person. All individuals located should be marked and translocated to similar habitat outside the development footprint under the supervision of an ecologist or someone with experience in plant translocation. A permit will be required to relocate listed plant species.			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			11.4	If topsoil must be removed, it should be replaced or used as soon as possible elsewhere as it will contain seed of local species which will aid the natural recovery of the vegetation.			
			11.5	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion potential.			
12.	Faunal Impacts	Minimise impacts to onsite fauna	12.1	Measures to minimise habitat loss listed above should be implemented to minimise impacts to fauna.	As above	Contractor	Prior to construction
			12.2	Security fencing surrounding the site should be constructed so as to allow the free movement of animals, especially during the construction phase when animals may need to leave the site. Strand fencing is highly preferable to mesh fencing in this regard.			
			12.3	The design of the solar power plant and associated infrastructure must be bird-friendly.			
13.	Bird Impacts	Minimise impacts on birds through habitat loss, destruction and displacement	13.1	Exclude development within a 1 km radius of the Martial Eagle nest site  Exclude development within a A 500 m radius of the Lanner Falcon nest site. If this is not possible, then a relocation program for the nest sites will be undertaken by a certified specialist.	Site Layout Plan	AES	Prior to commencement of construction.
14	Visual Impacts	Minimise visual impacts	14.1	Surface disturbance for internal compacted gravel roads and construction camp should be minimized and erosion control and dust suppression undertaken to minimize exposed soil.	Site Layout Plan and building designs	AES	Prior to commencement of construction.
			14.2	Disturbance of areas of indigenous vegetation should be minimized and disturbed areas should be prioritized for construction facilities.			
			14.3	No advertising billboards will be permitted and any signs limited to those informing the public of solar power plants.			
15	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	15.1	Palaeontological fossils preserved within alluvial sediments will be largely safeguarded by avoiding the drainage areas on site.	Site Layout Plan	AES	Prior to commencement of construction.

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Compliance with EMP	Confirm contractors commitment to adherence to EMP.	1.1	Ensure that the EMP and EA are available at the site during installation.	Copy of signed EMP and EA.	Contractor	Outset of construction
			1.2	Ensure that equipment is in place to meet EMP requirements and Contractor Compliance Standards.	Checklist of EMP requirements		
			1.3	Signed commitment from subcontractors to compliance with EMP and Contractor Compliance Standards.	Copy of signed EMP with subcontractor		
2.	Health and Safety	Ensure the health and safety of subcontractors and site users	2.1	A Health and Safety Plan developed by AES must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.	Signed Health and Safety Plan	Contractor	During construction
			2.2	Appropriate PPE must be worn by all construction personnel.	ECO Reports	ECO	
			2.3	No smoking to be allowed near the fuel storage area and notices depicting "No Smoking", "No Naked Lights" and "Danger" to be erected at the fuel storage site.	Signed Health and Safety Plan	Contractor	
3.	General environmental damage	Environmental awareness training of workers	3.1	The contractor will be required to employ a full-time ECO at the construction site until rehabilitation is complete.	ECO on site full-time	ECO	Prior to construction
			3.2	The contractor or his representative (e.g. ECO) shall provide training and guidance to site workers before commencing work on relevant components of the EMP, including any new site workers taken on during the course of work.	Proof of training of workers / Signed attendance register	Contractor	
			3.3	Workers shall understand the dos and don'ts of working on the site and controls on causing environmental damage. This should include notification of regulations on harvesting wild fauna and flora from the surrounding area, damage to cultural heritage, littering, use of formal latrines, sexual engagement with locals, etc.	Information posters displayed in social areas on site		
			3.4	Information posters should be put up in worker eating areas depicting typical prohibited activities that should be complied with on and off site.			
			3.5	All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.			



CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
4.	Construction area maintenance	General Environmental Protection	4.1	Construction area to be kept neat and clean at all times.	Camp clean and neat	Contractor	During construction
			4.2	Refuse and waste storage to be positioned away from buildings.	Refuse stored away from buildings		
5.	Access roads	General environmental protection and control of nuisances	5.1	Access to the site and works area shall use existing roads or tracks wherever possible.	ECO Report	Contractor and appointed engineer	During construction
			5.2	All temporary access roads shall be rehabilitated to the satisfaction of the Engineer.	ECO Report		
			5.3	Erect and maintain marker pegs or painted stones along the boundaries of work areas, access roads or tracks to prevent unauthorised movement outside designated areas.	Site pegged and marked		
			5.4	Upgrading of access roads should limit activities as far as possible within the existing confines of the road	Deviations of road alignment avoided		
			5.5	Implement dust control measures where windblown dust can create a nuisance.	Dust control implemented & no grievances noted		
			5.6	The contractor shall repair any damage caused to the existing access road as a result of construction activities.	No damage visible and any damage repaired		
			5.7	Install and maintain appropriate traffic warning signs.	Traffic warning signs		
			5.8	Trained and equipped flagmen shall be used in the event that construction activities (e.g. delivery of abnormal loads) may create a traffic hazard on public roads.	Flagmen contracted for solar infrastructure delivery		
6.	Fencing and site access	Minimise impacts to human health and safety	6.1	Access to the site should be off-limits to the public at all times.	Site suitably fenced	Contractor	Throughout lifespan of development
			6.2	Fencing shall be maintained throughout duration of project life.			
7.	Fire protection	Fire prevention.	7.1	No fires are allowed around the construction area.	Adequate fire fighting equipment with the contractor	Contractor	During construction
			7.2	Adequate fire fighting equipment must be available on site and maintained in good working order.			
			7.3	Welding, gas cutting or cutting of metal will only be permitted in an area designated as safe by the contractor.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			7.3	Smoke free areas should be declared and appropriate signage erected.	Appropriate signage		
8.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	8.1	Ensure that trenches and excavations are checked by a palaeontologist.	ECO reports	Palaeontologist	Prior to and throughout construction
			8.2	Heritage Northern Cape to be notified immediately if a burial/human remains is uncovered during the construction of the solar power plant.	Minutes/ communications	Contractor	
			8.3	The construction activities will be undertaken in accordance with a schedule that will be developed by AES.	Construction schedule		
9.	Refuse, waste (refers to all solid waste, including installation debris, timber, cans etc.) and effluent	Limit the potential for site pollution and the accumulation of waste materials on site.  Prevent soil and/or groundwater contamination from waste and effluent.	9.1	Minimise, reduce, reuse and recycle waste material where possible. All waste must be separated into clearly marked skips for recycling, reuse and disposal.	Waste manifest documents Relevant documentation for waste disposal must be prepared and filed (e.g. certificates of safe disposal).	Contractor	Throughout construction
			9.2	All wastes will be re-used or recycled, as far as possible.	Visual inspection of site- ECO Report.		
			9.3	Vegetative material will be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation.			
			9.4	All solid and liquid waste that cannot be reused or recycled will be placed in a skip and must be removed off site and disposed of at a licensed municipal disposal site.			
			9.5	Disposal of any waste and/or construction debris by burning or burying to be forbidden.			
			9.6	The skips shall be kept in a sheltered place and covered to prevent contents blowing out.			
			9.7	Effluent and stormwater run-off will be discharged away from any drainage lines. Effluent from construction site offices and staff facilities will be collected in storage tanks, which will be removed by a licensed sanitary contractor.			
			9.8	Effluent from staff facilities will be collected in storage tanks, which will be emptied by a sanitary contractor.			
10.	Solid waste management	Limit the potential for site pollution and the accumulation of waste	10.1	The contractor shall set up a solid waste control and removal system in accordance with the Waste Method Statement.	ECO Reports	Contractor and ECO	During construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
		materials on site.	10.2	Bins shall be emptied on a daily basis and shall not be left in an overflowing state.			
			10.3	Waste and litter shall be disposed of in scavenger and weatherproof bins stored in a fenced and covered area.			
			10.4	Waste shall be collected and removed from the site at least once a week			
			10.5	Waste disposed of in suitable landfill site to be confirmed and approved by the regulatory authority.			
			10.6	Workers must clean up the contractor's camp and work areas once a week.			
			10.7	If recycling facilities available, the contractor is encouraged to separate waste into glass, paper and tins and dispose of these at recycling depots.			
			10.8	No waste, including plastic waste, is to be burned on site			
11.	Pollution controls from ablation facilities	Minimise environmental impacts from toilet facilities for temporary workers	11.1	Adequate ablation facilities must be provided for staff.	Adequate toilets provided with toilet paper	Contractor and ECO	During construction
			11.2	Excretion or urination will be prohibited other than at provided facilities.	Site layout plan		
			11.3	Facilities for washing hands to be provided as part of or immediately next to all toilet facilities.	Toilets kept clean and no sign of sewage spills		
			11.4	Toilet facilities to be situated at least 50m away from drainage lines.			
			11.5	Discharge of waste from toilets and burial of waste is strictly prohibited.			
			11.6	Ensure no spillage occurs when toilets cleaned or emptied.			
			11.7	Portable toilets shall be properly secured to prevent toppling in wind.			
			11.8	At least 1 toilet per 20 workers to be provided.			
			11.9	Toilets to be maintained in hygienic state and serviced and emptied regularly. Toilet paper to be provided.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
12.	Concrete Works	Prevent contamination of soil and groundwater through management of concrete	12.1	If concrete is to be batched on site the following measures apply:	Waste documentation and visual inspection of site-ECO Report	Contractor	During construction
			12.2	Excess or spilled concrete or aggregate to be confined within the work area and then removed to a licensed landfill site.			
			12.3	Concrete to be mixed on mortar boards or in bunded area, away from drainage channels.			
			12.4	Visible remains of the mixing of concrete, either solid or from washings, to be physically removed and disposed of as waste at a licensed landfill site.			
13.	Earthworks	Minimise impact of earthworks on general environment	13.1	All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities and shall be limited to demarcated areas.	ECO Report	Contractor and appointed engineer	During construction
			13.2	No earthworks equipment shall be allowed outside demarcated areas unless permitted by the engineer.			
14.	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater	14.1	Soil stockpiles will be protected from wind or water erosion through placement, vegetation or appropriate covering.	Site inspection and photographic evidence	Contractor	Throughout construction phase
			14.2	Proper drainage controls such as culverts, cut-off trenches will be used to ensure proper management of surface water runoff to prevent erosion.			
			14.3	Cleared or disturbed areas will be rehabilitated as soon as possible to prevent erosion.			
			14.4	Fuel, oil and used oil storage areas will have appropriate secondary containment (ie bunds).			
			14.5	Spill containment and clean up kits will be available onsite and clean-up from any spill will be appropriately contained and disposed of to a licensed landfill by a licensed operator.			
			14.6	Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.			
			14.7	Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into drainage channels.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
15.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion and loss of topsoil	15.1	Restrict removal of vegetation and soil cover to the development footprint.	Site inspection and photographic evidence-ECO Report	Contractor	Throughout construction phase
			15.2	Appropriate erosion control and water diversion structures should be constructed at the same time as the vegetation is cleared so that the loosened soil is not left vulnerable to erosion.			
			15.3	Soil stockpiles should be vegetated or appropriated covered to reduce soil loss as a result of wind or water to prevent erosion.			
			15.4	Disturbed areas will be rehabilitated as soon as possible to prevent erosion.			
			15.5	Subcontractors are to use existing farm tracks as far as possible. If vehicles must leave the road for construction purposes, they should utilize a single track and should not take multiple paths.			
			15.6	Work areas will be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the development footprint.			
			15.7	If topsoil must be removed, it should be replaced or used as soon as possible elsewhere as it will contain seed of local species which will aid the natural recovery of the vegetation.			
16.	Dust and emissions	Limit fugitive dust and exhaust emissions.	16.1	Vehicles travelling on compacted unpaved roads should not exceed a speed of 40km/hr.	Site inspections	Contractor	During construction
			16.2	Where appropriate, dust abatement measures should be implemented to restrict airborne dust, especially during windy conditions.			
			16.3	Containers for dusty materials will be enclosed or covered by suitable tarpaulins / nets to prevent escape of dust during loading and transfer from site.			
			16.4	Where necessary, stock piles of soil must be covered by suitable shade cloth or netting to prevent erosion, fugitive dust and to prevent the escape of dust during loading and transfer from site.			
			16.5	Vehicles are too kept in good working order and serviced regularly to minimise emissions.			

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			16.6	Any complaints received from neighbours or site users must be reported to the AES Project Manager and measures must be taken to limit dust.	Grievance procedure documentation/logbook		
17.	Noise pollution	Avoid disturbing surrounding land-users.	17.1	Vehicles and equipment used on site must be in good condition and serviced regularly.	Service and maintenance records for equipment and vehicles. ECO Report  Signage on site	Contractor	During construction
			17.2	Mechanical equipment with lower sound power levels must be selected to ensure that permissible occupation noise-rating limit of 85 dBA is not exceeded.			
			17.3	Construction workers and personnel must wear hearing protection equipment when the 8-hour ambient noise levels exceed 75dBA.			
			17.4	Vehicles must to adhere to speed limits on site, and not exceed 40km/hr.			
18.	Vegetation loss	Prevent unnecessary disturbance and damage to natural vegetation and topsoil loss.	18.1	Subcontractors are to use existing farm tracks as far as possible. If vehicles must leave the road for construction purposes, they should utilize a single track and should not take multiple paths.	ECO reports	Contractor	Throughout construction
			18.2	Topsoil must be set aside to facilitate re-vegetation.	Photographic evidence ECO report		
			18.3	No vegetation should be collected for fire wood or other uses.			
			18.4	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion potential.	Site inspection	Ecologist or botanist	
			18.5	Remove alien vegetation from disturbed areas.	Site Layout Plan	Contractor	
			18.6	Soil disturbance should be kept to an absolute minimum.			
			18.7	All contractors must undertake training provided by AES to educate them on the importance of the undisturbed conservations areas.	ECO Report	AES	
			18.8	Any individuals of protected species observed within the development footprint during construction, should be translocated under the supervision of the ECO.	ECO Report Training materials		
19.	Traffic Impact	Mitigate traffic impacts	19.1	The Traffic Management Plan will be adhered to including adherence to speed limits and 'rules of the road'.	Traffic Management Plan and ECO reports	Contractor	During construction

CONSTRUCTION PHASE										
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing			
#	Description of Activity		#	Commitment / Actions Required / Key Controls						
20.	Socio-cultural issues: Influx of job seekers	Minimize impacts associated with influx of jobseekers and labour.	20.1	AES's code of conduct and HIV Policy developed by AES must form part of contractual agreement and must be adhered to.	Code of conduct and HIV policy must be available on site.	Contractor	During construction			
			20.2	No recruitment of workers shall be permitted at the site				Employment records	Contractor	During construction
			20.3	The construction workers (from outside the area) should be allowed to return home over the weekends or on a regular basis to visit their families; the contractor should make the necessary arrangement to facilitate these visits.				Employment records	Contractor	During construction
21.	Faunal Impacts	Mitigate impacts on fauna	21.1	All vehicles must stick to designated and prepared roads.	ECO reports and photographic evidence	Ecologist	During construction			
			21.2	Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable to prevent erosion.				Contractor		
			21.3	Control poaching by banning dogs on site and enclosing worker compounds.						
			21.4	Fauna must have 'right of way' on the roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.						
			21.5	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr) must be enforced.						
			21.6	No fires should be allowed at the site anywhere other than within demarcated areas within the compound.						
			21.7	No dogs or other pets belonging to the contractor should be allowed at the site.						
			21.8	No harvesting or collecting of plants, seeds, animals or their parts should be allowed.						
			21.9	Poaching or hunting should be strictly forbidden.						
			21.10	Littering should be strictly forbidden and waste generated by staff or at the compound should be disposed of in an appropriate manner, preferably off-site.						
			21.11	It should be mandatory for all contractors to attend an environmental						

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			21.12	briefing and training session with respect to the guidelines outlined in this EMP.  The staff accommodation should be fenced off and no personnel should be allowed to wander around at the site for any purpose after hours.	Training material and records of training		
22	Bird Impacts	Minimise impacts on birds through habitat loss, destruction and displacement	22.1	Timing construction to avoid sensitive times (e.g. Martial Eagle pre-breeding, incubation and small nestling seasons from March/April to June/July).		Bird Specialist	Prior to construction
			22.2	Relocate both the eagle nest structures to more distant pylons			
23	Visual Impacts	Minimise visual impacts	23.1	Measures to control wastes and litter should be included in the contract specification documents and contractor must agree to these.	ECO report	Contractor	Throughout construction
			23.2	Rehabilitate/ re-vegetate areas damaged by construction activities.		Botanist	



## 5.1

### *OPERATIONAL PHASE*

In order to ensure compliance with environmental legislation requirements and recommendations specified by the EIR Team during the EIA process, the following generic and specific requirements are applicable during the operational phase of the Olyven Kolk Solar Power Plant.

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OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Visual impacts	Minimize the visual impacts during the operation phase.	1.1	Signage related to the solar power plant must be discrete and confined to entrance gates. No advertising will be permitted.	Photographic evidence	AES	Throughout operation
			1.2	Footprint of the facilities, as well as parking and vehicular circulation, should be clearly defined.			
2.	Health and Safety	Maintain health and safety standards	2.1	Regular maintenance of solar infrastructure, cables and buildings must be undertaken to ensure optimal functioning.	Inspection records	AES	Throughout operation
3.	Dust and emissions	Limit fugitive dust and exhaust emissions.	3.1	Vehicles travelling on internal unpaved or gravel roads should not exceed a speed of 40 km/hr.	Signage	AES	Throughout operation
4.	Waste and Effluent	Prevent soil and groundwater pollution	4.1	Used oil stored on site must be stored in an impervious container, within a bunded area.	Photographic evidence	AES	Throughout operation
			4.2	General waste must be removed from site by a licensed contractor.	Waste manifest documents		
			4.3	Areas disturbed during construction will be re-vegetated with indigenous vegetation to prevent erosion.	Photographic evidence		
5.	Traffic	Minimise traffic impacts	5.1	All internal and access roads that will be used by AES during the operational phase of the project will be maintained by AES throughout the life of the Project.	Photographic evidence	AES	Throughout operation
6.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion	6.1	Erosion control measures should be initiated as soon as signs of erosion problems become apparent.	Photographic evidence	AES	Throughout operation
			6.2	All bare areas should be revegetated at least with a perennial grass layer of locally occurring species, to bind the soil and limit erosion potential.			
7.	Loss of Vegetation	Minimise impacts associated with loss of vegetation	7.1	Vegetation that needs to be reduced in height should be mowed or brush-cut to an acceptable height, and not to ground level except where necessary.	Photographic evidence	AES	Biannually
			7.2	On-site employees and visitors to the site will be educated about the conservation of vegetation. This will include strict guidelines for remaining on existing roads while on site to avoid unnecessary destruction or damage to undisturbed and rehabilitated vegetation.			

OPERATIONAL PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			7.3	Workers are to use existing farm tracks as far as possible. If vehicles must leave the road, they should utilize a single track and should not take multiple paths.			
			7.4	When alien plants are detected, these should be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur.			
			7.5	No herbicides to be used at the site.			
8.	Fauna	Minimise impacts to fauna on site	8.1	Poaching or hunting should be strictly forbidden and control poaching by banning dogs on site and enclosing worker compounds.	Monitoring reports and photographic evidence	AES	Throughout operation
			8.2	Fauna must have 'right of way' on the internal gravel compacted roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.			
			8.3	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr) must be enforced.	Signage		
			8.4	No harvesting or collecting of plants, seeds, animals or their parts to be allowed.			
			8.5	It should be mandatory for staff of AES to attend an environmental briefing and training session with respect to the guidelines outlined in this EMP.			