

# ENVIRONMENTAL MANAGEMENT PLAN

*THE PROPOSED CONSTRUCTION OF A 50MW PV SOLAR  
PARK PROJECT ON PORTIONS 15, 27 AND 28 OF FARM  
SCHIETFONTEIN 437 JQ WITHIN THE MADIBENG LOCAL  
MUNICIPALITY, NORTH WEST PROVINCE*



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## PROJECT DETAIL

DEA Reference No. *DEA Ref: 14/12/16/3/3/2/850*

DWS Reference No *DWS Ref T618/2015*

Project Title The proposed construction of a 50MW PV solar park project on portions 15, 27 and 28 of farm Schietfontein 437 JQ within the Madibeng Local Municipality, North West Province

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Report Status Final Environmental Management Plan

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## Definitions

The definitions and interpretations in the main Construction Contract document shall apply. The definitions contained within this section are for the benefit of this document for explanatory purposes only. In the event that any conflict occurs between the definitions contained herein and those contained within the main Construction contract document, those within the contract document shall prevail.

**Construction Activity:** A Construction activity is any action taken by the Contractor, his subcontractors, suppliers or personnel during the Construction process.

**Contractor:** Any legal entity or consortium contracted to undertake the activity associated with the Construction of the 50MW PV Solar Park.

**Environmental Control Officer (ECO):** The person to be appointed by the Contractor, with the approval of and the Engineer, to oversee the Construction phase of the 50MW PV Solar Park and to ensure that all environmental specifications and EMP obligations are met during these phases. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMP by the Contractor.

**Engineer:** Engineer refers to the person appointed by the Employer to act as the Engineer person or entity to oversee the implementation of the contract between the Contractor and for the purposes of the Contract.

**Environment:** Environment means the surroundings within which humans exist and that could be made up of:

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

**Environmental Aspect:** An environmental aspect is any component of a Contractor's Construction activity that is likely to interact with the environment, and cause harm to it.

**Environmental Impact:** An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of a Construction Activity between the limits that define the construction site. An impact may be the direct or indirect consequence of a Construction Activity.

**Environmental Impact Assessment (EIA):** The process of examining the environmental effects of a development. The assessment requires detailed/specialist studies of significant issues that have been identified

**Environmental Management Plan (EMP):** A detailed plan of action prepared to ensure that recommendations for enhancing positive impacts and/or limiting or preventing negative environmental impacts are implemented during the life-cycle of a project.

**Independent Environmental Consultant:** A suitably qualified and experienced Independent Environmental Consultant (IEC) appointed by the Contractor to perform the obligations specified in the Contract. The IEC shall provide reports to the Contractor and the Engineer.

**Interested and Affected Parties (I&APs):** People that are to be negatively affected by the Construction or gain from the Construction

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## Acronym

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CA	COMPETENT AUTHORITY
CBA	CRITICAL BIODIVERSITY AREA
CPV	CONCENTRATED PHOTOVOLTAIC
DEA	DEPARTMENT OF ENVIRONMENTAL AFFAIRS
DEA&DP	DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING
DOE	DEPARTMENT OF ENERGY
DNI	DIRECT NORMAL IRRADIANCE
EA	ENVIRONMENTAL AUTHORISATION
EAP	ENVIRONMENTAL ASSESSMENT PRACTITIONER
EAPSA	ENVIRONMENTAL ASSESSMENT PRACTITIONER FOR SOUTH AFRICA
EIA	ENVIRONMENTAL IMPACT ASSESSMENT
EMPR	ENVIRONMENTAL MANAGEMENT PROGRAMME
EMS	ENVIRONMENTAL MANAGEMENT SYSTEM
ESA	ECOLOGICAL SUPPORT AREA
GDS	GROWTH AND DEVELOPMENT STRATEGY
GHI	GLOBAL HORIZONTAL IRRADIATION
GIS	GEOGRAPHIC INFORMATION SYSTEMS
I&AP	INTERESTED AND AFFECTED PARTIES
IDP	INTEGRATED DEVELOPMENT PLAN
IPP	INDEPENDENT POWER PRODUCER
IRP	INTEGRATED RESOURCE PLAN
KV	KILOVOLT
MW	MEGAWATT
NFEPA	NATIONAL FRESHWATER ECOSYSTEM PRIORITY AREA
O&M	OPERATION AND MAINTENANCE
PGDS	PROVINCIAL GROWTH AND DEVELOPMENT STRATEGY

PPA	POWER PURCHASE AGREEMENT
PPP	PUBLIC PARTICIPATION PROCESS
PSEIA	PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT
PV	PHOTOVOLTAIC
REDZ	RENEWABLE ENERGY DEVELOPMENT ZONES
REIPPPP	RENEWABLE ENERGY INDEPENDENT POWER PRODUCER PROCUREMENT PROGRAMME
S&EIR	SCOPING AND ENVIRONMENTAL IMPACT REPORTING
SARERD	SOUTH AFRICAN RENEWABLE ENERGY RESOURCE DATABASE
SEA	STRATEGIC ENVIRONMENTAL ASSESSMENT
SDF	SPATIAL DEVELOPMENT FRAMEWORK
SIP	STRATEGIC INFRASTRUCTURE PLAN
TOR	TERMS OF REFERENCE

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## 1 INTRODUCTION

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Environmental Management Plan is implemented in order for environmental damage to be minimized, impacts need to be identified and mitigation measures defined, implemented and their effectiveness monitored. The purpose of this document is to describe how generally occurring negative environmental impacts during the life cycle of the proposed project will be managed, rehabilitated and monitored and how positive impacts maximized and describes the roles and responsibilities of the various role players. This document proposes generic mitigation measures to minimize and manage such impacts.

The provisions of this EMP are binding on the Contractor during the life of the contract. They are to be read in conjunction with all the documents that encompass the suite of documents for this contract. In the event that any conflict occurs between the terms of this EMP and the project specifications, the terms herein shall be subordinate. Any third party appointed by Contractor in terms of the design and construction must ensure compliance with the conditions of this EMP.

The EMP is a dynamic working document subject to similar influences and changes as are wrought by variations to the provisions of the project specification. Any substantial changes shall be submitted to the environment authorities in writing for approval.

The EMP identifies the following:

- ✓ Construction activities that could impact on the environment.
- ✓ Standards and guidelines that are required to be achieved in terms of environmental legislation.
- ✓ Specifications with which the Contractor shall comply in order to protect the environment from the identified impacts.
- ✓ Actions that shall be taken in the event of non-compliance.

### 1.1 OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN

The objectives of the EMP are to:

- ✓ Ensure that environmental concerns and impacts are taken into account during the project planning stages.
- ✓ Ensure that design alternatives are considered to minimise potential impacts on the environment.
- ✓ Ensure environmental compliance with the findings of the document during the construction and operational phase.
- ✓ Describe measures to mitigate and rehabilitate environmental degradation and pollution, resulting from the project.

- ✓ Define organisational and administrative arrangements for environmental management and monitoring of the various works contracts, including defining the responsibilities of staff and co-ordination, liaison and reporting procedures.
- ✓ Facilitate discussions regarding potential environmental concerns, between the Contractor, the Consulting Engineer and Interested & Affected Parties (I&APs.)
- ✓ Define procedures for environmental control, in the event of pollution or similar events.
- ✓ Raise environmental awareness and promote cultural tolerance with affected communities.

## 1.2 BRIEF DESCRIPTION OF THE PROJECT

Phakanani Environmental (Phakanani) has been appointed as an Environmental Assessment Practitioners (EAP'S) by Zolograph Investments (RF) Proprietary Limited to facilitate the Environmental Impact Assessment (EIA) process and also obtain environmental authorization for the proposed establishment of a 50MW PV Solar Park and the associated establishment of a 88KV transmission line that will transmit electricity from the 50MW power station into the national grind. The Department of Environmental Affairs (DEA) reference number for the proposed 50MW development is **14/12/16/3/3/2/850**

An application for authorization for the 88KV transmission line infrastructure that will be linked to the above mentioned activity will be lodged when an environmental authorisation on the 50MW PV solar park has been granted.

Zolograph Investments (RF) Proprietary Limited is owned by Blue Falcon 194 Trading (Pty) Ltd, which is wholly owned by SunEdison (Appendix 8) Zolograph Investments (RF) Proprietary Limited is proposing to establish a 50MW PV Solar Park plus associated 88KV transmission line on a 183.9147 ha of land on portions 15, 27 and 28 of the farm Schietfontein 437 JQ, 3km south west of DeWildt within Madibeng Local Municipality, North West Province. However the transmission line will be restricted to portion 15 of the farm Schietfontein 437 JQ.

The following infrastructure are associated with the proposed development:

- The PV Solar array with a generating capacity of up to 50MW that will be installed over an area of about 183ha.
- The PV Solar panels will be mounted on the steel support structures to maximum height of 7m and tilted approximately 25 degrees from the horizontal plane, facing to the north and may be on tracking systems to adjust the angle of the panels to the summer or winter solar radiation characteristics.
- Onsite substation and additional infrastructure for the transmission and distribution of electricity (loop in loop out configuration).
- Associated infrastructure: foundations, electrical cabling, internal access roads, storerooms, parking facilities, security and administrative buildings, access control

and fencing of the site, and temporary construction lay-down yard. The electricity generated from the facility will be fed into the National grid via a loop-in loop-out configuration to the existing power line which crosses the site.

### 1.3 FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The EIR stated that the area infrastructure (i.e. PV Solar array etc.) will be entirely contained within the identified site and will have a developmental footprint of approximately 183ha for up to 50MW facility. In terms of the findings of the EIA Report, various planning, construction, and operation-related environmental impacts were identified, including:

- Disturbance of the ecological environment (i.e. flora and fauna)
- Impacts on the visual aesthetics and sensitive receptors
- Impacts on agricultural potential and soils (i.e. in terms soil disturbance and erosion)
- Impacts on heritage resources
- Socio-economic impacts

### 1.4 ACTIVITIES AND COMPONENTS ASSOCIATED WITH THE SOLAR FACILITY

The main activities/components associated with the proposed facility are detailed in the tables which follow.

Table 1-1: Activities to be undertaken during the pre-construction and construction phase

PRE-CONSTRUCTION AND CONSTRUCTION	
<ul style="list-style-type: none"> <li>• <b>Staff requirements</b> – on average an estimated labour force of 450 will be used on-site during the construction phase. These positions will be comprised of low skilled, semi-skilled, and skilled workers sourced from within and outside Dewildt (i.e. as all the required skills are unlikely to be available within the local community). The specialists forming part of the construction team expect to make use of the local establishments for accommodation facilities. It is expected that most of the construction (i.e. civil works, electrical works) will be undertaken by local South African companies. The use of local contractors such as Small, Medium, and Micro Enterprises (SMMEs) operating in the area will be considered by the EPC Contractor, and will be driven largely by what skills and services could be sourced from local SMMEs (i.e. as part of a competitive tendering process). The EPC Contractor will determine the standards which all workers need to comply to and this will be in line with South African standards and laws applicable to the PV industry.</li> <li>• <b>Construction materials and equipment requirements</b> – some of the construction material and equipment may be sourced locally (i.e. within South Africa), depending on availability. The materials and equipment will be transported to site by road.</li> <li>• <b>Water requirements</b> - The proposed development will require approximately 8 400 m<sup>3</sup> over a period of 16 months for construction.</li> <li>• <b>Housing of the labour force</b> – The majority of the low and semi-skilled work force will be sourced from the local area and will be housed off-site. The security team will operate on site in shifts.</li> <li>• <b>Length of the construction phase</b> - commencement of the construction phase is planned for shortly after Financial Close. Thereafter, the construction phase is expected to take approximately 16 months to complete.</li> </ul>	
Activity	Detailed description
Undertake site preparation	» Site preparation activities will include:

	<ul style="list-style-type: none"> <li>» Clearance of vegetation within the footprint of the PV facility and associated infrastructure).</li> <li>» Levelling of site (as necessary)</li> <li>» Clearance of vegetation at the footprint of the linear component (i.e. internal access roads).</li> <li>» The development of stormwater control management systems which will include drainage channels which will collect all rain water and lead it to the natural stormwater drainage system.</li>   <li>» These activities will require the stripping of topsoil which will need to be stockpiled for future rehabilitation.</li> </ul>
<b>Establishment of access roads, grid connection &amp; substation</b>	<ul style="list-style-type: none"> <li>» Access to the proposed project site will be from an existing road that joins up with the R566 road. An internal network of roads will be required to access the different components of the proposed project.</li> <li>» Establishment of substation area and connection to grid via loop-in loop-out configuration.</li> <li>» Construction of short power line (100-200m) as part of loop-in loop out configuration</li> </ul>
<b>Transport of components to site</b>	<ul style="list-style-type: none"> <li>» The majority of the facility components and civil engineering construction equipment will be transported to site via road transport from the port for imported equipment, from major towns for locally manufactured equipment and from close by towns the construction material available locally.</li> </ul>
<b>Establishment of construction laydown areas, storage facilities</b>	<ul style="list-style-type: none"> <li>» Once the required equipment has been transported to site, dedicated construction equipment camp(s), storage facilities, and laydown area/s will need to be established. These areas serve to confine activities to a designated area to limit potential site disturbance. The laydown area will be used as a logistical area for the contractors and as a prefabrication area.</li> <li>» Security personnel will be present on site on a shift basis. Contractors and their employees will be accommodated at existing accommodation facilities in the local area.</li> <li>» The fuel required for on-site construction vehicles and equipment will need to be secured in a temporary bunded facility within the construction camp to prevent leakages and soil contamination.</li> </ul>
<b>Undertake site rehabilitation</b>	<ul style="list-style-type: none"> <li>» Areas requiring rehabilitation will include those areas disturbed during the construction phase which are not required for operation and maintenance purposes. Rehabilitation should be undertaken in an area as soon as practically possible after the completion of construction activities within that area.</li> <li>» Where relevant disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.</li> <li>» All temporary facilities, temporary equipment, and waste materials must be removed from site.</li> <li>» Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. drainage lines), to minimise loss of topsoil and control erosion.</li> <li>» Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.</li> </ul>

Table 1-2: Activities to be undertaken during the operational phase

<b>OPERATIONS</b>	
<p>» Staff requirements - approximately 30 staff members are expected to be required on-site during the operational phase of the project increasing during major maintenance periods such as module cleaning and landscaping and decreasing during normal operating periods.</p> <p>» Length of the operation phase – the facility is expected to be commissioned in 2018 and is expected to be operational for at least 20-25 years, where after it could be decommissioned or its lifespan extended depending on the power generation requirements at the time.</p>	
<i>Activity</i>	<i>Detailed description</i>
<b>Solar Panel Array</b>	<p>» The PV facility will be operational during daylight hours only but not under circumstances of mechanical breakdown, or maintenance activities. The plant will remain energised at night but will not be producing any power.</p> <p>» No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or grid outage events.</p>
<b>Treatment and disposal of waste water</b>	<p>» Any water from ablution facilities will be collected in a septic tank.</p>
<b>Water Use</b>	<p>» An estimated 2500 m<sup>3</sup> litres of water per annum would be required for domestic use and the cleaning of panels 2 approximately 2 times per annum.</p> <p>» Water will be sourced from a borehole</p>
<b>Site operation and maintenance</b>	<p>» It is anticipated that a full-time security, maintenance, and control room staff will be required on site.</p>

Table 1-3: Activities to be undertaken during the decommissioning phase

<b>DECOMMISSIONING</b>	
<p>» Timing of the decommissioning phase – following the operational phase the facility could be decommissioned or its lifespan extended depending on the power generation requirements at the time.</p> <p>» Activities during the decommissioning phase - it is most likely that decommissioning would comprise the disassembly and removal of the individual components.</p>	
<i>Activity</i>	<i>Detailed description</i>
<b>Site preparation</b>	<p>» Site preparation activities similar to those undertaken in the construction phase will be required during the decommissioning phase. This will include confirming the integrity of site access to the site in order to accommodate the required equipment (e.g. lay down areas and decommissioning camp) and the mobilisation of decommissioning equipment.</p>
<b>Disassemble and remove existing components</b>	<p>» The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.</p>

## 2 LOCATION

The proposed site is located west of DeWildt along the R566 road. The coordinates for proposed site are 25°37'56.53"S and 27°55'38.78"E



Figure 2-1: Site google image

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### 3 PURPOSE AND OBJECTIVES OF THE EMPR

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

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site remediation (i.e. soil stabilisation, re-vegetation), during operation and decommissioning (i.e. similar to construction phase activities).

This EMPr has been compiled in accordance with Section 19 of the EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.
- Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.



- Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and preventing longterm or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within the Environmental Impact Assessment (EIA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

Zolograph Investments (RF) Proprietary Limited must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the EIA process it is important that this document be read in conjunction with the final Scoping and EIA Reports. This will contextualize the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in current legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the construction and operational phases and shall be enforceable at all levels of contract and operational management within the project.

### 3.1 PROJECT TEAM

The EIA Project Team is led by Tsunduka Hatlane who has more than 12 years' experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and EMPs. Tsunduka has extensive experience in conducting environmental assessment and management processes through-out South Africa. Below is a list of the EIA team responsible for the DeWildt PV Solar Park Project

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Phakanani Environmental has included the following specialist consultants to conduct specialist assessments:

NAME	ORGANIZATION	ROLE
<b>PHAKANANI ENVIRONMENTAL</b>		
<b>Tsunduka Hatlane</b>	Phakanani Environmental	Senior EAP
<b>Hluke Baloyi</b>		Project Manager
<b>Aluwani Ramagwedzha</b>		Junior EAP
<b>SPECIALIST</b>		
<b>Carl Schoeman</b>	ENVASS (Environmental Assurance)	Noise impact study
<b>Vincent van Der Merwe</b>	Specialist Ecological Consultant	Ecological Impact study
<b>Vanessa Marais</b>	Galago Environmental	Avifauna Study
<b>Munyadziwa Magoma</b>	Vhubvo Archaeo-Heritage Consultants Cc	Heritage impact assessment
<b>Mr. Petrus Stephanus Rossouw,</b>	Terra Soil Science cc	soil, agricultural potential, land type and land use study
<b>Mr. Mfanelo Khosa</b>	Manna Group Architects	Visual Impact study
<b>Shannon McKay</b>	Animal Behaviour Consulting	Wild animal behavior (In progress)
<b>Dr JF Durand (Sci.Nat.)</b>	Private	Paleontology
<b>Dr Herman Joubert</b>	Tech IQ Consulting Engineers	Traffic Impact Study
<b>Elena Broughton</b>	Urban Econ	Social Impact Study

Table 3-1: EIA team

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## 4 ADMINISTRATION OF ENVIRONMENTAL OBLIGATION

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### 4.1 ADMINISTRATION

Before the Contractor begins each construction activity the ECO shall give to the Engineer a written statement (Method Statement), prepared on behalf of the Contractor, setting out the following:

- ✓ The type of construction activity.
- ✓ Locality where the activity will take place.
- ✓ Identification of the environmental aspects and impacts that might result from the activity.
- ✓ Methodology for impact prevention for each activity or aspect.
- ✓ Methodology for impact containment for each activity or aspect.
- ✓ Emergency/disaster incident and reaction procedures.
- ✓ Treatment and continued maintenance of impacted environment.

The Contractor may provide such information in advance of any or all Construction activities provided that new submissions shall be given to the Engineer whenever there is a change or variation to the original.

The Engineer may provide comment on the methodology and procedures proposed by the ECO, but he shall not be responsible for the Contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the Contractor shall demonstrate at inception and at least bi-annually once during the contract that the approved measures and procedures function properly.

### 4.2 GOOD HOUSEKEEPING

The Contractor shall undertake "good housekeeping" practices during construction process. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole.

Good housekeeping extends beyond the wise practice of construction methods that leaves production in a safe state from the ravages of weather to include the care for and preservation of the environment. Any site-specific measures should be highlighted by the ECO to the Contractor.

### 4.3 MANAGEMENT STRUCTURE

The Contractor must compile an organogram illustrating their environmental management structure as part of the EMS. This organogram shall depict the organizational structure of the Contractor, including the ECO and must contain supporting documentation to demonstrate the environmental responsibilities, accountability and liability of the Contractor's employees.

The Contractor should assign responsibilities for the following:

- 💡 Reporting structures.
- 💡 Actions to be taken to ensure compliance.
- 💡 Actions to be undertaken in the event of non-compliance.
- 💡 Overall design, development and implementation of the EMP.
- 💡 Documenting the environmental policy and strategy.
- 💡 Implementing the EMP in all stages/phases of the project.
- 💡 All the aspects which require action under the other core elements and sub-elements of the EMP.

All official communication and reporting lines including instructions, directives and information shall be channelled according to the organizations structure.

### 4.4 AUTHORITY CONSULTATION IN THE APPLICATION FOR AUTHORISATION

#### **Authority consultation in the application for authorization**

The first step of the EIA process involves consultation with the relevant authority involved with the decision making process concerning the authorization of the proposed project. The main purpose of this was to clarify the requirements of the regulations and procedures to be followed. At this stage the authorities also registered the activity. Authority involvement undertaken during this exercise has included the following:

- 💡 A project application was submitted to DEA National, Pretoria. The purpose of the application was to introduce the authority concerned to the proposed project and to register the project with DEA.

#### **Relevant Legislation**

Relevant administrative, legal and policy requirements which the developer will be responsible for carrying out during the further construction and operation of the 50MW PV Solar Park:

#### **Co-operative governance (Constitution Act 108 Of 1996)**

The constitution states that: *'...everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that 1) prevent pollution and ecological degradation; 2) promote conservation; and 3) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development'*.

### **National Environmental Management Act (No. 107 of 1998)**

Any actions taken by the developer must be done in accordance with constitutional principles, the common law, the overarching policy principles set out in section 2 of NEMA and the principles applicable to environmental assessment.

- Development must be environmentally, socially and economically sustainable. Sustainable development requires the consideration of inter alia the following factors:
  - that pollution and degradation of the environment is avoided, or, where they cannot be altogether avoided, are minimised and remedied;
  - that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
  - that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
  - that the development, use and exploitation of renewable resources and the eco-systems of which they are part do not exceed the level beyond which their integrity is jeopardised; and
  - That negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented are minimised and remedied.
- Environmental management must place people and their needs at the forefront of its concern, therefore any environmental impacts resulting from the development activities are not distributed in such a manner as to unfairly discriminate against any persons, particularly vulnerable and disadvantaged persons.
- The developer is required to undertake Environmental Impact Assessments (EIA) for all projects listed in the EIA regulations in order to control activities which might have a detrimental effect on the environment. Such activities will only be permitted with written authorization from DEA.

### **National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)**

In terms of the Biodiversity Bill, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorization of the area (not just by listed activity as specified in the EIA regulations).
- Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.

### **National Water Act 36 of 1998**

#### **Section 19 of the National Water Act, (Act No. 36) of 1998**

States that: *Where an activity or process is or was performed or undertaken or any other situation exists which has caused or is likely to cause pollution of a water resource, all responsible steps must be taken to prevent such pollution from occurring or to remedy the effects of the pollution and effects on the river bed or banks.*

- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, or other conduit requires registration and licensing with DWAF and monitoring of nearby surface and groundwater must be done.
- Licences are required for all water uses listed in Section 21 unless the water use is permissible in terms of schedule 1 to the Act, falls within the general authorizations in terms of Section 39 of the Act or is an “existing lawful water use”. The water uses that require registration and licensing include the following: taking water from a water resource; storing water; discharging waste or water containing waste into a water resource through a pipe, canal, sewer, and other conduit; disposing of waste in a manner which may detrimentally impact on a water resource.
- Further, Section 22.2 of the Water Act “A person who uses water (a) must use the water subject to any condition of the relevant authorization of that use; (b) is subject to any limitation, restriction or prohibition in terms of this Act or any other applicable law (c) in the case of the discharge or disposal of water or water containing waste contemplated in section 21(f),(g), (h) or (j) must comply with any applicable waste standards or management practices prescribed under section 26(l)(h) and (i), unless the conditions of the relevant authorization provide otherwise: (d) may not waste that water: and (e) must

*return any seepage, run-off or water containing waste which emanates from that use, to the water resource from which the water was taken, unless the responsible authority directs otherwise or the relevant authorization provides otherwise.*

#### **General Authorizations in Terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998)**

- 4.12.(1) A person who disposes of wastewater in terms of this authorisation must submit a registration form obtained from the Department, for registration of the water use before the commencement of the disposal if more than 50 cubic metres of domestic wastewater or biodegradable industrial wastewater is disposed of on any given day.
- 4.13. Wastewater storage dams and wastewater disposal sites must be located-
  - a) outside of a watercourse;
  - b) Above the 100 year flood line, or alternatively, more than 100 meters from the edge of a water resource or a borehole which is utilized for drinking water or stock watering; and
  - c) On land that is not, or does not overlie, a Major Aquifer (identification of a Major Aquifer will be provided by the Department upon written request).
- 4.14.(1) The registered user, with the exception of a local authority, must ensure the establishment of monitoring programmes to monitor the quantity and quality of the wastewater prior to storage or disposal, as follows-

#### **Conservation of Agricultural Resources Act 43 of 1983 and Conservation of Agricultural Resources Regulations.**

In terms of section 6 of the Act, the Minister may prescribe control measures with which all land users have to comply. The control measure may relate to the following:

- 💡 the regulating of the flow pattern of run-off water;
- 💡 the control of weeds and invader plants;
- 💡 the restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;

#### **Forest Act 122 of 1984**

##### *Protected trees*

The Forest Act provided for the protection of trees on private land by providing that 'no person may cut, damage, destroy, disturb or remove any *protected tree* from the land in question, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any part or produce thereof'. The Minister was authorized, in respect of any land not forming part of a State forest, to declare a particular tree, a particular group of trees, or trees belonging to a particular species occurring on that land, to be a protected tree or trees (Appendix E) Regulations published under the Act list 58 species of protected trees to which these prohibitions apply. Although the NFA has repealed the old Forest Act, the

majority or regulations promulgated under the Act still remain in force until such time they are replaced by new regulations under the NFA.

### **National Forests Act 84 of 1998**

#### *Protected trees*

The Minister may declare a tree, group of trees, woodland or a species of trees as protected. The Minister is required to publish a list of all species protected under this Act, an appropriate warning of the prohibitions set out and the consequences of its infringements, annually in the Government Gazette. The prohibitions provide that ‘ no person may cut, damage, disturb, destroy or remove any *protected tree*, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister’.

### **National Heritage Resources Act 25 of 1999**

- No person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
- No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
- The protection of archaeological and paleontological sites and material is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the state. Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority.
- No person may, without a permit issued by SAHRA or a provincial heritage resources authority 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. “Grave” is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
- A permit will only be granted if SAHRA is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents and reached agreement with the affected communities regarding the future of such grave or burial ground.



#### 4.5 CONSULTING ENGINEER

The duties and powers of the Consulting Engineer (CE) or his representative are to:

- Implement and enforce the EMP during the planning and design phases of the project.
- Ensure constant consultation with the IEC during the planning and design phases of the project.
- Comply with the findings of the site-specific study and the EMP

#### 4.6 INDEPENDENT ENVIRONMENTAL CONSULTANT (IEC)

The duties and powers of the IEC are:

- Ensure compliance with the environmental requirements of the EMP.
- Ensure complete compliance with the EIA regulations for listed activities.
- Ensure compliance with the Environmental Management Impact System for non-listed activities.
- Ensure compliance with all conditions of the Record of Decisions.
- Complete the Environmental Compliance Checklist according to the site-specific investigation.
- Give site instructions to the Contractor when stated in the record of decision that the Contractor be monitored.

##### 4.6.1 The Engineer

The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified Engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as state in the Particular Conditions. The Employer undertakes not to impose further constraints on the Engineer's authority, except as agreed with the Contractor.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

Except as otherwise stated in these Conditions:

- a. Whenever carrying out duties or exercising authority, specified in or implied by the Contract, The Engineer shall be deemed to act for the Employer.
- b. The Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract.
- c. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

#### 4.6.2 The Contractor

The Contractor is responsible for implementing the identified mitigation measures during the construction phase of the project and is answerable to the IEC for non-compliance with the EMP.

The Contractor may appoint a Contractors Representative (CR) who could be the site agent, the site engineer, a dedicated environmental officer, independent consultant, or external auditor. However, the Contractor must ensure that the appointed CR is suitably qualified to perform the necessary tasks and is appointed at a suitable level to interact effectively with other site contractors, labourers and the public. Specific responsibilities of the CR are:

- Know the background of the project and monitor the implementation of the EMP.
- Act as a guide and advisor to the Contractor on environmental issues.
- Ensure continuous auditing of the project for adherence to the EMP, identification of problem areas and provision of action plans to avoid costly stoppages and/or further environmental damage.
- Ensure transparent and open communication for reporting significant environmental incidents to the relevant authorities.
- Ensure that all complaints and concerns from the public and other I&APs are resolved and addressed immediately.
- Establish a liaison, co-ordination and reporting framework involving I&APs.
- Ensure that any modifications to the document are communicated to the I&APs.

#### 4.6.3 Environmental Control Officer (ECO)

The ECO will oversee the Construction phase of the project on the ground, and ensure that all environmental specifications and EMP requirements are met at all times. The ECO shall initially be a dedicated officer, tasked with ensuring environmental compliance with the EMP. Should the ECO's workloads diminish over time and as the contract progresses, then the ECO

could be permitted to take on non-environmentally related tasks on written approval of the Engineer.

The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMP by the Contractor. The ECO's duties in this regard will include, *inter alia*, the following:

- Ensuring that all the environmental authorizations and permits required in terms of the applicable legislation have been obtained prior to Construction commencing.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving Construction method statements with input from the independent environmental consultant and Engineer, where necessary, in order to ensure that the environmental specifications contained within this EMP are adhered to.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Keeping accurate and detailed records of all activities on site.
- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMP and Contract specifications.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of, or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMP.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the Engineer.

The ECO must have:

- a good working knowledge of all relevant environmental policies, legislation, guidelines and standards;
- the ability to conduct inspections and audits and to produce thorough and informative reports;
- the ability to manage public communication and complaints;
- the ability to think holistically about the structure, functioning and performance of environmental systems; and

- proven competence in the application of the following integrated environmental management tools:
  - \* EIAs
  - \* EMPs
  - \* Environmental auditing.
  - \* Mitigation and optimization of impacts.
  - \* Monitoring and evaluation of impacts.
  - \* EMSs

#### 4.6.4 Traffic Safety Officer

The Contractor shall nominate knowledgeable members of staff on site who shall be the responsible persons for the arrangement and maintenance of all traffic accommodation measures required for the duration of the contract. The Traffic Safety Officer shall liaise with the ECO in order to ensure adequate and appropriate traffic arrangements

#### 4.6.5 Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

#### 4.7 PUBLIC COMMUNICATION AND LIAISON WITH INTERESTED AND AFFECTED PARTIES

Communication must include liaising with the local communities.

The Contractor shall comply with the requirements for public consultation as required by the Constitution Act, 1996 (Act No 108 of 1996) and the NEMA, 1998 (Act No 107 of 1998).

During the Construction phase of the project, the Contractor shall be responsible for erecting information boards, in English, Afrikaans and SeSotho, in the position, quantity, design and dimensions approved by the Engineer. The information boards shall contain relevant information regarding the construction activity and the relevant contact details to assist persons who wish to submit complaints regarding construction activities.

The Contractor shall ensure that a complaints register is kept on site. The register shall contain all contact details of the person who made the complaint and information regarding the complaint itself, the date of submission as well as responsible person who is dealing with complaint. The complaints register must be kept in accordance with the requirements of the ECO.

#### 4.8 TRAINING

##### a) Environmental Control Officer

The ECO must be appropriately trained in environmental management and must possess the skills necessary to impart environmental management skills to all personnel involved in the contract.

##### b) Environmental Awareness Course

The Contractor shall ensure that its employees and any third party, who carries out all or part of the Contractor's obligations under the 50MW PV Solar Park Contract, are adequately trained with regard to the implementation of the EMP, as well as regarding environmental legal requirements and obligations.

A training needs analysis shall be conducted by the ECO to identify the appropriate environmental and health training programmes, and the appropriate target groups amongst the employees of the Contractor.

Environment and health awareness training programs should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes shall contain the following information:

- ✿ The names, positions and responsibilities of personnel to be trained.
- ✿ The framework for appropriate training plans.
- ✿ The summarised content of each training course.
- ✿ A schedule for the presentation of the training courses.

The Contractor shall ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMP. The training records shall verify each of the targeted personnel's training experience.

The Contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness and the content of the EMP. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training shall, as a minimum, include the following:

- The importance of conformance with all environmental policies.
- The environmental impacts, actual or potential, of their work activities.
- The environmental benefits of improved personal performance.
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities.
- Environmental legal requirements and obligations.
- The importance of not littering.
- The importance of using supplied toilet facilities.
- The need to use water sparingly.
- Details of and encouragement to minimize the production of waste and re-use, recover and recycle waste where possible.

In the case of permanent staff the Contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the Contractor shall inform the Engineer when and how it intends concluding its environmental training obligations.

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## 5 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

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The following legislation and guidelines have informed the scope and content of this EMPr:

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 4 of NEMA Government Gazette of 04 December 2014
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014 Public Participation in the EIA Process

A review of legislative requirements applicable to the proposed project is provided in the table that follows.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<b>National Legislation</b>			
<b>National Environmental Management Act (Act No 107 of 1998)</b>	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GN R982, R983, R984 and R985 of December 2014, a Scoping and EIA Process is required to be undertaken for the proposed project.</p>	DEA – lead authority. READ- commenting authority.	The final EIA report is to be submitted to the DEA and Provincial Environmental Departments in support of the application for authorisation.
<b>National Environmental Management Act (Act No 107 of 1998)</b>	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	DEA (as regulator of NEMA).	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.
<b>Environment Conservation Act (Act No 73 of 1989)</b>	National Noise Control Regulations (GN R154 dated 10 January 1992)	DEA – lead authority. READ- commenting authority. Local Authorities	There is no requirement for a noise permit in terms of the legislation. Noise impacts may result from specific activities carried out during the construction phase of the project and could present an intrusion impact to the local community.
<b>National Water Act (Act No 36 of 1998)</b>	Water uses under S21 of the Act must be licensed, unless such water use falls into one of the categories listed in S22 of the Act or	Department of Water and Sanitation (DWS)	A water use license (WUL) is required in terms of Section 21(c) and 21 (i) of



	falls under the general authorisation (and then registration of the water use is required). Consumptive water uses may include the taking of water from a water resource and storage - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse – Section 21i.		the National Water Act. If wetlands or drainage lines are impacted on, or the regulated area of a watercourse (being the riparian zone or the 1:100yr floodline whichever is greatest). Should water be extracted from groundwater/ a borehole on site for use within the facility, a water use license will be required in terms of Section 21(a) and 21 (b) of the National Water Act.
<b>Minerals and Petroleum Resources Development Act (Act No 28 of 2002)</b>	According to S27 of the act, any person who wishes to apply to the Minister for a mining permit must simultaneously apply for an environmental authorisation and must lodge the application (repealed by section 23 (b) of Act 49 of 2008). Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act (repealed by section 33 of Act 49 of 2008) S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002). Section 42 of Act 49 of 2008 (Repealed of section of S53) states that the Minister may cause an investigation to be conducted if it is alleged that a person intends to use the surface of any land in any way that could result in the mining of mineral resources being detrimentally affected.”.	DMR	As no borrow pits are expected to be required for the construction of the facility, no mining permit or environmental authorisation is to be obtained. A Section 53 application has been submitted to the relevant DMR office.
<b>National Environmental Management: Air</b>	Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas” in terms of air quality. Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.	DEA – air quality Local Municipality - Noise	No permitting or licensing requirements applicable for air quality aspects. The section of the Act regarding noise control is in force, but

<p><b>Quality Act (Act No 39 of 2004)</b></p>	<p>Section 32 makes provision for measures in respect of dust control. Section 34 makes provision for:</p> <ul style="list-style-type: none"> <li>i. the Minister to prescribe essential national noise standards – <ul style="list-style-type: none"> <li>(a) for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or</li> <li>(b) for determining – <ul style="list-style-type: none"> <li>(i) a definition of noise</li> <li>(ii) the maximum levels of noise</li> </ul> </li> </ul> </li> <li>(2) When controlling noise the provincial and local spheres of government are bound by any prescribed national standards.</li> </ul>		<p>no standards have yet been promulgated. Draft regulations have however, been promulgated for adoption by Local Authorities. An atmospheric emission licence issued in terms of Section 22 may contain conditions in respect of noise. This will however, not be relevant to the facility, as no atmospheric emissions will take place. The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.</p>
<p><b>National Heritage Resources Act (Act No 25 of 1999)</b></p>	<p>Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</p> <ul style="list-style-type: none"> <li>• the construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length;</li> <li>• any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup> in extent.</li> </ul> <p>The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m<sup>2</sup>; or the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. Standalone HIAs</p>	<p>DEA where heritage assessment is a component of the EIA » SAHRA – National heritage sites (grade 1 sites) as well as all historic graves and human remains.</p>	<p>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</p>

	<p>are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of Section 38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p>		
<p><b>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</b></p>	<ul style="list-style-type: none"> <li>• Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53)</li> <li>• A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657.</li> <li>• Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R152 (Threatened or Protected Species Regulations).</li> <li>• Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011).</li> <li>• DEA published Regulations on Alien and Invasive Species (AIS) in terms of the National Environmental Management: Biodiversity Act, on Friday 1st August 2014. A total of 559 alien</li> </ul>	<p>DEA</p>	<p>Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. An ecological study has been undertaken as part of the EIA Phase. As such the potential occurrence of critically endangered, endangered vulnerable, and protected species and the potential for them to be affected has been considered. This report is contained in the EIAR</p>

	species are now listed as invasive, in four different categories. A further 560 species are listed as prohibited, and may not be introduced into the country		
<b>Conservation of Agricultural Resources Act (Act No 43 of 1983)</b>	<ul style="list-style-type: none"> <li>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories: <ul style="list-style-type: none"> <li>Category 1 plants: are prohibited and must be controlled.</li> <li>Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.</li> <li>These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</li> </ul> </li> </ul>	DAFF	<ul style="list-style-type: none"> <li>While no permitting or licensing requirements arise from this legislation, this Act will find application during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</li> <li>The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas. However, none of these activities are expected to be undertaken on site.</li> </ul>
<b>National Forests Act (Act No. 84 of 1998)</b>	» Protected trees: According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that ' no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner	DEA	A permit or license will be required for any destruction of protected tree species and/or indigenous tree species within a natural forest.

	<p>acquire or dispose of any protected tree, except under a licence granted by the Minister’.</p> <p>» Forests: Prohibits the destruction of indigenous trees in any natural forest without a licence.</p>		
<b>National Veld and Forest Fire Act (Act 101 of 1998)</b>	<p>In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p>	DAFF	<p>While no permitting or licensing requirements arise from this legislation, this act will find application during the operational phase of the project. Due to the fire prone nature of the area, it must be ensured that the landowner and developer proactively manage risks associated with veld fires and provide cooperation to the local Fire Protection Agency</p>
<b>Hazardous Substances Act (Act No 15 of 1973)</b>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>» Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance;</p> <p>» Group IV: any electronic product;</p> <p>» Group V: any radioactive material.</p>	Department of Health	<p>It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.</p>

	The use, conveyance or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
<b>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</b>	<p>The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by –</p> <ul style="list-style-type: none"> <li>» Adding other waste management activities to the list.</li> <li>» Removing waste management activities from the list.</li> <li>» Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 921), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: <ul style="list-style-type: none"> <li>» The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste.</li> <li>» Adequate measures are taken to prevent accidental spillage or leaking.</li> <li>» The waste cannot be blown away.</li> <li>» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and</li> <li>» Pollution of the environment and harm to health are prevented.</li> </ul> </li> </ul>	Hazardous Waste – National DEA General Waste –READ	A waste licence could be required in the event that more than 100m <sup>3</sup> of general waste or more than 35m <sup>2</sup> of hazardous waste is to be stored on site at any one time. The volumes of waste generated during construction and operation of the facility are not expected to be large enough to require a waste license.
<b>National Road Traffic Act (Act No 93 of 1996)</b>	» The technical recommendations for highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.	Provincial Department of Transport (provincial roads) South African National Roads Agency Limited (national roads)	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include: Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.

	<p>» Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>» The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p>		<p>Transport vehicles exceeding the dimensional limitations (length) of 22m. Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</p>
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## 6 ENVIRONMENTAL AWARENESS PLAN

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

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and subcontractors have attended site induction training which includes the environmental impacts associated with the. The training must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
  - Refresher sessions must be held at least once every 6 months or as necessary to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental “do’s” and “don’ts” are erected at prominent locations throughout the site.



The developer is committed to promoting and implementing sustainability throughout their operations. As part of this commitment, the team recognises the importance of making all employees aware of the potential environmental impacts that could result from conducting their jobs and how this potential can be minimised through effective training. Environmental awareness to the employees of the project will be provided by implementing environmental awareness training in the following forums:

- Water consumption and conservation;
- Potential for water pollution and the related impacts (including health related);
- Dust generation related impacts (including health-related) ;
- Noise generation and related impact (including health-related);
- Waste minimisation and recycling;
- Practical training regarding the clean-up of major and minor hydrocarbon spills/use of spill management kit;
- Practical training on using a fire extinguisher; and
- Alien vegetation identification and removal, and the importance of indigenous vegetation.
- Importance of wildlife, snakes and other reptiles in support of ecosystem.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMP. This training and awareness will be achieved in the following ways:

### 6.1 INDUCTION TRAINING

Environmental impacts and requirements should be included in induction training and be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should be undertaken by the Contractor's Environmental Officer and should include discussing the developer's environmental policy and values, the function of the EMP and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall "dos and don'ts" on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

## 6.2 TOOLBOX ACTIVITY SPECIFIC TOPICS

Some activities may have environmental impacts that are unique to each area. These must be addressed in the SHEQ meetings. Area specific topics include, but are not limited to those impacts which are ranked as having a negative “medium” to “high significance” as determined in the EIA study. Some of these topics may be a repeat of those covered under general topics.

- Stormwater management;
- Identification and management of erosion;
- Water consumption and conservation;
- Vehicle emissions and related impacts (including health related)
- Practical training regarding the clean-up of major and minor hydrocarbon spills;
- The importance of the waste management system and implementing good housekeeping; and
- Dust generation and why and how to reduce dust.
- Biodiversity interaction awareness

## 6.3 TAKE-HOME TOPICS

Environmental awareness should not stop at the work place. Many of the concepts learned at work can be applied to employees’ life style at home. Topics that can be covered under “take home topics” include, but are not limited to:

- Water consumption and conservation;
- Energy consumption and conservation; and
- Waste minimisation and recycling - “Reduce, Reuse and Recycle”.

## 6.4 MONITORING PROGRAMME

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

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

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

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

#### 6.4.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, IEO and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

#### 6.4.2 Monitoring Reports

A monitoring report will be compiled by the ECO on a weekly and monthly basis and must be submitted to the Contractor and Developer. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

#### 6.4.3 Final Audit Report

A final environmental audit report must be compiled by the independent ECO and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

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## 7 RESTORATION OF THE DISTURBED STEEP SLOPE AND OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

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### 7.1 4.1 RESTORATION

The removed vegetation and any bare ground within the site layout boundaries including its access paths will have to be rehabilitated at the project proponent's expense, such as the translocation of plants and re-vegetating bare ground with indigenous plants.

Any soil excavated and not utilized in the process of constructing the 50MW PV Solar Park should be spread over a large area in the vicinity of the excavation. No large mounds of soil should be left behind after the construction period.

### 7.2 4.2 REVEGETATION

Re-vegetation of disturbed areas consists of the following steps:

1. Spreading of stored topsoil i.e. that which has been removed from the site for the purposes of construction.
2. Planting of indigenous plant species, using a combination of grass species and other species on steep slopes.
3. Watering of newly planted plants. The amount and duration of watering will be dependent on the season in which the plants are planted.
4. Regular audits and maintenance programmers to ensure that plants are growing and serving the purpose for which they were planted (i.e. to prevent erosion).

The species recommended are bush species as these are generally fast growing or pioneer species and would therefore develop well in disturbed areas. Rehabilitation should be advised by a suitably qualified person to assess the needs for the area.

Once the grass cover is in place, the natural succession processes should result in the incorporation of bush species. During this process however the encroachment of alien plant species should be prevented by active removal.

### 7.3 4.3 SITE REHABILITATION

The Contractor shall be responsible for rehabilitating any areas cleared or disturbed for construction purposes at the completion of construction. He will also be responsible for repairing any damage to fences and other infrastructure as a result of construction activities.

All construction equipment and excess aggregate, stone, gravel, concrete, etc. shall be removed from the site upon completion of work. No discarded materials shall be buried. Locally indigenous vegetation, only, shall be used for rehabilitation. The Contractor and

Project Manager should agree for how long the Contractor will be responsible for erosion control.

The Contractor shall be responsible for the elimination of alien plants and weeds in the areas disturbed by construction for the duration of the contract, and the first month thereafter, after which time the project proponent will be responsible.

#### 7.4 4.4 ACCESS ROADS

The existing access track will be used. Site guests during construction will arrive by car, will be met at the reception, they will park at a designated area away from the construction site.

The parking area will be decided upon by the project manager on site. The project proponent will be responsible for rehabilitation on any disturbed areas caused during construction; furthermore any previously used access paths not currently used will be rehabilitated.

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## 8 MANAGEMENT PROGRAMME: PRE-CONSTRUCTION

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**Overall Goal:** To undertake the pre-construction (planning and design) phase in a way that:

- Ensures that the design of the PV Plant responds to the identified environmental constraints and opportunities.
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements
- Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- Ensures that the best environmental options are selected for the linear components, including the pipe lines and access roads.
- Enables the solar energy facility construction activities to be undertaken without significant disruption to other land uses and activities in the area. In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

### 8.1 OBJECTIVES

#### **OBJECTIVE 1: ENSURE THE FACILITY DESIGN RESPONDS TO IDENTIFIED ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES**

The following potentially sensitive areas were identified:

*Areas of high ecological sensitivity* – there are sensitive habitats which include listed and red data species, recorded for the site.

PRE CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Impact on identified sensitive areas.	<p>» Plan and conduct pre-construction activities in an environmentally acceptable manner</p> <p>» Undertake a heritage pre-construction survey of the facility development area (as required by SAHRA). Obtain the required permits where significant sites are to be impacted on.</p> <p>» Provision of the appointment of service providers (waste management) should be undertaken during site Establishment</p> <p>» Undertake an ecological walk-through survey of the development area. Obtain biodiversity permits from DAFF for impacts on protected plants and trees where applicable.</p> <p>» Obtain any additional environmental permits required (e.g. water use license, protected tree and protected plant permits, heritage permit, etc.). Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA where applicable.</p> <p>» External access point and internal access road to be carefully planned to maximise road user safety.</p> <p>» Areas of high ecological sensitivity include the sensitive habitat of the ridges and areas which include protected and red data species. It is recommended that the main drainage line (located outside the development footprint) and associated system be avoided during construction and operation, owing to the sensitivity of the benefiting ephemeral river systems and the largely natural state of these systems. A buffer zone of 50 m is prescribed</p>	<p>» Review of the design by the Construction Manager and the Environmental Control Officer prior to the commencement of construction.</p>	Pre-construction	Developer, Engineer, ECO and Contractor



PRE CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<ul style="list-style-type: none"> <li>» Water usage design - optimise the design or technology to reduce consumptive water requirements as far as possible.</li> <li>» Consult a lighting engineer in the planning and placement of light fixtures for the plant and the ancillary infrastructure.</li> <li>» Plan the placement of lay-down areas and temporary construction accommodation in order to minimize vegetation clearing.</li> <li>» Develop a comprehensive construction rehabilitation plan for the site.</li> <li>» Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the project reference number.</li> <li>» ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.</li> <li>» Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible.</li> </ul>			

**OBJECTIVE 2: MINIMISE STORMWATER RUNOFF AND SUBSEQUENT ALTERATION OF THE LOCAL HYDROLOGICAL REGIME**

PRE CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Poor stormwater management and alteration of the hydrological regime.	» A buffer zone of 50m must be maintained around the main drainage system (outside the development area) with 30m buffer zones around its tributaries. » Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system through increased sedimentation. » Construction must include appropriate design measures that allow surface and sub-surface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff. » Design must ensure the separation of dirty and clean water runoff from the site, and appropriate containment of dirty water. » New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures. » Wind screening and stormwater control systems should be implemented to reduce/prevent erosion from the project site.	» Appropriate stormwater management system in place	Planning and design	Developer and Contractor

**OBJECTIVE 3: TO ENSURE EFFECTIVE COMMUNICATION MECHANISMS**

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the solar energy facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

PRE CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Impacts on affected and surrounding landowners and land uses	<p>» Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.</p> <p>» Implement a transparent approach and open consultation with adjacent property owners, prior and throughout the construction period in order to provide a platform where grievances or requests can be addressed before issues become contentious.</p> <p>» Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners, should be informed of the details of the contractors, size of the workforce and construction schedules.</p>	»An incident reporting system should be used to record nonconformances to the EMP.	»Pre-construction (construction procedure)	Developer, ECO and Contractor

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## 9 MANAGEMENT PROGRAMME: CONSTRUCTION

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**Overall Goal:** Undertake the construction phase in a way that:

- Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value. Minimises impacts on fauna using the site. Minimises the impact on heritage sites should they be uncovered.

### 9.1 INSTITUTIONAL ARRANGEMENTS: ROLES AND RESPONSIBILITIES FOR THE CONSTRUCTION PHASE

As the proponent, Zolograph Investments (RF) Proprietary Limited must ensure that the implementation of the facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and implementation of the EMPr, and through its integration into the contract documentation. Zolograph Investments (RF) Proprietary Limited will retain various key roles and responsibilities during the construction of the facility.

#### **OBJECTIVE 1: ESTABLISH CLEAR REPORTING, COMMUNICATION, AND RESPONSIBILITIES IN RELATION TO OVERALL IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PROGRAMME DURING CONSTRUCTION**

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Internal Environmental Officer, Safety and Health Representative; Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. (Figure 9-1) provides an organogram indicating the organisational structure for the implementation of the EMPr.

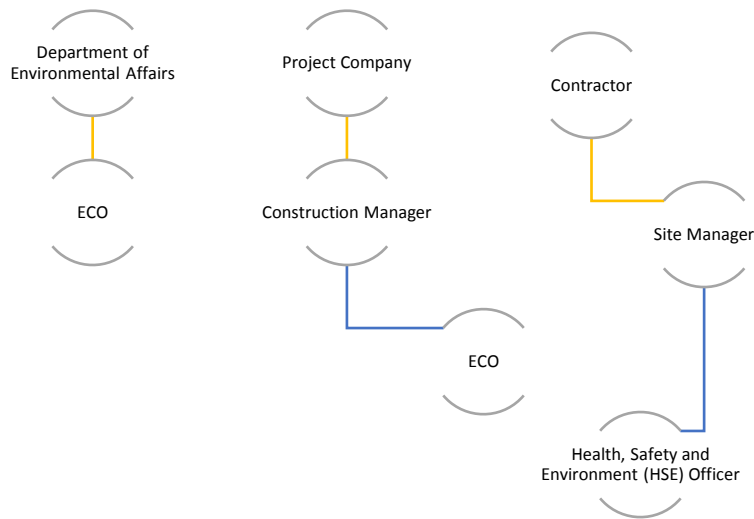


Figure 9-1: Organisational structure for the implementation of the EMPr

**Construction Manager will:**

- Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- Ensure that Zolograph Investments (RF) Proprietary Limited and its Contractor(s) are made aware of all stipulations within the EMPr.
- Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes through input from the independent ECO.
- Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
- Be fully knowledgeable with the contents of all relevant licences and permits.

**Site Manager (Contractor's on-site Representative) will:**

- Be fully knowledgeable with the contents of the EIA and risk management.
- Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.

- Have overall responsibility of the EMPr and its implementation.
- Conduct audits to ensure compliance to the EMPr.
- Ensure there is communication with the Technical Director, the ECO, the Internal Environmental Officer and relevant discipline engineers on matters concerning the environment.
- Be fully knowledgeable with the contents of all relevant licences and permits.
- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- Be fully knowledgeable with the contents with the EIA.
- Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents with the EMPr.
- Be fully knowledgeable of all the licences and permits issued to the site.
- Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them. Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit. Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient. However, in the absence of the ECO there should be a designated owner's environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

**Contractors and Service Providers:** It is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor will appoint an Internal Environmental Officer to whom will be responsible for informing contractor employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Internal Environmental Officer and Contractor's obligations in this regard include the following:

- Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
- Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- Be fully knowledgeable with the contents with the EMPr.
- Be fully knowledgeable of all the licences and permits issued to the site.
- Ensure a copy of the Environmental Authorisation and EMPr must be easily accessible to all on-site staff members.
- Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
- Ensure that prior to commencing any site works, all contractor employees and subcontractors must have attended an environmental awareness included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor
- Manage the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports.

- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO. Staff will be informed of environmental issues as deemed necessary by the Independent ECO.

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

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

**Contractor's Safety, Health and Environment Representative:** The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's Safety, Health and Environment Representative should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of Non-Compliance.
- Know the background of the project and understand the implementation programme.
- Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
- Keep accurate and detailed records of all EMPr-related activities on site.



## 9.2 OBJECTIVES

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

### **OBJECTIVE 1: MINIMISE IMPACTS RELATED TO INAPPROPRIATE SITE ESTABLISHMENT**

The contractor must take all reasonable measures to ensure the safety of the public in the surrounding area.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Hazards to landowners and public.</li> <li>» Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located.</li> <li>» Loss of threatened plant species and protected tree species.</li> </ul>	<ul style="list-style-type: none"> <li>» Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager and ECO.</li> <li>» Prior to the commencement of construction activities, the project site must be clearly demarcated with fencing. No construction activities are allowed outside of the demarcated footprint area.</li> <li>» The Contractor is to provide a method statement, including a construction site layout plan, before site clearance commences. The method statement must clearly indicate all material storage areas, offices and other site infrastructure, waste disposal/ storage areas etc., designed to minimize removal of vegetation and damage to surrounding areas.</li> <li>» Fence and secure contractor's equipment camp as agreed with the ECO.</li> <li>» Develop an efficient access control system which allows for the identification of all people on site</li> <li>» Where access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out.</li> <li>» Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.</li> <li>» All unattended open excavations must be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent</li> </ul>	<ul style="list-style-type: none"> <li>» An incident reporting system will be used to record non-conformances to the EMP.</li> <li>» ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager.</li> </ul>	Site establishment and duration of contract	Contractor and ECO

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>unauthorised access to the working area and the internal access/haul routes.</p> <ul style="list-style-type: none"> <li>» Minimise vegetation clearance or removal associated with site establishment activities. Compile a method statement specific to vegetation clearance.</li> <li>» Topsoil is to be stripped to a depth of at least 150 mm where possible from construction areas and preserved for rehabilitation. Stockpiles must be established in a designated area, not exceeding a height of 2 m. The stockpile must be located away from seepage zones, floodlines, water courses and other ecological sensitive areas. Perhaps use topsoil, if any, to create storm water management berms around the facility.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> <li>» ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager. Establish SABS 089: 1999 Part 1 approved bunded areas for storage of hazardous materials and hazardous waste.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> <li>» ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager. Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.</li> <li>» Ablution or sanitation facilities should not be located within 100 m of water courses and wetlands.</li> </ul>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	» Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shade cloth) at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.			

**OBJECTIVE 2: APPROPRIATE MANAGEMENT OF THE CONSTRUCTION SITE AND CONSTRUCTION WORKERS**

Only security personnel will be accommodated on site. Contractors and their employees are expected to be accommodated at existing accommodation facilities in the study area or within an appropriately sited construction camp. Construction equipment will need to be stored at appropriate locations on site. In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their subcontractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Damage to indigenous natural vegetation and sensitive areas.</li> <li>» Damage to and/or loss of topsoil (i.e. pollution, compaction etc.).</li> <li>» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.</li> <li>» Pollution/contamination of the environment.</li> </ul>	<ul style="list-style-type: none"> <li>» The developer is encouraged to use the solar park area to graze sheep or goat for sustainability</li> <li>» The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the EIA studies and reflected on the site layout plan included within this EMP. No temporary site camps will be allowed outside the footprint of the development area.</li> <li>» Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.</li> <li>» Safety representatives, managers and workers must be trained in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant Act.</li> <li>» Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas.</li> <li>» Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Portable ablutions must be removed from site when construction is completed.</li> <li>» Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.</li> <li>» Informal vending stations should not be allowed on or near the construction site.</li> </ul>	<ul style="list-style-type: none"> <li>» Regular audits of the construction camps and areas of construction on site by the ECO.</li> <li>» Proof of maintenance of ablution facilities available on site</li> <li>» An incident reporting system should be used to record nonconformances to the EMP.</li> <li>» Complaints investigated and, if appropriate, acted upon.</li> </ul>	<p>Duration of Contract</p>	<p>Developer and Contractor</p>

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>» Fire-fighting equipment and training must be provided before the construction phase commences.</p> <p>» All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.</p> <p>» Ensure waste disposal facilities are maintained and emptied as and when required.</p> <p>» All work sites must be kept free of waste. No solid waste may be burned or buried on site or disposed of by any other method on site or within quarries or borrows pits.</p> <p>» Solid waste (general waste) to be disposed of at the closest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal</p> <p>» No one may disturb flora or fauna outside of the demarcated construction area/s.</p> <p>Sub-contractors appointed by the Contractor must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.</p> <p>» Water resources to be used sparingly and use not to exceed the resource potential or recharge rate. Contractor to keep detailed records of water quantities used.</p> <p>» Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan to be developed with emergency procedures in the event of a fire.</p> <p>» Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.</p>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	» Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce. » No vehicles or machinery are to be washed on site, outside of the designated areas.			

**OBJECTIVE 3: MAXIMISE LOCAL EMPLOYMENT AND BUSINESS OPPORTUNITIES ASSOCIATED WITH THE CONSTRUCTION PHASE**

Limited employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» The opportunities and benefits associated with the creation of local employment and business.	» Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible. » An equitable process should be promoted whereby locals and previously disadvantaged individuals (including women) are considered for employment opportunities. » Create conditions that are conducive for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	» The Owner and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.	Pre-construction and construction	ECO , Contractor and Developer

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<ul style="list-style-type: none"> <li>» A local labour desk should be set-up (if not already established) in the beneficiary communities to coordinate the process of involving local labour.</li> <li>» Develop a transparent communication and recruitment process to minimise the influx of jobseekers to the area.</li> <li>» The recruitment process and the use of contractors should be clearly communicated to the local communities. The communication strategy should ensure that unrealistic employment expectations are not created.</li> </ul>			

**OBJECTIVE 4: MINIMISE THE POTENTIAL IMPACT ON HEALTH, SAFETY AND SECURITY**

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to “outsiders” being in the area to undertake their criminal activities. Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.

The actual safety of construction workers is also of concern. Further health and safety issues associated with the actual construction site include unauthorised entry to the site and construction areas, the usage of large equipment on site, the risks associated with the storage of equipment and material on site, as well as the increased risk of accidents due to the increased movement of construction vehicles on the local roads.

Other concerns relate to littering, unwanted behavior of construction workers, transmission of Sexually Transmitted Diseases (STDs), environmental pollution, an increase risk in fires and so forth. Although such perceptions cannot be substantiated or be changed it should be sensitively dealt with. It is thus clear that even though the construction phase when these impacts could occur is only of a short duration, the effects of the impacts could remain in the medium term.



CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Outside workers are involved in criminal activities and/or fires occur.	<ul style="list-style-type: none"> <li>» On-site security should be active prior to the construction phase.</li> <li>» Construction workers should be easily identifiable by wearing uniforms and identification tags/ induction cards.</li> <li>» All staff should undergo a general H&amp;S induction and simplified environmental awareness training session</li> <li>» The construction site should be fenced and access to the area controlled.</li> <li>» Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners and the Local Municipality</li> <li>» Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires</li> <li>» Contact details of emergency services should be prominently displayed on site.</li> <li>» Heavy vehicles turning warning signs must be provided on the R566 on both sides of the access points during the construction phase.</li> </ul>	» The Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.	Construction	ECO and Contractor

**OBJECTIVE 5: MINIMISE THE POTENTIAL IMPACT ON THE DAILY LIVING AND MOVEMENT PATTERNS**

Some intrusion impacts due to the construction activities and vehicular movements (noise and dust) on the surrounding property owners could be experienced.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals.</p> <p>» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted.</p> <p>» Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.</p> <p>» Possible increase in dust, noise, and general intrusion.</p>	<p>» Regular monitoring of noise generating activities should occur. This will serve as the core of noise mitigation as it will enable the determination of problem areas. If deemed necessary, the points indicating exceedances in the current study could be re-measured.</p> <p>» Personal Protective Equipment to all persons working in areas where high levels of noise can be expected.</p> <p>» Major noise generating activities can be restricted to between 06h00 and 18h00 on Monday to Friday, and 06h00-13h00 on Saturdays and Sundays.</p> <p>» Placement of noise generating activities can be planned as far away as possible from affected areas and/or persons.</p> <p>» Installation of acoustic enclosures for equipment to stop noise at the source.</p> <p>» Ensure that all staff on the proposed activity is provided with “noise sensitivity” training to ensure noise generation is limited.</p> <p>» The efficiency of noise mitigation measures should be assessed on a regular basis.</p> <p>» No amplified music should be allowed on the site.</p> <p>» Good public relations are essential. The information provided to stakeholders should be factual and not set unrealistic expectations.</p> <p>» A clear line of communication should be in place where complaints can be lodged and response can be provided on.</p> <p>» A clear commitment should be made on accommodating the local communities in preventing noise as far as possible. and</p>	<p>Owner, and appointed ECO must monitor indicators listed above to ensure that they have been implemented.</p> <p>» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager.</p> <p>» A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.</p> <p>» An incident reporting system must be used to record nonconformances to the EMP.</p>	<p>Construction</p>	<p>ECO and Contractor</p>

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>» Should any complaints regarding noise be received from the adjacent community / staff, a baseline noise assessment and subsequent noise monitoring should be conducted.</p> <p>» Adequate parking for all employees, contractors and subcontractors will be made available and should not impact negatively on neighbouring farmers.</p> <p>» Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. Additional access roads should be kept to a minimum.</p> <p>» Source general construction material and goods locally where available to limit transportation over long distances.</p> <p>» Local labourers should be used during the construction phase to limit the inflow of outsiders to the area.</p> <p>» Construction activities should not interfere with the farming activities on surrounding properties.</p> <p>» Compile and implement a traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. A points-men should be deployed at the intersection of M21 and R566 during the AM peak period.</p> <p>» Two entrance gates will be required, namely one for employees who have been issued with access control devices and a separate access for visitors, deliveries or other traffic where permission to enter the property has to be confirmed.</p>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<ul style="list-style-type: none"> <li>» Gravel roads and cleared areas should be sprayed with an appropriate dust suppressant to limit dust creation.</li> <li>» Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.</li> <li>» Strict vehicle safety standards should be implemented and monitored.</li> <li>» All relevant permits for abnormal loads must be applied for from the relevant authority.</li> <li>» Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.</li> <li>» Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.</li> <li>» The movement of all vehicles within the site must be on designated roadways.</li> <li>» Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions, and other standard traffic control information. All signage to be in accordance with prescribed standards and must be appropriately maintained for the duration of the construction period.</li> <li>» Ensure that any damage to internal roads because of construction activities is repaired before completion of the construction phase.</li> <li>» Haul vehicles moving outside the construction site carrying material that can be wind-blown will be covered with suitable material.</li> <li>» Speed of construction vehicles must be restricted, as defined by the contractor.</li> </ul>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	» Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if visible dust is blowing toward nearby residences outside the site.			

#### OBJECTIVE 6: MINIMISATION OF DEVELOPMENT FOOTPRINT

In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Impacts on natural vegetation.</li> <li>» Loss of indigenous natural vegetation due to construction activities.</li> <li>» Impact on avifauna</li> </ul>	<ul style="list-style-type: none"> <li>» Permits must be obtained to translocated or destroy all the identified protected species that are located in the development footprint</li> <li>» Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.</li> <li>» Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.</li> <li>» No-Go areas are to be demarcated with tape and warning signs prohibiting access erected. Plant and</li> </ul>	<ul style="list-style-type: none"> <li>» Observation of vegetation clearing activities by ECO throughout construction phase.</li> <li>» Supervision of all clearing and earthworks.</li> <li>» An incident reporting system will be used to record non-conformances to the EMPr.</li> </ul> <p><b>Avifauna</b></p> <ul style="list-style-type: none"> <li>» The construction phase of the solar power plant is likely to be highly impactful, although</li> </ul>	Construction	ECO and Contractor

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>vehicle operators must be instructed by the SHE on where these No-Go sites are.</p> <ul style="list-style-type: none"> <li>» No vegetation removal must be allowed outside the designated project development footprint.</li> <li>» Ridges and areas which include protected and red data species must be avoided at all costs during construction, unless the necessary permits are obtained.</li> <li>» A site rehabilitation programme must be implemented.</li> <li>» Disturbed areas should be rehabilitated when construction in an area is completed. Rehabilitated areas must be inspected on a monthly basis and maintained, if necessary</li> </ul> <p><b>Avifauna</b></p> <ul style="list-style-type: none"> <li>» It is recommended that the Solar photovoltaic (PV) solar farm type be used since this will have the least impact on avifaunal species.</li> <li>» Where possible the construction of the solar farm should take place in the area that has already been disturbed or degraded by past and present human activities.</li> <li>» Construction in dense woodland area, especially along drainage lines should be avoided, as many avifaunal species are associated with trees that grow along these conduits.</li> <li>» Construction should not take place near large trees which serves as nesting or roosting sites for raptors and vultures – large trees are a limited resource in dry areas.</li> <li>» Solar arrays should not be constructed in areas close to roosting and breeding sites of significant populations of threatened, endemic, rare or range-</li> </ul>	<p>many of these impacts will be temporary. Having environmental monitors present on site to guide management and mitigation efforts and to monitor the effects of construction activities is optimal, but not necessarily mandatory for smaller sites and/or lower risk sites.</p> <ul style="list-style-type: none"> <li>» The effects that the solar farm has on avifaunal species should be constantly monitored and recorded in a database. The area within and surrounding a solar farm should be inspected on a daily basis. Any avifaunal carcasses should be kept in fridges for identification purposes by a specialist and for other research purposes to study the effect of the solar farm on the bird population in this region. Each individual solar farm should be analysed on a case-by-case basis.</li> <li>» Post-construction monitoring is not required for lower-risk projects (assessment regime 1), although it is encouraged. Any incidents of bird injuries or mortalities observed during operations should be recorded and reported.</li> <li>» For higher-risk projects (assessment regimes 2 and 3), post-construction monitoring is necessary to a) determine the actual impacts of the SEF, b) determine if additional mitigation is required at the SEF and c) learn about impacts and improve future assessments.</li> <li>» Post-construction monitoring does not negate the need to first avoid, minimise and mitigate negative impacts during the project development stage.</li> <li>» Post-construction monitoring should be started as the facility becomes operational, bearing in mind that the effects of a solar plant may change over time</li> </ul>		

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>restricted avifaunal species, as their flight paths might be across the solar farm.</p> <ul style="list-style-type: none"> <li>» Ideally, the solar facility should be designed from concept stage to feed into existing power lines or should be used locally and therefore be independent of the grid.</li> <li>» New lines should be constructed in such a way that they have a minimal impact on the birds by using bird-friendly designs and appropriate devices for marking the wires.</li> <li>» New power lines should follow existing roads wherever possible.</li> <li>» The amount of vegetation that is cleared should be kept to the minimum so as to limit habitat loss.</li> <li>» Grazing or careful mowing should be used to retard the regrowth of vegetation and not chemical herbicides.</li> <li>» The vegetation under the solar panels should be kept short at all times to prevent fires and to prevent avifaunal from breeding or nesting on the ground.</li> <li>» The technology that is used can be chosen to minimise impact on birds, as reflective surfaces which are parabolic (curved) will reduce the extent of sky reflection, relative to flat heliostats. It should be ensured that trough receivers utilise evacuated glass tubes or similar technology to reduce heat loss. This will mean lower surface temperatures which will not burn birds.</li> <li>» The plant should either be upgraded or decommissioned after the normal 20 year expected lifespan.</li> <li>» The cables of high voltage powerlines connecting the solar farm with the Schietfontein grid, especially the thin earth-wires or lines above large powerlines that could form part of the site should be fitted with</li> </ul>	<ul style="list-style-type: none"> <li>» Post-construction monitoring can be divided into three categories: a) habitat classification, b) quantifying bird numbers and movements (replicating baseline data collection), and c) estimating bird mortalities.</li> <li>» There are three components to estimating bird fatality rates: a) estimation of searcher efficiency and carcass persistence rates, b) carcass searches, and c) data analysis incorporating systematically collected data from a and b above.</li> <li>» A minimum of 20 - 30% of the solar hardware (plus an area with a diameter of 300 m around the CSP power tower, where relevant) should be methodically searched for fatalities, with a search interval informed by carcass persistence trials and objective monitoring. Any evidence of mortalities or injuries within the remaining area should be carefully recorded and included in reports as incidental finds.</li> <li>» The search area should be defined and consistently applied throughout monitoring.</li> <li>» Observed mortality rates must to be adjusted to account for searcher efficiency (which can change seasonally depending on vegetative condition of the site), scavenger removal and the proportion of the facility covered by the monitoring effort. Some of these factors may change seasonally due to the breeding season of scavengers and whether visibility of the survey area changes through the year.</li> <li>» The duration and scope of post-construction monitoring should be informed by the outcomes of the previous year's monitoring, and should be reviewed annually. The findings and recommendations of the post-construction</li> </ul>		

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	bird diverters such as tags to prevent birds from colliding with the powerlines. This should not only be done at the direct vicinity of the study site but along the entire route that the powerlines will follow to their destination.	monitoring report should be included in the updated Environmental Management Programme. » Post-construction monitoring of bird abundance and movements and fatality surveys should span 2-3 years to take inter-annual variation into account. However, if significant problems are found or suspected, the post-construction monitoring should continue as needed in conjunction with adaptive management, taking into account the risks related to the particular site and species involved.		

**OBJECTIVE 7: APPROPRIATE MANAGEMENT OF TOPSOIL**

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
Loss of topsoil	» Topsoil must be stockpiled and appropriately managed to ensure viability for reuse during rehabilitation. » No mixing of topsoil and subsoil must be permitted. » Stockpiles must be stored separately and returned for backfilling in the correct soil horizons. » Should topsoil be stockpile for longer than 6 months it must be vegetated.	» Monitoring of topsoil clearing activities » An incident reporting system will be used to record non-conformances to the EMP.	Construction	ECO and Contractor



CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	» Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur. » Topsoil is to be stripped to a depth of 300 mm where possible from construction areas will be stockpiled in a designated area, not exceeding a height of 2 m. The stockpile shall be located away from seepage zones, floodlines, water courses and other ecological sensitive areas (drainage lines).			

**OBJECTIVE 8: MINIMISE SOIL DEGRADATION AND EROSION**

The soil on site may be impacted in terms of:

- Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
- Incorrect storage of topsoil
- Accidental spillages
- Poor rehabilitation
- Erosion from rainwater

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Soil and rock degradation.</li> <li>» Soil erosion.</li> <li>» Increased deposition of soil into drainage systems.</li> <li>» Increased run-off over the site.</li> </ul>	<ul style="list-style-type: none"> <li>» Identify disturbance areas and restrict construction activity to these areas.</li> <li>» Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.</li> <li>» Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.</li> <li>» Minimise removal of vegetation which adds stability to soil.</li> <li>» Erosion and loss of soil must be prevented by minimizing the construction site exposed to surface water run-off. Where necessary erosion stabilizing actions such as gabions or re-vegetation must be implemented to prevent further habitat deterioration.</li> <li>» Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, storm water catchpits, shade nets, gabions or temporary mulching over denuded area as required.</li> <li>» No soil is to be stripped from areas within the site that the contractor does not require for construction works.</li> <li>» Erosion control measures to be regularly maintained.</li> </ul>	<ul style="list-style-type: none"> <li>» On-going inspections of the site by the ECO.</li> <li>» Monthly inspections of sediment control devices by the ECO</li> <li>» Monthly inspections of surroundings, including drainage lines (outside the development area) by the ECO.</li> <li>» An incident reporting system will record non-conformances.</li> </ul>	Construction	ECO and Contractor

**OBJECTIVE 9: MINIMISE THE IMPACTS ON FAUNA**

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Loss or displacement of fauna	» Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance. » Vehicles to adhere to speed limits at all times » The intentional harming or killing of animals will be prohibited through on-site supervision and worksite rules. » A site rehabilitation programme should be implemented.	» Observation of vegetation clearing activities by ECO throughout construction phase » Supervision of all clearing and earthworks » Recording faunal fatalities to monitor success of relocation efforts » An incident reporting system will be used to record non-conformances to the EMP.	Construction	ECO and Contractor

**OBJECTIVE 10: MINIMISE IMPACTS ON WATER RESOURCES**

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Pollutants such as lime-containing (high pH) construction materials such as concrete, cement, grouts, etc. could be harmful to aquatic biota, particularly during low flows when dilution is reduced.	» A buffer zone of 50m must be maintained around the main drainage system (that is located outside the development area) with 30m buffer zones around its tributaries. » Implement strict management of all hazardous materials used on site.	» Monitor management measures in place for potentially hazardous materials	Construction	ECO and Contractor

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>»Ensure strict management of potential sources of pollution (hydrocarbons from vehicles and machinery, cement during construction, etc.).</p> <p>» No unauthorised groundwater abstraction may occur on site.</p> <p>» Should any water be discharged from the site, the water is to comply with national effluent standards. No contaminated water may be discharged from site.</p> <p>» Potentially contaminated water originating from site must be directed through an oil and water separator. Oil is to be removed and/or recycled from site by a licensed contractor.</p> <p>» Proper use of chemical toilets should be strictly enforced.</p> <p>» No activities shall be allowed to encroach into a water course or wetland/pan without a Water Use License being in place from the Department of Water and Sanitation (DWS).</p>			

**OBJECTIVE 11: APPROPRIATE STORMWATER MANAGEMENT**

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Poor stormwater management and the alteration hydrological regime	» Any stormwater within the site must be handled in a suitable manner, i.e. clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, shade nets, or gabions trapping sediments and reduce flow velocities. » Stormwater control systems must be implemented to reduce erosion on the project site. » New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures. » Drainage measures must promote the dissipation of storm water run-off.	Appropriate stormwater management system in place	Construction	Developer, ECO and Contractor

**OBJECTIVE 12: PROTECTION OF HERITAGE RESOURCES**

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large scale excavations for foundations will damage archaeological sites, as will road construction activities.

Archaeological or other heritage materials occurring in the path of any surface or subsurface disturbances associated with any aspect of the development are highly likely to be subject to destruction, damage, excavation, alteration, or removal. The objective should be to limit such

impacts to the primary activities associated with the development and hence to limit secondary impacts during the medium and longer term working life of the facility.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» Heritage objects or artefacts found on site are inappropriately managed or destroyed</p>	<p>» Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).</p> <p>» Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.</p> <p>» Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.</p> <p>» If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess to site, the area needs to be barricaded within a radius of at least 10m of such indicator</p> <p>Although no archaeological objects were observed during the survey, the client is reminded that these often happen underground, as such should any archaeological material be unearthed accidentally during the course of construction, SAHRA should be alerted immediately and construction activities be stopped within a radius of at least 10m of such indicator. The area should then be demarcated by a danger tape. Accordingly, a professional</p> <p>» In the event that fossils resources are discovered during excavations, immediately stop excavation in</p>	<p>» Observation of excavation activities by SHE throughout construction phase</p> <p>» Supervision of all clearing and earthworks</p> <p>» Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported.</p> <p>» Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required).</p> <p>» An incident reporting system will be used to record non-conformances to the EMPr.</p>	<p>Construction</p>	<p>Developer, ECO and Contractor</p>

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils. Inform the site foreman and the ECO. ECO to inform the developer, the developer contacts the standby archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images by email.			

**OBJECTIVE 13: MINIMISATION OF VISUAL IMPACTS ASSOCIATED WITH CONSTRUCTION**

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Visual impact of general construction activities and laydown areas and the potential scarring of the	» Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. » Ensure that rubble, litter, and disused construction materials are managed and removed regularly.	» Monitoring of vegetation clearing during construction. » Monitoring of rehabilitated areas post construction.	Construction	ECO and Contractor

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
landscape due to vegetation clearing.	<ul style="list-style-type: none"> <li>» Ensure that all infrastructure and the site and general surrounds are maintained in a neat a manner.</li> <li>» Reduce and control construction dust using approved dust suppression techniques.</li> <li>» As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.</li> <li>» Rehabilitate all disturbed areas, construction areas, roads, and servitudes to acceptable visual standards.</li> <li>» Any additional external lighting of the facility will be limited.</li>   <li>» The laydown area should be sited away from the R566 road and preferably at an area of low elevation prominence. soil</li> <li>» Trees and shrubs should be planted especially along the boundaries so as to reduce the visual impact on surrounding neighbours.</li>   <li>»The landscaping must be a combination of indigenous plants consisting of low ground covers, shrubs and lawn.</li>   <li>» The 3-dimensional visualisations have shown that this will soften the outer boundary of the development. This will also form an obstruction to the viewers possibly seeing the solar farm development.</li>   <li>» However, at certain parts of the landscape, especially the viewpoints on higher ground to the north and north-east of the site, the development will be visible.</li> </ul>			



CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	» External lighting must be minimized. No spot lights should be allowed.  » Choice of colour, lighting and positioning should be properly planned.  » The outward features of the solar power farm should be taken into consideration as they need to blend in with the surrounding environment in order to minimise visual impacts.			

**OBJECTIVE 14: APPROPRIATE HANDLING AND MANAGEMENT OF WASTE**

The construction of the solar energy facility will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction of the solar energy facility will include:

- general solid waste
- hazardous waste
- liquid waste (including grey water and sewage)

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Inefficient use of resources resulting in excessive waste generation</li> <li>» Litter or contamination of the site or water through poor waste management practices</li> </ul>	<ul style="list-style-type: none"> <li>» Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.</li> <li>» Construction contractors must provide specific detailed waste management plans to deal with all waste streams.</li> <li>» Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.</li> <li>» Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).</li> <li>» Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.</li> <li>» Uncontaminated waste must be removed at least weekly for disposal; other wastes must be removed for recycling/ disposal at an appropriate frequency.</li> <li>» Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.</li> <li>» Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.</li> <li>» Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.</li> </ul>	<ul style="list-style-type: none"> <li>» Observation and supervision of waste management practices throughout construction phase.</li> <li>» Waste collection will be monitored on a regular basis.</li> <li>» Waste documentation completed.</li> <li>» Proof of disposal of sewage at an appropriate waste water treatment works.</li> <li>» A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon.</li> <li>» An incident reporting system will be used to record non-conformances to the EMP.</li> </ul>	Duration of construction	Contractor

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>» No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal</p> <p>» Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. Hazardous waste to be disposed of at a registered landfill site. »</p> <p>» Depending on the classification of the waste, a registered service provider with the necessary permits is to collect, transport and dispose of hazardous waste. Proof of appropriate disposal to be provided to the ECO.</p> <p>» Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.</p> <p>» SABS approved spill kits to be available and easily accessible.</p> <p>» Regularly serviced chemical toilets facilities and septic tanks must be used to ensure appropriate control of sewage.</p> <p>» Under no circumstances may waste be burnt on site.</p> <p>» Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.</p> <p>» Implement an integrated waste management approach that is based on waste minimisation and</p>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	incorporates reduction, recycling, re-use and disposal where appropriate. » Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.			

**OBJECTIVE 15: APPROPRIATE HANDLING AND STORAGE OF CHEMICALS, HAZARDOUS SUBSTANCES**

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. Chemical storage is likely to occur within the on-site substation.

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Pollution of water and soil resources.	» All chemicals, fuels and other hazardous materials are to be stored in designated and bunded areas, where the bunded area is impermeable and is impervious to the stored substance as per the requirements of SABS 089:1999 Part 1. The bunded area will contain 110% volume of the largest container stored. » Bunds and service area platforms to be cleaned and maintained regularly.	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMP.	During the construction phase	Contractor

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>» SABS approved Spill kits must be made available onsite for the clean-up of spills and leaks of contaminants. The relevant construction crew members must be trained in their use.</p> <p>» Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Refer to Emergency Response procedure included in the appendices.</p> <p>» In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.</p> <p>» Spilled cement must be cleaned up as soon as possible, stored as hazardous waste and disposed of at a suitably licensed waste disposal site.</p> <p>» Any contaminated/polluted soil must be removed, stored as hazardous waste and disposed of at a licensed hazardous waste disposal facility.</p> <p>» Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.</p> <p>» Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.</p> <p>» Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.</p> <p>» Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated prior to discharge, or</p>			

CONSTRUCTION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>disposed of as hazardous waste. Clean stormwater contained within the bunds may be reused.</p> <ul style="list-style-type: none"> <li>» Construction machinery must be stored in an appropriately sealed area. If machinery cannot be stored in a sealed area then a drip tray must be used to prevent spillage from any leaks.</li> <li>» No chemicals must be stored or vehicle maintenance undertaken within 100m of wetlands or drainage lines.</li> <li>» The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions.</li> <li>» Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.</li> <li>» Transport of all hazardous substances must be in accordance with the relevant legislation and regulations</li> <li>» An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.</li> <li>» Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.</li> <li>» Upon the completion of construction, the area must be cleared of potentially polluting materials.</li> </ul>			

### 9.3 DETAILING METHOD STATEMENTS

#### **OBJECTIVE 16: ENSURE ALL CONSTRUCTION ACTIVITIES ARE UNDERTAKEN WITH THE APPROPRIATE LEVEL OF ENVIRONMENTAL AWARENESS TO MINIMISE ENVIRONMENTAL RISK**

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMP will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO. Method statements must be reviewed by the ECO and owner's engineering team for further technical, legislative and health and safety input.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- Details of the responsible person/s
- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications, and
- Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).

- Preparation of the site (i.e. Clearing vegetation, compacting soils and removing existing infrastructure and waste).
- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure.
- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
- Stipulate the storm water management procedures recommended in the storm water management method statement.
- Ablution facilities (placement, maintenance, management and servicing)
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of waste process.
  - Recycle, re-use and removal process and procedure.
  - Liquid waste management:
    - To design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
    - Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
- Dust and noise pollution
  - Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  - Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at storage and handling areas.
  - All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip



trays underneath dispensing mechanisms including leaking engines/machinery).

- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
  - Rehabilitation, re-vegetation process and bush clearing.
- Incident and accident reporting protocol.
- General administration
- Designate access road and the protocol on while roads are in use.
- Requirements on gate control protocols.

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

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

#### 9.4 AWARENESS AND COMPETENCE: CONSTRUCTION PHASE OF THE SOLAR ENERGY FACILITY

##### **OBJECTIVE 17: TO ENSURE ALL CONSTRUCTION PERSONNEL HAVE THE APPROPRIATE LEVEL OF ENVIRONMENTAL AWARENESS AND COMPETENCE TO ENSURE CONTINUED ENVIRONMENTAL DUE DILIGENCE AND ON-GOING MINIMISATION OF ENVIRONMENTAL HARM**

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

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.

- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and subcontractors have attended site induction training which includes the environmental impacts associated with the. The training must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
  - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental “do’s” and “don’ts” (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

#### 9.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the EPC Contractor and must take the form of an on-site talk and demonstration by the ECO before the commencement of site establishment and construction on site. The education/awareness programme should be

aimed at all levels of management within the contractor team. A record of attendance of this training must be maintained by the ECO on site.

#### 9.4.2 Induction Training

Environmental impacts and requirements should be included in induction training and be presented to all persons who are to work on the site – be it for short or long durations; Contractor’s or Engineer’s staff; administrative or site staff; sub-contractors or visitors to site. This induction training should be undertaken by the Contractor’s Environmental Officer and should include discussing the developer’s environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall” dos and don’ts” on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

#### 9.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

### 9.5 MONITORING PROGRAMME: CONSTRUCTION PHASE OF THE SOLAR ENERGY FACILITY

#### **OBJECTIVE 18: TO MONITOR THE PERFORMANCE OF THE CONTROL STRATEGIES EMPLOYED AGAINST ENVIRONMENTAL OBJECTIVES AND STANDARDS**

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation. Where this is not clearly dictated, Main Street 957 (RF) Proprietary Limited will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Technical Director/Manager will ensure that the monitoring is conducted and reported.

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

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

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

#### 9.5.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, IEO and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

#### 9.5.2 Monitoring Reports

A monitoring report will be compiled by the ECO on a weekly and monthly basis and must be submitted to the Contractor and Developer. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

#### 9.5.3 Final Audit Report

A final environmental audit report must be compiled by the independent ECO and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase. This report must indicate the date of the audit,

the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

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## 10 MANAGEMENT PROGRAMME: REHABILITATION

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**Overall Goal:** Undertake the rehabilitation measures in a way that:

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

### 10.1 OBJECTIVES

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

**OBJECTIVE 1: ENSURE APPROPRIATE REHABILITATION OF DISTURBED AREAS SUCH THAT RESIDUAL ENVIRONMENTAL IMPACTS ARE REMEDIATED OR CURTAILED**

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

REHABILITATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for ongoing management intervention.</p>	<p>» The area of habitat converted at any one time and to speed up recovery of natural habitats.                      » All temporary facilities, equipment, and waste materials must be removed from site.                      » All temporary fencing and danger tape must be removed once the construction phase has been completed.                      » The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.                      » All hardened surfaces within the construction camp area should be loosened up all imported materials will be removed, and the area shall be top soiled and revegetated.                      » Temporary roads (if any) must be closed and access across these blocked                      » Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.                      » Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.</p> <p>Newly rehabilitated areas must be adequately demarcated and access restricted (specifically vehicular access) until vegetation is established. Appropriate signage must be established and maintained to ensure personnel are aware of these areas.</p> <p>On-going alien plant monitoring and removal must be</p>	<p>» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility.                      » On-going alien plant monitoring and removal should be undertaken on an annual basis prior to the commencement of construction.</p>	<p>Following completion of construction activities in an area</p>	<p>Developer / contractor</p>

REHABILITATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	undertaken on all areas of natural vegetation on an annual basis.			



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## 11 MANAGEMENT PROGRAMME: OPERATION

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

- Ensures that operation activities are properly managed in respect of environmental aspects and impacts
- Enables the solar energy facility's operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents
- Minimises impacts on fauna using the site

An environmental manager must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr.

### 11.1 OBJECTIVES

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

#### **OBJECTIVE 1: ESTABLISH CLEAR REPORTING, COMMUNICATION, AND RESPONSIBILITIES IN RELATION TO OVERALL IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PROGRAMME DURING OPERATION**

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:

- Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
- Conduct annual basis reviews of the EMPr to evaluate its effectiveness.

- Take appropriate action as a result of findings and recommendations in management reviews and audits.
- Provide forums to communicate matters regarding environmental management.

The **Environmental Manager** will:

- Develop and Implement an Environmental Management System (EMS) for the solar energy facility and associated infrastructure.
- Manage and report on the facility's environmental performance.
- Maintain a register of all known environmental impacts and manage the monitoring thereof.
- Conduct internal environmental audits and co-ordinate external environmental audits.
- Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs (DEA) on environmental performance and other issues.
- Conduct environmental training and awareness for the employees who operate and maintain the solar energy facility.
- Compile environmental policies and procedures.
- Liaise with interested and affected parties on environmental issues of common concern.
- Track and control the lodging of any complaints regarding environmental matters.

The ECO must provide fourteen (14) days written notification to the DEA that the operational phase will commence.

## **OBJECTIVE 2: PROTECTION OF INDIGENOUS NATURAL VEGETATION, FAUNA AND MAINTENANCE OF REHABILITATION**

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Disturbance to or loss of vegetation and/or habitat.</li> <li>» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.</li> </ul>	<ul style="list-style-type: none"> <li>» Vehicle movements must be restricted to designate roadways.</li> <li>» Operation and maintenance personnel must restrict all activities to within the solar energy facility. No disturbance of the surrounding areas must be permitted.</li> <li>» Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.</li> <li>» An on-going alien plant monitoring and eradication programme must be implemented, where necessary.</li> <li>» Implement appropriate management plan for offset area, as agreed with the relevant authorities</li> </ul>	<ul style="list-style-type: none"> <li>» Observation of vegetation on-site by contractor and environmental manager.</li> <li>» Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.</li> </ul>	Operational (will be monitored on a monthly bases)	contractor and environmental manager

**OBJECTIVE 3: MINIMISE THE ESTABLISHMENT AND SPREAD OF ALIEN INVASIVE PLANTS**

Preservation of natural habitat is of prime importance within this study area, mainly because of the CBA data that indicates the site as of Marikana Thornveld, demarcated as highly sensitive areas. The site falls within CBA 1 which means the ecosystems and species should be largely intact and undisturbed. However this isn't the case, the area has been degraded by cattle grazing and the operation mine that is within close proximity to the proposed project site. It is however imperative that the management of alien invasive species may be detrimental if left unattended, is essential.

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.</p>	<p>» Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per the NEM: Biodiversity Act (No. 10 of 2004).</p> <p>» Avoid creating conditions in which alien plants may become established:</p> <p>» Keep disturbance of indigenous vegetation to a minimum.</p> <p>» Rehabilitate disturbed areas as quickly as possible.</p> <p>» Do not import soil from areas with alien plants.</p> <p>» Weeds, alien plants and invasive vegetation will be removed should ingress into the site occur. Category 1 (declared weeds) and Category 2 (declared invader plants with a value) according to the Biodiversity Act (No. 10 of 2004) will be removed whenever possible.</p> <p>» On-going alien vegetation clearing must be implemented.</p> <p>» Immediately control any alien plants that become established using registered control methods.</p> <p>» The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides.</p> <p>» All areas of the site disturbed by construction must be rehabilitated using locally occurring indigenous plant species.</p>	<p>» Ongoing monitoring of area by Environmental Manager and Operational Manager during operation.</p> <p>» Annual audit of project area and immediate surroundings by qualified botanist.</p> <p>» The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.</p> <p>» The Environmental Manager should be responsible for driving this process.</p> <p>» Reporting frequency depends on legal compliance framework.</p>	<p>Construction and operation</p>	<p>Contractor and operator</p>

**OBJECTIVE 4: MINIMISATION OF VISUAL IMPACTS**

The primary visual impact of the facility and its infrastructure, including the power line, is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Visual impact of facility degradation and vegetation rehabilitation failure.</li> <li>» Lighting influences from the facility on surrounding areas.</li> </ul>	<ul style="list-style-type: none"> <li>» Maintain the general appearance of the facility in an aesthetically pleasing way.</li> <li>» Monitor rehabilitated areas, and implement remedial action as and when required.</li> <li>» Use of light fixtures and the fitment of covers and shields will be designed to contain rather than spread light.</li> </ul>	<ul style="list-style-type: none"> <li>» Monitoring of rehabilitated areas.</li> </ul>	Operation and maintenance	Contractor and operator

**OBJECTIVE 5: MINIMISE SOIL DEGRADATION AND EROSION**

The soil on site may be impacted in terms of:

- Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
- Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
- Degradation of the natural soil profile due to pollution.



OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>»Soil degradation.                      » Soil erosion.                      » Increased deposition of soil into drainage systems.                      » Increased run-off over the site.</p>	<p>» The loss of agricultural land is a long term loss and there are no mitigation measures that can be put in place to combat this loss. This loss extends to the post-construction phase. The area is, however, of low agricultural potential.</p> <p>» During construction, stripped soil should be stockpiled. Soil erosion and hard setting of the stockpiled material may occur. This can be mitigated by:</p> <p>» Ensuring that the slope of the stockpiled material is such that surface runoff is minimal;                      » Additions of stabilising agents such as organic material or vegetative cover.</p> <p>Stockpiling of soil must be for a minimum period. Stockpiled soil can be used in the construction of berms, swales etc. to ensure that soil erosion does not cause major degradation of the surrounding land.</p> <p>» Care must be taken with the ground cover during and after construction on the site.</p> <p>» If it is not possible to retain a good plant cover during construction, technologies should be employed to keep the soil covered by other means, i.e. straw, mulch, erosion control mats, etc., until a healthy plant cover is again established. Care should also be taken to control and contain storm water run-off.</p>	<p>» Ensure rehabilitation of disturbed areas is maintained.                      » Minimise soil degradation.                      » Minimise soil erosion and deposition of soil into drainage lines.                      » Ensure continued stability of embankments/excavations.</p>	<p>Operation</p>	<p>Developer, Contractor and Operator</p>

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<ul style="list-style-type: none"> <li>» Rehabilitate construction sites by using indigenous grasses.</li> <li>» Minimise activity on steep slopes / the side of slopes.</li> <li>» Implement effective erosion control measures and Erosion Management Plan.</li> <li>» Keep to existing roads, where practical, to minimise impact on undisturbed ground.</li> <li>» Ensure stable slopes of stockpiles/excavations to minimise slumping.</li> <li>» Stockpiles should not exceed 2m in height.</li> <li>» Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion, only if natural seeding does not occur.</li> <li>» Limit soil disturbance to dry season.</li> <li>» Ensure dust control on site through the use of an appropriate dust suppression measure.</li> <li>» Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catchpits, and shade nets).</li> </ul>			

**OBJECTIVE 6: MINIMISE DUST AND AIR EMISSIONS**

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicle), and from the augmentation plant. Windy conditions and the movement of vehicles on site may lead to dust creation.

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Re-entrainment of deposited dust by vehicle movements.</li> <li>» Wind erosion from unsealed roads and surfaces.</li> <li>» Fuel burning vehicle and combustion engines.</li> </ul>	<ul style="list-style-type: none"> <li>» Roads must be maintained to a manner that will ensure that nuisance to the community from dust is not visibly excessive.</li> <li>» Appropriate dust suppressant must be applied to the roads as required to minimise/control airborne dust.</li> <li>» Speed of vehicles must be restricted, as defined by the Environmental Manager/ECO.</li> <li>» Vehicles and equipment must be maintained in a roadworthy condition at all times.</li> </ul>	<ul style="list-style-type: none"> <li>» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager.</li> <li>» A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon.</li> <li>» An incident reporting system must be used to record nonconformances to the EMPr.</li> </ul>	Duration of contract	Contractor and operator

**OBJECTIVE 7: ENSURE THE IMPLEMENTATION OF AN APPROPRIATE FIRE MANAGEMENT PLAN DURING THE OPERATION PHASE**

The vegetation in the study area may be at risk of fire. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the solar energy facility infrastructure.</p>	<p>» Maintain adequate fire fighting equipment on site.                      » Provide fire-fighting training to selected operation and maintenance staff.                      » Ensure that appropriate communication channels are established to be implemented in the event of a fire.                      » Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).                      » Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.                      » Contact details of emergency services should be prominently displayed on site.</p>	<p>The project developer must monitor indicators listed above to ensure that they have been met.</p>	<p>Operation</p>	<p>Contractor and Operator</p>

**OBJECTIVE 8: MAXIMISE LOCAL EMPLOYMENT, BUSINESS OPPORTUNITIES AND SKILLS DEVELOPMENT**

The proposed facility is expected to require approximately 70 permanent employees including security personnel who would be on site on a permanent basis. Some local procurement of goods, materials and services could occur which would result in positive economic spin-offs. These opportunities for local service providers to render services to the proposed facility could include maintenance of the guardhouse, gardening at the guardhouse, cleaning services, security services and maintenance or replacement of general equipment

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<p>» The opportunities and benefits associated with the creation of local employment and business should be maximised.</p> <p>» Capacity building and skills training undertaken during the operational phase.</p>	<p>» Project developer to encourage the Engineering, Procurement and Construction (EPC) Contractor to employ labour-intensive measures in construction, where feasible, to increase the number of employment opportunities for the local labour.</p> <p>» The project owner should encourage the contractor to increase the local procurement practices and employ people from local communities as far as feasible to maximise the benefits to the local economy and local communities specifically.</p> <p>» The project owner or its contractor should engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and services (i.e. transportation, accommodation, security, and catering) from local businesses, where feasible.</p> <p>» The contractor or the project developer is to set-up a skills desk at the local municipal office and at least in the nearby community of Ga-Rankuwa to identify skills available in the community, which would assist in recruiting local labour during both construction and operation.</p> <p>The proposed mitigation measures will possibly increase the positive impact in the local economy; however, this will not affect the rating.</p> <p>» Project developer or EPC contractor to set up a recruitment office in the nearby town of Ga-Rankuwa and adhere to strict labour recruitment practices that would reduce the desire of potential job seekers to loiter around the site in hope to find temporary employment.</p>	<p>The project developer should be able to demonstrate that the above indicators are implemented.</p>	<p>Operation</p>	<p>Contractor and Operator</p>

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>» Project developer to encourage the contractor to employ locals as far as feasible through the creation of the local skills database (through a skills desk in the local municipal office and in Ga-Rankuwa) and recruitment of suitable candidates.</p> <p>» Project developer to ensure clear communication of the project information and effective public participation processes to minimise the influx of migrant job seekers.</p> <p>» Contractor to set up a control gate on the service road coming to the site from R566 to control the movement of people and vehicles coming towards the project site and leading to the properties south of the site (i.e. especially Portion 102, 104, 104 and 105 of 437). This is to be done to minimise the opportunities for presence of unauthorised individuals in the area close to the project site and the nearby properties. Setting up a control gate will need to be done in consultation with the potentially affected land owners.</p> <p>» During construction, contractor needs to clearly communicate the rules and regulations of working on site and moving from and to the site to all workers, sub-contractors, and suppliers.</p> <p>» Accommodation of workers, whether coming from outside or within the community, should be outside the project site.</p> <p>» Contractor to manage the presence of workers on site to ensure that they are only on site during the reasonable working hours.</p> <p>» Contractor to establish a proper fencing around the property to reduce the desire and the ability of workers to trespass between the construction site and adjacent properties.</p>			

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<p>»Project developer and contractor to implement health awareness campaigns to curb the potential of spreading disease, use of drugs, or alcohol abuse for example.</p> <p>» Project developer and/or contractor is to assign a person to deal with complaints and concerns of the affected parties.</p> <p>» An equitable process whereby minorities and previously disadvantaged individuals (including women) are taken into account should be implemented.</p> <p>» Local sourcing of materials, general services to assist in providing economic, and employment opportunities for the local people.</p> <p>» In cases for the middle to lower skilled jobs, where the relevant skills do not exist, training should be provided to willing local community members to enable them to fill the positions.</p>			

**OBJECTIVE 9: APPROPRIATE HANDLING AND MANAGEMENT OF HAZARDOUS SUBSTANCES AND WASTE**

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

OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
<ul style="list-style-type: none"> <li>» Inefficient use of resources resulting in excessive waste generation.</li> <li>» Litter or contamination of the site or water through poor waste management practices.</li> <li>» Contamination of water or soil because of poor materials management.</li> </ul>	<ul style="list-style-type: none"> <li>» Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.</li> <li>» All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.</li> <li>» Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.</li> <li>» The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions.</li> <li>» Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.</li> <li>» Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.</li> <li>» Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.</li> <li>» Used oils and chemicals:</li> <li>» Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority</li> </ul>	<ul style="list-style-type: none"> <li>» Waste collection must be monitored on a regular basis.</li> <li>» Waste documentation must be completed and available for inspection</li> <li>» An incidents/complaints register must be maintained, in which any complaints from the community must be logged.</li> <li>» Complaints must be investigated and, if appropriate, acted upon.</li> <li>» Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the Operational Manager.</li> <li>» All appropriate waste disposal certificates with the monthly reports.</li> </ul>	<p>Operation</p>	<p>Contractor and Operator</p>



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OPERATION PHASE				
Identified or Potential Environmental Impacts Requiring Mitigation	Mitigation Measures	Monitoring Actions and Methods	Timeframe	Responsibility
	<ul style="list-style-type: none"><li>» Waste must be stored and handled according to the relevant legislation and regulations</li><li>» General waste must be recycled where possible or disposed of at an appropriately licensed landfill.</li></ul>			

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## 12 MANAGEMENT PROGRAMME: DECOMMISSIONING

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The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of at least 20-25 years and eventual extensions (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the solar infrastructure with more appropriate technology/infrastructure available at that time.

*The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section.*

- **Site Preparation**

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

- **Disassemble and Remove Infrastructure**

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

### 12.1 OBJECTIVES

In decommissioning the facility, Zolograph Investments (RF) Proprietary Limited must ensure that:

- All sites not already vegetated are vegetated as soon as possible after operation ceases with species appropriate to the area.
- Any fauna encountered during decommissioning should be removed to safety by a suitably qualified person,
- All structures, foundations and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as requirement by the relevant legislation.
- All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
- All vehicles to adhere to low speed limits (i.e. 20km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust. All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- All rehabilitated areas are monitored for erosion.
- Components of the facility are removed from the site and disposed of appropriately.
- Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Construction and Rehabilitation are also relevant to the proposed project and must be adhered to

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## 13 REVISION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

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The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this EMPr be updated to include any site-specific information and specifications as the project develops. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features. In addition, the EMPr should be updated throughout the life of the facility in order to ensure that appropriate measure are included for the minimisation of impacts on the environment. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation, unless these are required to address an emergency situation.

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## 14 SOLID WASTE MANAGEMENT

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### 14.1 TYPE OF WASTE PRODUCED

The type of waste produced from the construction site is categorised 'General Waste' and 'Hazardous Waste' (National Waste Management Strategy', 1999). General waste is subdivided into paper, metals, glass, plastic, organic and inert materials (such as builder's rubble and garden refuse).

Due to its composition and characteristics general waste does not pose a significant threat to public health or the environment, if managed properly. Hazardous waste is categorised according to the nine classes and four hazardous ratings, as described in the DWAF Minimum Requirements documents (Second Edition). These will include substances such as detergents or washing-up liquids etc. The majority of the waste, however, produced will be of the 'general waste' category.

### 14.2 FORMAT OF THE WASTE MANAGEMENT PLAN

The Waste Management Plan for the 50MW Solar Park is presented below (**Error! Reference source not found.**). The table presents actions, identified during the site visits, to overcome identified possible negative environmental impacts or to enhance positive impacts (e.g. recycling). These actions represent the project proponents commitment to good environmental practice and the table sets out specific "management statements of intent" (or proposed mitigation measures) that identify how the labourers will manage specific waste-associated impacts that will arise as a result of the operation of the development.

### 14.3 ENVIRONMENTAL IMPACTS

Identified environmental issues resulting from the production of waste are summarized below. The mitigation measures (**Error! Reference source not found.**), relevant to these issues, present specifications on how to manage these impacts.

#### 14.3.1 Restoration and rehabilitation: waste

If insignificant amounts of waste have been generated during the construction phase. The main waste generated is general waste. Potential negative impacts to soil and ground and surface water could occur, therefore this needs to be cleared and disposed of.

#### 14.3.2 Operation Phase: Process Waste

During the operation phase process, there won't be any waste generated from the transmission line.

Table 14-1: Waste disposal Issues: Activities and associated environmental impacts for the key issue of waste control. The statement of intent describes the management intervention required to lower the significance of the impact.

<b>A. RESTORATION AND REHABILITATION: WASTE</b>			
<b>Activity</b>	<b>Potential Impacts/ Environmental Issue(s)</b>	<b>Mitigation measures / Statement of Intent (Actions)</b>	<b>Responsibility</b>
Waste (general waste, which includes waste generated during the construction of the powerline infrastructure.	<ul style="list-style-type: none"> <li>• Pollution of soil and water.</li> <li>• Health threats arising</li> <li>• Visual impacts of solid waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Refuse</li> <li>• discharge of construction equipment;</li> <li>• Site Rehabilitation.</li> </ul>	Contractor
<b>B. OPERATION PHASE: SOLID WASTE</b>			
Management disposal of all general / solid wastes generated during construction	1) Infiltration of pollutants into ground and surface water.	1. The project proponent to ensure the construction of a separate 'waste sorting & storage depot', on-site.  1.1) The depot must be situated away from drainage lines.	1. Project Proponent  1.1) Contractor

		<p>1.2) The depot must be lined with non-permeable lining or concrete to prevent infiltration/seepage of pollutants into groundwater.</p> <p>1.3) Further it must be lined or constructed so as to avoid surface run off exiting the separate waste disposal depot, for example: a low wall constructed i.e. run-off and storm water control measures.</p> <p>1.4) The depot must be regularly cleaned in order to prevent seepage into groundwater or run-off into other areas within the site</p>	<p>1.2) Contractor</p> <p>1.3) Contractor</p>
	<p>3) Scavengers may become a problem if the storage site for waste is not well managed</p>	<p>3.1 The waste disposal depot must be suitably enclosed / fenced to prevent entrance by scavengers.</p> <p>3.2 Suitable enclosure must be maintained.</p>	<p>3.1 Project proponent &amp; Contractor (Restoration).</p>

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## 15 IMPLEMENTATION OF THE WASTE MANAGEMENT PLAN

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Implementation of the Waste Management Plan (WMP) will be achieved through appropriate staffing. This section outlines the suggested organisational structures and other activities that will be required to implement the WMP.

### 15.1 ORGANISATIONAL STRUCTURE

Effective waste disposal management during the construction phase will require trained and organised staff.

#### **Site Manager (SM)**

The role of the SM, with respect to waste disposal issues, will be to ensure that all personnel on site abide by the requirements of the WMP and that the project operates in such a manner that it meets all specified legal and environmental requirements.

#### **Cleaning or Maintenance Staff**

A designated individual must be appointed from the cleaning or maintenance team to ensure the proper management of waste disposal activities. This individual (designated staff member) must be held responsible for the proper maintenance (cleanliness, quality maintained) of the waste disposal depot and the efficient management of waste removal and disposal from site. The rest of the cleaning staff will be responsible for the timeous removal of waste and proper sorting of recyclable waste.



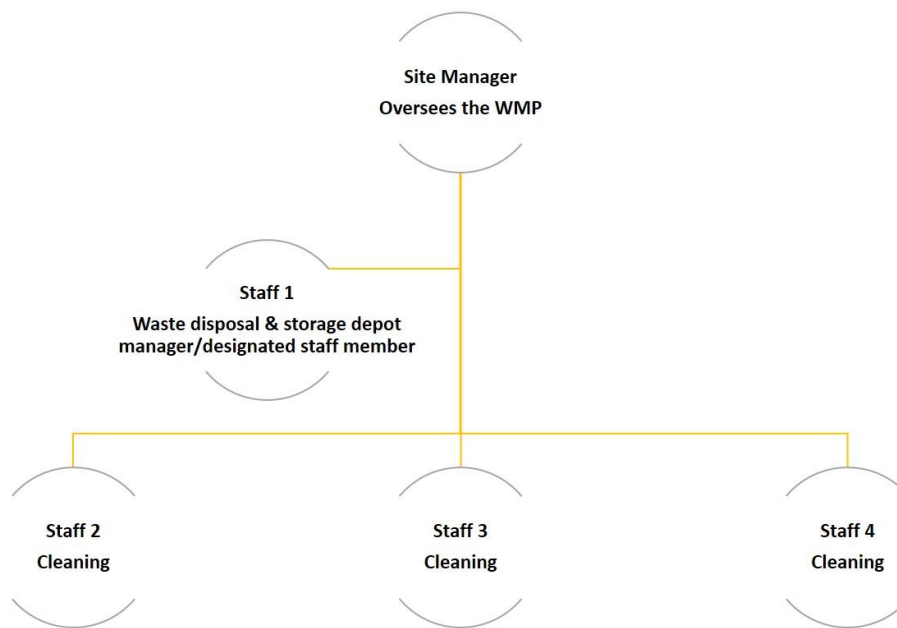


Figure 15-1: Line of Responsibility

### Site Manager (SM)

It is the responsibility of the **SM** to ensure that the roles and responsibilities of the staff are clearly understood and that the necessary equipment (e.g. waste bins with lids) is available.

### 15.2 TRAINING AND AWARENESS PROGRAMMES

All personnel will undergo a training and awareness programs on waste disposal management prior to commencing activities. A procedure for training will be developed which will layout in detail the methodology used to present environmental awareness, waste disposal and induction training. The procedure will state the range of topics that will be covered in environmental training. These will include:

- The construction site Environmental Policy.
- The construction site Statement of Environmental Commitment.
- The construction site Environmental Objectives and Targets, including Key Performance Indicators (KPIs), e.g. cleanliness of the depot, volumes of waste collected, returns on recycled waste, etc.
- Aspects of routine or day-to-day activities, which can have environmental impacts

- Identify environmental hazards, which could arise from non-routine situations and corrective actions.
- Organizational structure and responsibilities, e.g. Lines of responsibility.
- The importance of Environmental Hazard Incident reporting and completion of appropriate reports.
- Channels of communication for discussing and reporting waste disposal issues.
- Documentation systems so that appropriate records of waste disposal matters are maintained.

A site Waste Disposal Handbook will be developed and distributed to all literate personnel. This handbook will cover some of the information presented in the training session.

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## 16 WASTE MANAGEMENT PROGRAMME

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### Steps undertaken:

1. Daily removal of refuse from the site.
2. Daily sorting and cleaning of solid waste into recyclable and non-recyclable waste by cleaning staff at the on-site waste disposal depot.
3. Refuse is then stored in black bags in bins with lids that are scavenger proof within the enclosed on-site waste disposal depot. This is the responsibility of the cleaning staff.
4. Daily maintenance of the on-site waste disposal depot to ensure adequate cleanliness and identification of 'leaks'.
5. Weekly removal of non-recyclable and hazardous waste to the registered waste disposal site by the designated staff member.
6. Weekly collection or removal of recyclable goods to the recycling depot or the designated staff member respectively.
7. Where accidental spillage has occurred, immediate remedial action applied and rehabilitation implemented, if necessary, by maintenance staff. Rehabilitation implemented with the advice of a skilled horticulturist.
8. All collection or removal of waste must be documented in a weekly time-table to enable proper management of these activities.

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## 17 MONITORING OF WASTE DISPOSAL ACTIVITIES

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The objectives of the monitoring programme are to:

- Demonstrate that personnel are managing the removal and production of waste efficiently and that control structures and programmes are operating consistently with the mitigation measures put in place.
- Provide timely, relevant and appropriately presented information within the company (manager and maintenance staff) and regulatory authorities (where and if necessary) on the performance of the operation with respect to the management of waste

The following will be monitored:

- The level of waste produced and stored, to ensure the timeous removal of waste to the 'Waste Disposal Site'.
- Suitability of the waste disposal time-table or programmer.
- The condition or quality of the on-site waste disposal site, namely is it kept clean regularly, is the infrastructure still of good quality, are the bins in good working condition.
- Staff duties are being maintained according to a regular time-table with respect to the removal and separation of waste.

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## 18 AUDITING AND REVIEW

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Audits of the construction site and personnel will be undertaken over the construction period. The purpose of the audits will be to assess compliance with the conditions of the WMP.

The findings will be recorded and items requiring action will be identified from the recommendations made. Comments received from visiting patrons will also provide input in this regard. The implementation of these actions will be assessed in the following audit.





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## 19 COMPLIANCE AND PENALTIES

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The Contractor shall act immediately when such notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. This record shall be submitted with the monthly reports and a verbal report given at the monthly site meetings.

The following violations, and any others determined during the course of work, shall be penalised per event:

-  Hazardous chemical/oil spill and/or dumping in non-approved sites.
-  Uncontrolled/unmanaged erosion.
-  Pollution of water sources.
-  Unnecessary removal or damage to trees.

The Engineer's decision with regard to what is considered a violation, its seriousness and the penalty imposed shall be final.

In addition to penalties, the Engineer has the power to remove from site any person who is in contravention of the EMP, and if necessary, the Engineer can suspend part of or all of the works, as required.

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## 20 CONCLUSION

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The construction of the 50MW PV Solar Park will not have a detrimental impacts or even continuous environmental impacts on condition that the mentioned mitigation measures and implementation of this EMP is adhered to.