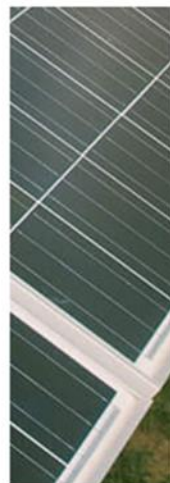


# ENVIRONMENTAL MANAGEMENT PROGRAMME

June 2023

THE PROPOSED 20MW SOLAR FACILITY  
LOCATED ON THE REMAINING EXTENT  
OF THE FARM VOGELSRAND NO. 373  
NEAR HENNINGMAN, FREE STATE



ENVIRONAMICS

## PROJECT DETAIL

<b>Reference No:</b>	14/12/16/3/3/2/2233
<b>Project Title:</b>	The proposed 20MW solar facility located on the Remaining Extent of the Farm Vogelsrand No. 373 near Hennenman, Free State Province
<b>Authors:</b>	Mrs. Lisa de Lange
<b>Report Status:</b>	Environmental Management Programme submitted as part of the Final Environmental Impact Assessment.
<b>Report date:</b>	06 June 2023

**When used as a reference this report should be cited as:** Environamics (2023) Environmental Management Programme for proposed 20MW solar facility located on the Remaining Extent of the Farm Vogelsrand No. 373 near Hennenman, Free State Province.

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## LIST OF ABBREVIATIONS

DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
EP	Equator Principles
EPFI	Equator Principles Financial Institutions
Environmental impact	Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects.
GNR	Government Notice Regulation
I&AP	Interested and affected party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
MLM	Matjhabeng Local Municipality
kV	Kilo Volt
Mitigate	Activities designed to compensate for unavoidable environmental damage.
MW	Megawatt
NEMA	National Environmental Management Act No. 107 of 1998
NERSA	National Energy Regulator of South Africa
NWA	National Water Act No. 36 of 1998
OHSA	Occupational Health and Safety Act (Act 85 of 1993)
PPP	Public Participation Process

PV	Photovoltaic
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SHE	Safety, Health and Environment

# 1 INTRODUCTION

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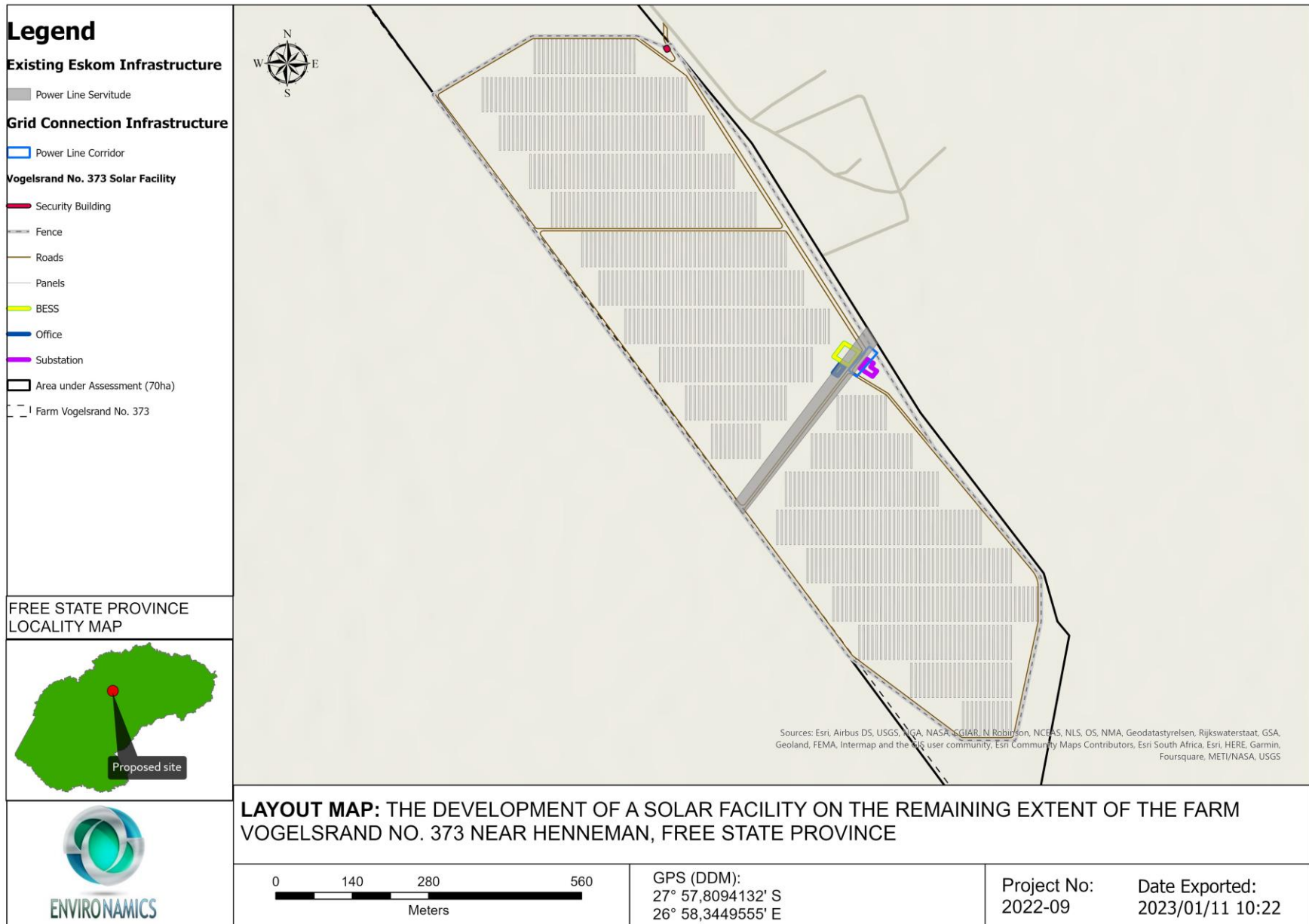
The purpose of the Environmental Management Programme (EMPr) is to ensure that the potential social and environmental impacts, risks and liabilities identified during the Environmental Impact Assessment process is effectively managed during the construction and operational phases of the 20MW Solar Facility near Hennenman. The EMPr specifies the mitigation and management measures to which the Developer is committed to in relation to the establishment of the Photovoltaic Solar Energy Facility and its associated infrastructure and shows how the project will mobilise organizational capacity and resources to implement these measures.

In order to comply with the requirements of GN R 326 (23), an EMPr has been compiled as part of the Environmental Impact Report (EIR). The content of the EMPr is structured in such a way as to comply with the requirements of Appendix 4 to GN R 326.

## 1.1 BACKGROUND

This EMPr has been compiled for the 20MW Solar Facility near Hennenman, Free State Province. This solar energy facility is proposed to involve the following:

- Site clearing and preparation;
- Civil works;
- Construction of the PV panel array and on site substation;
- Installation of the Battery Energy Storage System;
- Construction of supporting infrastructure in the form of office and ablution facilities;
- Construction of internal roads;
- Fencing; and
- Construction of a stormwater management system.



**Figure 1: Facility Layout Map**



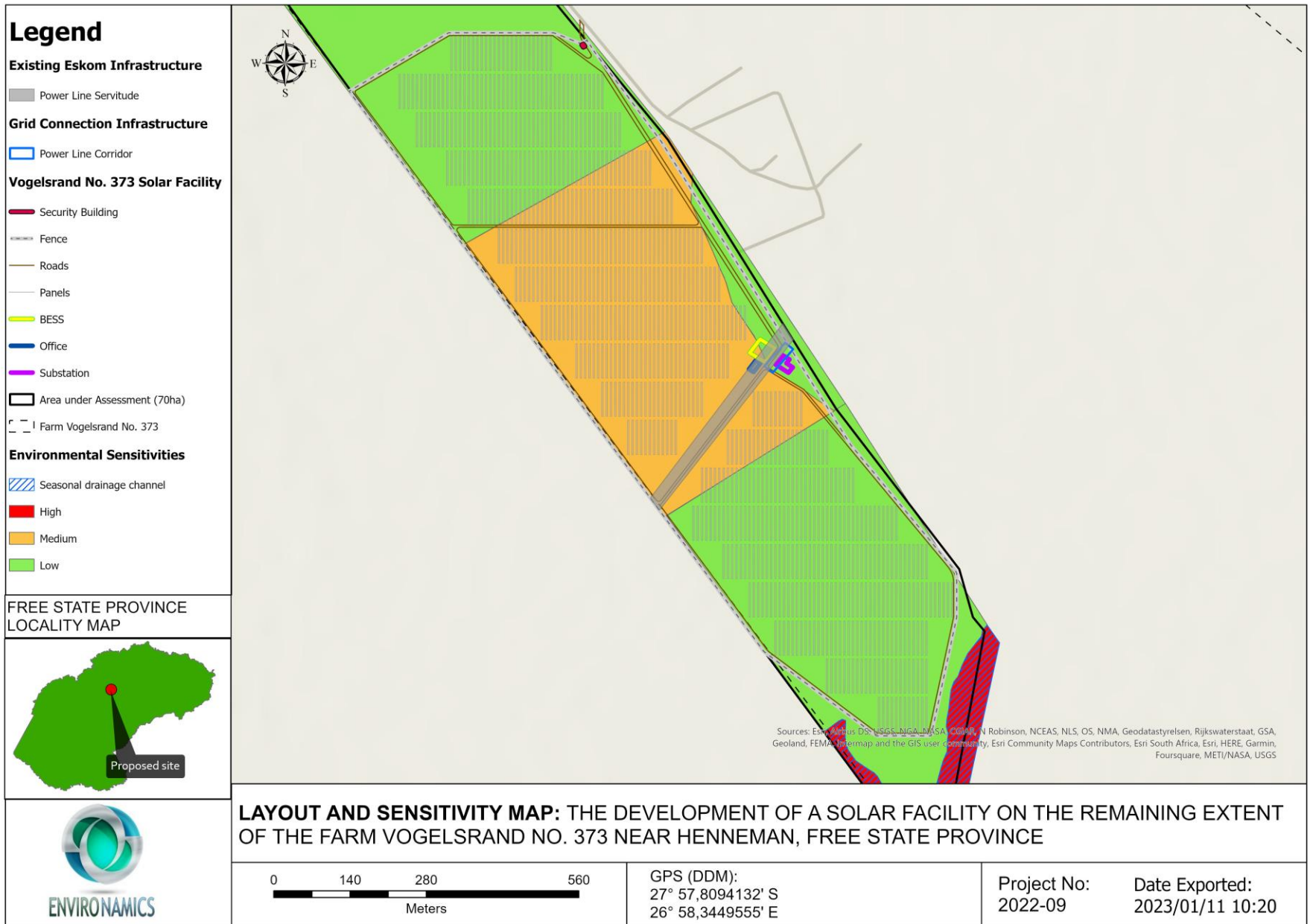


Figure 2: Facility Layout and Sensitivity Map

## 1.2 OBJECTIVES OF THE EMPr

The key objectives of the EMPr are to:

- Formalise and disclose the programme for environmental and social management;
- Identify and define the roles and responsibilities for the different role players required to participate actively in the implementation of the EMPr;
- Ensure that appropriate management and mitigation measures and requirements are implemented from the start of the project;
- Ensure compliance to environmental legislation;
- Manage identified impacts;
- Ensure precautions against damage and claims arising from damage are taken timeously;
- Provide a framework for the implementation of environmental and social management initiatives.
- Ensure sufficient resources are allocated on the project budget so that the scale of the EMPr related activities are consistent with the significance of project impacts; and
- Provide feedback for continual improvement in environmental performance.

Best practice principles require that every reasonable effort be made to reduce and preferably to prevent negative impacts, while enhancing positive benefits, especially within the communities directly affected by the proposed project. These principles have guided the Environmental Impact Assessment process and the compilation of the EMPr.

The EMPr covers information on the management and mitigation measures that will be implemented to address impacts in respect of:

- Planning and design;
- Pre-construction and construction;
- Operation and maintenance;
- Rehabilitation; and
- Decommissioning.

## 1.3 ENVIRONMENTAL IMPACTS

The proposed development was assessed to have an overall low impact on the receiving environment, with limited impacts of a medium significance expected. Refer to Table 1-1 for aspects requiring specific mitigation within the development footprint as specified in this EMPr.

**Table 1-1:** Environmental impacts and management outcomes

<b>Impact</b>	<b>Significance (with mitigation)</b>	<b>Impact management outcomes</b>
<b>Construction phase</b>		
Impacts on fauna and flora	Negative low	To avoid or reduce the loss of fauna and flora
Impacts on Avifauna	Negative Medium / Low	To avoid the loss or fragmentation of habitats for avifauna, and the loss of avifauna species
Impacts on Agricultural Potential	Negative low	To enhance erosion control and prevent land capability loss
Visual Impact	Negative Low	To minimise visual impacts
Temporary employment opportunities	Positive Medium	To enhance the use of local skills and uplift the local community
Economic Multiplier Effect	Positive Medium	To enhance the use of local goods and services
Social Impact	Negative Low	To minimise the impact on the local resources and social networks.
Impacts on heritage resources	Negative Low	To avoid any loss of potential heritage resources
Impacts on paleontological resources	Negative Low	To avoid any loss of potential palaeontological resources
Impacts on existing service infrastructure (i.e., roads)	Negative Low	To avoid any damage to existing service infrastructure
Traffic impacts	Negative Low	To avoid traffic impacts on the existing road network
<b>Operational phase</b>		
Visual Impact	Negative Low	To minimise visual impacts
Impacts on Avifauna	Negative Low	To avoid habitat loss as well as to avoid increase mortality
Impacts on fauna and flora	Negative Low	To avoid the loss of biodiversity as much as possible
Impacts on agricultural potential	Negative Low	To enhance erosion control and prevent soil loss
Impacts on heritage resources	Negative Low	To avoid any loss of potential heritage resources
Social Economic Impacts	Positive Medium / High	To enhance the contribution to Local Economic Development (LED) and social upliftment
Cumulative biophysical impacts resulting from similar development in the area	Negative Low / Medium	These types of developments are not located on ecological sensitive areas.
<b>Decommissioning phase</b>		
Impacts on fauna and flora	Negative Low	To avoid the loss of biodiversity as much as possible
Impacts on Avifauna	Negative Low	To avoid habitat loss as well as to avoid

		increase mortality
Socio-economic impacts (loss of employment, nuisance impacts)	Negative Low	Loss of local employment will occur
Traffic impacts	Negative Low	Impact to the local road network

#### 1.4 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Environamics was appointed by the applicant as the independent EAP to conduct the Environmental Impact Assessment Process and prepare all required reports such as the EMPr. All correspondence to the EAP can be directed to:

Contact person: Lisa de Lange (Opperman)

EAPASA Registration: 2020/2150

Postal Address: 14 Kingfisher Street, Tuscany Ridge Estate, Potchefstroom, 2531

Telephone: 084 920 3111 (Cell)

Electronic Mail: [lisa@environamics.co.za](mailto:lisa@environamics.co.za)

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP must conduct the Environmental Impact Assessment (EIA) process. In terms of the independent status of the EAP, a declaration is attached as Appendix A to the EIA report.

#### 1.5 STRUCTURE OF THE REPORT

The implementation of an approved EMPr for the proposed activities is a requirement of the National Environmental Management Act (Act 107 of 1998) (NEMA) and will be a condition in the Environmental Authorisation (EA), should it be issued by the National Department of Forestry, Fisheries and the Environment (DFFE). As such, failure to comply with this EMPr will constitute an offence in terms of Section 24F of the NEMA and the holder of the EA (Applicant / Developer) may be liable for penalties and/or legal action. Therefore, it is important that all responsible parties understand their duties and undertake them with duty and care.

This report is structured in accordance with the prescribed contents stipulated in Appendix 4 of Regulation No. 326. It consists of five sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1-2.

**Table 1-2:** Structure of the report

Requirements for the contents of an EMPr as specified in the Regulations		Section in report
<b>Appendix 4(1) - An EMPr must comply with section 24N of the Act and include-</b>		
(a)	details of -	
	(i) The EAP who prepared the EMPr;	1.4
	(ii) The expertise of that EAP to prepare an EMPr, including a curriculum	

	vitae.	
(b)	A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description.	2.3
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	1.1
(d)	a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the Assessment process for all phases of the development including- (i) Planning and design; (ii) Pre-construction activities; (iii) Construction activities; (iv) Rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities	1.2 & 1.3
(e)	a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	1.3
(f)	a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	2.8
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	2.6
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	2.6
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	2.2
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	2.8
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	2.4

(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	4
(m)	An environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	3
(n)	any specific information that may be required by the competent authority.	N/A

This EMPr must form an integral part of the contract documents which will inform the Contractor/s of their duties in the fulfillment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by the proposed activities associated with the project as stipulated in the EMPr. The Contractor/s must note that conditions imposed by the EMPr are legally binding in terms of environmental legislation and that administrative and punitive actions can be taken against them should the conditions of the EMPr not be complied with. Furthermore, the EMPr is enforceable through additional conditions to the general conditions of contract that pertain to this project.

It is expected that the Contractor/s are conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract.

The EMPr is a dynamic document that will be periodically reviewed and updated. As part of on-going implementation, this EMPr has also been publicly disclosed during the Public Participation Process of the EIA process for this project. An opportunity has been provided to participating stakeholders to comment on it.

## 2 APPROACH TO THE EMPR

---

This section introduces the approach to impact management – refer to Table 2-1. It also outlines the responsibilities of the Project Management Team. Table 2-3 to 2-7 details the range of approaches to be undertaken to manage project activities.

**Table 2-1: Approach to Impact Management**

<b>Approach</b>	<b>Description</b>
Avoidance	Avoiding activities that could result in adverse impacts and/or resources or areas considered sensitive.
Prevention	Preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having negative impacts.
Preservation	Preventing any future actions that might adversely affect an environmental resource.
Minimization	Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project.
Mitigation	Measures taken to minimise adverse impacts on the environment.
Enhancement	Magnifying and/or improving the positive effects or benefits of a project.
Rehabilitation	Repairing affected resources, such as natural habitats or water resources.
Restoration	Restoring affected resources to an earlier (possibly more stable and productive) state, typically 'background' or 'pristine' condition. These resources may include soils and biodiversity.
Compensation	Compensating for lost resources, and where possible, the creation, enhancement or protection of the same type of resource at another suitable and acceptable location.

## 2.1 KEY DEFINITIONS USED IN THIS EMPR

The key definitions used throughout this EMPr are listed in Table 2-2.

**Table 2-2:** Key definitions used in this EMPr

<b>Term</b>	<b>Definition</b>
Alien species	A species not indigenous to the area or out of its natural distribution range.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Assessment	The process of collecting, organising, analysing, interpreting and communicating information which is relevant.
Construction	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.
Decommissioning	To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.
Environment	As per definition in the NEMA.
Environmental Assessment Practitioner	An independent environmental consultant with experience in the management of EA applications in terms of the NEMA.
Environmental Authorisation (EA)	Means the authorisation issued by a competent authority (Department of Forestry, Fisheries and the Environment) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.
Environmental Control Officer (ECO)	The ECO is appointed by the Developer to ensure compliance to the EMPr and conditions of the EA during construction and provides proof of compliance documentation to the Project Management Team. The role of ECO will be fulfilled by the Developer or its Agent's SHE Representative.
Environmental Impact	A change in the environment, whether adverse or beneficial, wholly or partly, resulting from an organisations' activities, products or services.
Environmental	It is the responsibility of the entire Project Management Team to deal with



management	environmental considerations during the management cycle of the project, i.e. policy, planning and design, implementation (preconstruction, construction and operation), monitoring and corrective action and review.
Interested and affected party (I&AP)	Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.
Incident	An undesired event that may result in a significant environmental impact, although can be managed through internal response and procedures.
Method Statement	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.
Plan	Sets out the intended method and/or specific measures required to mitigate and/or enhance the negative and positive impacts of the Project. A plan usually focuses on one project phase, i.e., construction, operation or closure.
Pre-construction	The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation
Project Management Team	The responsibility of the EMPr implementation resides on this team. This team includes the Developer and/or his appointed Agent as well as appointed contractors and consultants, including the ECO.
Programme	Identifies a series of interrelated measures (often contained in detailed plans) for managing the environmental effects of the Project. A programme provides broad direction and covers more than one project phase.
Safety, Health and Environmental Representative (SHE representative)	<p>A representative of the Developer or it's Agent, appointed as a SHE representative, assisting the construction manager on Health, Safety and Environmental aspects of the project on the construction site. The SHE representative will also perform the functions of the ECO for the project.</p> <p>Each Principal Contractor/s may also have their own SHE representative, but the SHE representative as referred to in this EMPr, refers to the SHE representative acting on behalf of the Developer and/or his appointed Agent.</p>

## **2.2 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT**

The following legislation and guidelines are applicable to the development and have informed the scope and content of the EMPr:

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 5 of NEMA (GNR 545, GNR 546 in Government Gazette 33306 of 18 June 2010)
- Guidelines published in terms of NEMA EIA Regulations, specifically:
  - Companion to the NEMA EIA Regulations of 2010 (Draft Guideline; DEA, 2010)
  - Public Participation in the EIA process (DEA, 2010)
- International Standards – IFC Standards and Equator Principles (2013)

## **2.3 ROLES AND RESPONSIBILITIES**

The roles and responsibilities of the different legal appointments anticipated for the construction of the proposed 20MW Solar Facility will be dependent on the final Method Statements as well as the Health and Safety Plan to be compiled prior to the commencement of any site clearing and construction activities. The roles and responsibilities mentioned in this section of the EMPr will act as a guide for the compilation of the Health and Safety Plan.

### **2.3.1 Project Management Team**

The following individuals form part of the Project Management Team and will be required to sign the policy before commencement of any work on site:

- The Developer or its appointed Agent;
- Principal contractors appointed for the development;
- Construction supervisor;
- Subcontractors; and
- Safety, Health and Environment (SHE) representative (acting as the ECO).

The Project Management Team will be responsible for the following:

- Ensuring that the Contractor/s are aware of the specifications, legal constraints/requirements and the Developer's policies pertaining to activities taking place regarding the proposed project;
- Monitoring and inspecting contractors' written records to illustrate compliance with the EMPr;

- Familiarising themselves with the Environmental Impact Assessment and EMPr for this development, the conditions set out in the EA, and all relevant environmental legislation; and
- Ensuring that all commitments/conditions in the EMPr, EA and any other environmental permits are communicated and adhered to by all employees and contractors involved with the proposed development.

### **2.3.2 The Developer**

The Developer as holder of the EA will be ultimately responsible for the implementation of all the relevant legislative requirements and compliance with the EMPr. To this end, the Developer will have the following responsibilities:

- The Developer will appoint Principal Contractor/s for each logical project phase in writing to assume the role of Principal Contractor/s as intended by the Construction Regulations and as determined by the Bills of Quantities;
- The Developer or its appointed Agent must discuss and negotiate with the Principal Contractor/s the contents of the Health and Safety Plan of both Principal Contractor/s and Sub-Contractor/s for approval;
- The Developer or its appointed Agent will take reasonable steps to ensure that the Health and Safety Plan of both the Principal Contractor/s and Sub-Contractor/s is implemented and maintained. The steps taken will include periodic audits at intervals of at least once every month;
- The Developer or its appointed Agent will prevent the Principal Contractor/s and/or the Sub-Contractor/s from commencing or continuing with construction work should the Principal Contractor/s and/or the Sub-Contractor/s at any stage in the execution of the works be found to:
  - have failed to comply with any of the administrative measures required by the Construction Regulations in preparation for the construction project or any physical preparations necessary;
  - have failed to implement or maintain their Health and Safety Plan;
  - have executed construction work, which is not in accordance with their Health and Safety Plan.
- Act in any way which may pose a threat to the Health and Safety of any person(s) present on the site of the works or in its vicinity, irrespective of him/them being employed or legitimately on the site of the works or in its vicinity; and
- The Developer or its appointed Agent will ensure compliance of all contractors and sub-contractors to the conditions set in the approved EMPr and EA.

- The Developer needs to give 14 (fourteen) days written notice to inform the DFFE that the activity will commence. The notification must include a date when the activity will commence as well as the reference number.

### **2.3.3 Principal Contractor/s**

The Principal Contractor/s appointed for the construction of the different phases of the 20MW Solar Facility will be responsible for the following:

- Ensure that he/she is fully conversant with the requirements of the specifications of this EMPr and all relevant Health and Safety legislation. This EMPr is not intended to supersede the Occupational Health and Safety Act (Act 85 of 1993) (the Act) nor the Construction Regulations or any part of either. Those sections of the Act and the Construction Regulations which apply to the scope of work to be performed by the Principal Contractor/s in terms of this contract (entirely or in part) will continue to be legally required of the Principal Contractor/s to comply with. The Principal Contractor/s will in no manner or means be absolved from the responsibility to comply with all applicable sections of the Act, the Construction Regulations or any Regulations proclaimed under the Act or which may perceivable be applicable to this contract;
- Provide and demonstrate to the Developer a suitable and sufficiently documented Health and Safety Plan based on this EMPr, the Act and the Construction Regulations, which must be applied from the date of commencement of and for the duration of execution of the works. This plan must, as appendices, include the Health and Safety Plans of all sub-contractors for which he/she has to take responsibility in terms of this contract;
- Provide proof of his/her registration and good standing with the Compensation Fund or with a licensed compensation insurer prior to commencement with the works;
- In submitting his/her tender, the Principal Contractor/s will demonstrate that he/she has made provision for the cost of compliance with the specified occupational health and safety requirements, the Act and Construction Regulations (Note: This shall have to be contained in the conditions of tender upon which a tenderer's offer is based.);
- Consistently demonstrate his/her competence and the adequacy of his/her resources to perform the duties imposed on the Principal Contractor/s in terms of this Specification, the Act and the Construction Regulations;
- Ensure that a copy of his/her Health and Safety Plan is available on site and is presented upon request to the Client, an Inspector, Employee or Sub-contractors;
- Ensure that a Health and Safety file, which must include all documentation required in terms of the provisions of this EMPr, the Act and the Construction Regulations, is opened and kept on site and made available to the Client or Inspector upon request. Upon completion of the works, the Principal Contractor/s must hand over a consolidated Health and Safety file to the Developer;

- Throughout execution of the contract, the Principal Contractor/s will ensure that all conditions imposed on his sub-contractors in terms of the Act and the Construction Regulations are complied with as if they were the Principal Contractor/s;
- From time to time the Principal Contractors must evaluate the relevance of the Health and Safety Plan and revise the same as required, following which a revised plan must be submitted to the Developer and/or his/her Agent for approval;
- In terms of Construction Regulation 5(7), keep a Health and Safety file on site at all times that must include all documentation required in terms of the Act and Regulations and must also include a list of all Contractors and sub-contractors on site that are accountable to the Principal Contractor/s and the agreements between the parties and details of work being done;
- Comply with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhere to any instructions issued by the Matjhabeng Local Municipality's Environmental Manager and/or the Developer and/or his/her Agent and/or the ECO / SHE Representative;
- Submit an environmental report on any environmental incidents that have occurred within 48 hours of the incident occurring; and
- Arrange that all employees and those of the sub-contractors receive appropriate training prior to the commencement of construction, taking cognisance of this EMPr and EA.

These functions will be performed by the Construction Supervisor of each Principal Contractor/s.

### **2.3.4 Construction Supervisor**

The Construction Supervisor will be responsible for:

- Ensuring compliance with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhering to any instructions issued by the Matjhabeng Local Municipality's Environmental Manager and/or the Developer and/or his/her Agent and/or the ECO / SHE Representative; and
- Ensuring that all employees receive adequate training on the requirements of the conditions as set out in the EA and EMPr.

### **2.3.5 Sub-contractors**

Sub-contractors are responsible for:

- Ensuring compliance of their workforce with the requirements of the conditions as set out in the EA and EMPr, and any other legislative requirements as applicable to their workings; and
- Reporting any health, safety and environmental incidents to the construction supervisor within 24 hours of the incident.

### **2.3.6 SHE Representative**

The SHE Representative will be responsible for:

- Reporting to the Developer and/or it's Agent;
- Familiarising him / herself with the project and EMPr, and ensuring compliance with the relevant legislation applicable to the project and Matjhabeng Local Municipality Health, Safety and Environment Policy as well as the Health and Safety Specifications and procedures;
- Authorising the removal of personnel and / or equipment should they contravene the requirements of any applicable Health and Safety legislation and policies;
- Advising the Developer on environmental issues and recommendations for the proposed development;
- Arranging for liaison with interested and affected parties (I&APs) on environmental issues of concern, should the need arise;
- Ensuring that all environmental and health and safety conditions are undertaken by all staff and contractors on site; and
- Ensuring that corrective actions are followed up and closed out in accordance with the conditions set out in the EMPr.

### **2.3.7 ECO**

An independent ECO is to be appointed prior to the commencement of any authorised activities. Once appointed, the name of the ECO must be submitted to the Director: Compliance Monitoring at the DFFE. This is the responsibility of the developer/owner. The ECO will be responsible for the following:

- Reporting directly to the Developer and/or its Agent;
- Familiarising him / herself with the project and EMPr, and ensuring compliance with the relevant legislation applicable to the project as well as the Health and Safety Specifications and procedures;

- Communicating the contents and conditions of the EMPr and EA to the Principal Contractor/s and sub-contractor's employees. Training will be required to ensure all staff members are aware of the requirements of the EMPr;
- Monitoring the implementation of the conditions of the EMPr and EA throughout the project by means of site inspections and meetings;
- Recommending amendments to the EMPr if the need arises;
- Undertaking regular monthly site inspections to assess compliance with the conditions of the EMPr and EA and take appropriate action to rectify non-conformances;
- Liaising with environmental statutory bodies, including but not limited to the Matjhabeng Local Municipality's Environmental Manager, and the DFFE, where deemed necessary;
- Compiling monthly progress reports during the construction phase for submission to the Developer and/or his Agent and competent authorities (DEFF);
- Advising the Developer on environmental issues and recommendations for the proposed development during construction phase;
- Arranging for liaison with I&APs on environmental issues of concern, should the need arise;
- Recording all environmental concerns raised by I&APs;
- Ensuring that all environmental and health and safety conditions are undertaken by all staff and contractors on site; and
- Ensuring that corrective actions are promptly followed up and closed out.

### **2.3.8 Community Liaison Officer (CLO)**

The "CLO" refers to an independent Community Liaison Officer who is a member of a local community. The role of the CLO will include:

- Facilitation of community relations for the duration of the construction phase;
- Providing recommendations for, and facilitation the notification or information dissemination methods for issues such as any planned service disruptions or nuisance disturbances; and
- Liaise with the complainants to address any issues.

### **2.3.9 Environmental Liaison Officer (ELO)**

The 'ELO' refers to the nominated staff member of the Contractor who will fulfil the role of the Contractor's environmental representative to monitor, review and verify compliance with the EMPr. The ELO shall liaise closely with the Contract Manager and the ECO and shall ensure that

the works on site are conducted in an environmentally responsible manner and in compliance with the requirements of the EMPr. The role of the ELO will include:

- Liaison between the Contractor and ECO on matters relating to the environmental considerations on site.
- Assisting with the compilation of environmental components of Method Statements on behalf of the Contractor.
- Undertaking daily environmental compliance inspections of the various work areas.
- Providing a regular and routine account on environmental matters for the ECO, including any environmental incidents, events or accidents, and reporting on any entries in the Environmental Incident Report File or Complaints Register. This account may take the form of a written report or checklist or similar, or meeting with the ECO.
- Ensuring that any environmental monitoring requirements are being fulfilled and including results in the weekly submissions.
- Responding to and reporting on environmental accidents, incidents and events immediately, and overseeing all works requiring remediation are undertaken in accordance with the ECO or Contract Manager's instructions.

## **2.4 LIFECYCLE OF THE SOLAR ENERGY FACILITY**

The EMPr has recommended mitigation and management measures to avoid or minimise negative impacts and optimise the benefits arising from the positive impacts during the life-cycle of the development.

### **2.4.1 Pre-construction**

The primary task of the pre-construction phase will include surveying, pegging and search and rescue of plants and animal (if required).

### **2.4.2 Construction**

The primary focus on project management for the construction phase will include:

- Transportation of equipment and machinery to the site location;
- Setting up a construction camp and laydown areas;
- Development of temporary materials and waste storage and control measures;
- Stripping of surface vegetation and removal of vegetation, building rubble and domestic waste from site to the Matjhabeng Local Municipality Landfill Site or any licensed Landfill Site;



- Stripping and stockpiling of topsoil and sub soil from the site for later use for rehabilitation and landscaping; and
- Site rehabilitation following the construction phase, of areas that have been disturbed and are not part of the on-going operational phase of the proposed project.

### **2.4.3 Operation**

The operational phase of the development will involve the following:

- Maintenance and washing of PV panels;
- Maintenance and monitoring of battery management system;
- Maintenance of the stormwater management system;
- Solid waste removal.

### **2.4.4 Rehabilitation**

Rehabilitation activities associated with the 20MW Solar Facility are around the rehabilitation of disturbed areas outside of the infrastructure footprint, such as the construction camp and laydown area. The topsoil stripped during the construction phase of the project must be used to rehabilitate these disturbed areas. The topsoil can also be used for landscaping purposes.

The rehabilitation measures are to be undertaken in such a way that it ensures the rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

### **2.4.5 Decommissioning**

The PV facility will be operational for between 20 – 30 years from where the technology of the panels will be upgraded, or the site will be decommissioned.

## **2.5 CHECKING AND CORRECTIVE ACTION**

Checking and implementing corrective action forms an important component of the EMPr management cycle. These ensure that:

- The required EMPr and EA conditions are being implemented on the site;
- The desired outcomes are being achieved and potential impacts managed;
- On-going bi-weekly inspections of operational controls and general state of operation;
- Internal monthly audits by the ECO to assess the compliance to the EMPr and EA or to focus on a particular performance issue; and
- Quarterly external audits by an independent professional for the duration of the construction phase, to be undertaken every six months.

Many potential impacts are difficult to monitor quantitatively, such as soil erosion and waste management. However, an on-going, but pragmatic, inspection regime must be developed that allows for potential environmental transgressions to be identified proactively so that mitigation can be quickly and effectively implemented.

There are several mechanisms for implementing corrective action both during the construction and operational phases. The main instruments used to address non-compliances are the following:

- Verbal instructions – Minor transgressions from an established procedure;
- Written instructions – Normally following an audit; and
- Contract Notice – Following a breach in contract.

These instruments must be included in the contracts between the Developer and the Principal Contractors as a means of deterring personnel from contravening the conditions of the EA and the EMPr.

## **2.6 SITE DOCUMENTATION AND REPORTING**

All non-conformances will be recorded and reported to the Developer and/or its Agent. These non-conformances will be rated according to a weighing methodology to be developed that will be used to determine the significance of each incident. Considering the transient nature of construction, continual daily visual inspections will be conducted by the SHE representative. The following documentation will be required on site:

- Complaints register;
- Environmental Incident Register;
- Disposal certificates of waste and wastewater generated as a result of the proposed development;
- Monthly internal audit reports;
- Bi-annual external audit reports;
- Method statements with potential environmental impacts included;
- Non-conformance reports;
- Written corrective action instructions;
- EA; and
- EMPr and associated amendments.

The findings of all inspections and internal audits will be structured into instructive reporting providing information to all members of the Project Management Team. Corrective actions must be clearly defined where required. Within the reporting function a structured review component must be enforced. This review function will assist in prescribing necessary corrective actions.

Within the reporting structure it will be necessary to incorporate a review function that continually assesses the reporting and prescribes any necessary corrective action. The purpose of the review function is for the Developer to review the environmental management performance during all phases, and to propose measures to improve performance focusing on continual improvement.

## **2.7 MONITORING**

All programmes and plans forming part of this document will be subject to monitoring. The monitoring of the compliance with the conditions of the EA and the EMPr will be done on a monthly basis during construction by the ECO / SHE representative and annually during the operational phase by DPT Hennenman (Pty) Ltd. Monitoring will have two elements namely:

- Routine monitoring against set standards or performance criteria;
- Annual review or evaluation. This will focus on the assessment of the effectiveness of the plan or programme.

During the construction phase, the Project Management Team will be responsible for monitoring and inspecting contractors' written records to illustrate compliance with the EMPr. This falls under the inspection role of the SHE Representative / ECO. This compliance monitoring is to verify that the responsible parties are adhering to the procedures, management conditions, and specifications contained in this EMPr.

### **2.7.1 Programme Monitoring**

The SHE Representative / ECO will monitor their programme implementation for the proposed development on a monthly basis during the construction phase. This will include, but not be limited to, the monitoring of:

- Occurrence of alien vegetation as well as any possible (albeit unlikely) sensitive species;
- Waste Management Programmes used to manage the generation and disposal of waste on site; and
- Rehabilitation of the construction sites, post construction and continually during operation.

## **2.8 MANAGEMENT REVIEW**

The Developer will review the EMPr at annual intervals during the operational phase. The purpose of the management review is to ensure that the conditions of the EMPr are still relevant, and to propose measures for improving the performance in the spirit of continuous improvement.

## **2.9 MITIGATION AND MANAGEMENT MEASURES**

The mitigation and management measures identified to address the anticipated and potential impacts identified during the Environmental Impact Assessment process is presented in Table 2-3 to Table 2-7.

**Table 2-3:** Proposed Mitigation Measures during the Planning and Design Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING PLANNING AND DESIGN (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
<b>General Management Measures</b>			
Contractors and sub-contractors may not have sufficient knowledge and understanding of the potential impacts of construction or the requirements of the EMPr, leading to impacts identified under each aspect.	Compliance with the requirements of the EMPr will form part of the construction contract.	Upon appointment of Principal Contractors	Developer and/or appointed Agent
	A construction plan and method statement must be submitted by the Principal contractor and approved by the Developer and/or his appointed Agent prior to the start of activities on site. It must cover all aspects of site establishment, construction and site disestablishment and describe how the EMP will be complied with.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
	Emergency action plans must be devised and approved by the Developer and/or his appointed Agent to deal with any risks identified, such as unplanned disruption of services.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Impacts on the environment as a result of inappropriate design and planning.	<ol style="list-style-type: none"> <li>1. Carry out a Hazardous Operating Procedures (HAZOP) assessment of the design to ensure that all practical measures to minimise the impact of operations on the environment have been included and to identify what emergency plans need to be developed.</li> <li>2. Reduce the construction phase through careful logistical planning.</li> </ol>	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Site demarcation and compliance	<ol style="list-style-type: none"> <li>1. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barriers where applicable. This must be undertaken prior to initial site clearance.</li> <li>2. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage must be</li> </ol>	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	<p>erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp must be controlled by a guard or otherwise monitored, to prevent unlawful access.</p> <ol style="list-style-type: none"> <li>3. The Contractor and ECO must ensure compliance with conditions described in the EA.</li> <li>4. Records of compliance/non-compliance with the conditions of the authorisation must be kept and be available on request.</li> <li>5. Records of all environmental incidents must be maintained and a copy of these records be made available to the department on request throughout the project execution.</li> <li>6. In terms of onsite associated infrastructure and buildings, clear planning must be implemented to minimise vegetation clearing. Consolidating infrastructure as much as possible and making use of areas that are already disturbed, where possible, is preferred.</li> <li>7. All development activities must be restricted to specific recommended areas. The Environment Control Officer (ECO) must control these areas.</li> <li>8. Storage of equipment, fuel and other materials must be limited to demarcated areas.</li> <li>9. Layouts must be adapted to fit natural patterns rather than imposing rigid geometries.</li> <li>10. The entire development footprint must be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development.</li> <li>11. As much of the natural habitat as possible must be preserved during construction and operation to lessen the operational impacts and to reduce the irreversibility of impacts.</li> <li>12. The ECO must advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO must enforce any measures that he/she deem necessary.</li> <li>13. Regular environmental training must be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation.</li> </ol>		
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	<ol style="list-style-type: none"> <li>14. All relevant provincial or national permits for the removal of protected plant species must be obtained and kept on file prior to the commencement of any construction/clearance activities.</li> <li>15. A stormwater plan must be developed with the aid of an engineer to ensure that water runoff is diverted off the site without pooling and stagnation or erosion.</li> <li>16. The Eskom requirements for work at or near Eskom infrastructure and servitudes, as well as a setbacks guideline for renewable energy developments must be complied with.</li> </ol>		
Establishment of a Construction camp	<ol style="list-style-type: none"> <li>1. Site establishment must take place in an orderly manner and all required amenities must be installed at camp sites before the main workforce move onto site.</li> <li>2. All construction equipment must be stored within this construction camp.</li> <li>3. All associated oil changes etc (no servicing) must take place within this camp on a sealed surface such as a concrete slab.</li> <li>4. An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.</li> <li>5. All construction camps must be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible.</li> <li>6. Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.</li> <li>7. The Contractor must provide sufficient ablution facilities, in the form of portable/VIP toilets, at the construction camps, and must conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems must be allowed, and toilets may not be situated within 50 meters of any surface water body or 1:100 year floodline. A sufficient number of toilets must be provided to accommodate the number of personnel working in the area.</li> <li>8. The Contractor must inform all site staff to make use of supplied ablution</li> </ol>	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	<p>facilities and under no circumstances can indiscriminate sanitary activities be allowed.</p> <p>9. No open veld fires will be allowed for cooking or heating unless in designated areas and under supervision. LP Gas may be used, provided that all required safety measures are in place. The Contractor must take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter.</p>		
Appointment of labour	<ol style="list-style-type: none"> <li>1. Where reasonable and practical DPT Hennenman (Pty) Ltd must appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.</li> <li>2. Where feasible, efforts must be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria.</li> <li>3. Before the construction phase commences DPT Hennenman (Pty) Ltd must meet with representatives from the Matjhabeng Local Municipality to establish the existence of a skills database for the area. If such a database exists, it must be made available to the contractors appointed for the construction phase.</li> <li>4. The local authorities, community representatives, and organisations on the interested and affected party database must be informed of the potential job opportunities for locals and the employment procedures that DPT Hennenman (Pty) Ltd intends on following for the construction phase of the project.</li> <li>5. The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.</li> <li>6. The recruitment selection process must ensure all Human rights are respected and enforced.</li> </ol>	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Training of site staff	Ensure that all staff have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-	Prior to commencement of site preparation and	Developer and/or appointed Agent



	<p>going minimization of environmental harm, by:</p> <ol style="list-style-type: none"> <li>1. Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artifacts.</li> <li>2. Where feasible training and skills development programmes for local workers must be initiated prior to the initiation of the construction phase.</li> <li>3. Project manager must ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks.</li> <li>4. Staff operating equipment (such as loaders, etc.) must be adequately trained and sensitised to any potential hazards associated with their tasks.</li> <li>5. No operator must be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager.</li> <li>6. Staff must be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training.</li> <li>7. Staff must be trained in the hazards and required precautionary measures for dealing with hazardous substances.</li> <li>8. Spillage packs must be available at construction areas.</li> </ol>	construction	
Public consultation of the site	<ol style="list-style-type: none"> <li>1. A meeting must be held with the landowner to provide details and logistics regarding the construction phase and identify any potential issues for the landowner that must be addresses prior and during construction.</li> <li>2. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders.</li> <li>3. Compile and implement a grievance mechanism procedure for the public. This procedure will include details of the contact person who will be receiving issues raised by I&amp;APs, and the process that will be followed to address issues.</li> <li>4. Identify relevant stakeholders and engage them at applicable stages of</li> </ol>	Pre-construction and construction	Principal Contractor

	<p>the development.</p> <ol style="list-style-type: none"> <li>5. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction.</li> <li>6. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures.</li> <li>7. The Matjhabeng Local Municipality, in conjunction with the local business sector and representatives from the local hospitality industry, must identify strategies aimed at maximising the potential benefits associated with the project.</li> </ol>		
Site clearing	<ol style="list-style-type: none"> <li>1. Site clearing must take place in a phased, environmentally acceptable manner, as and when required.</li> <li>2. Areas which are not to be constructed on within two weeks must not be cleared to reduce erosion risks.</li> <li>3. The area to be cleared must be clearly demarcated and the footprint strictly maintained to limit vegetation clearing.</li> <li>4. Soil that is removed from the site must be removed to an approved spoil site or a licensed landfill site.</li> <li>5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.</li> <li>6. The removal of indigenous plants must be kept to a minimum necessary.</li> </ol>	Site preparation prior to construction	Principal Contractor
Erosion	<ol style="list-style-type: none"> <li>1. Design an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.</li> </ol>	Once-off, during the design of the facility	Developer and/or appointed Agent
Establishment of a Social and Environmental Management System	<ol style="list-style-type: none"> <li>1. Performance Standard One underscores the importance of managing social and environmental performance throughout the life of a project.</li> <li>2. An effective social and environmental management system is a dynamic,</li> </ol>	Prior to construction	Principal Contractor

	<p>continuous process initiated by management and involving communication between the client, its workers and the local communities directly affected by the project. The client must develop a Social and Environmental Management System, appropriate to the nature and scale of the project and commensurate to the level of social and environmental risks and impacts.</p>		
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**Table 2-4:** Proposed Mitigation Measures during the Construction Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING CONSTRUCTION (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
<b>Construction Camp</b>			
Site of the construction camp	<ol style="list-style-type: none"> <li>1. The size of the construction camp must be minimised.</li> <li>2. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and/or sheet erosion.</li> <li>3. Secure the site, working areas and excavations in an appropriate manner.</li> <li>4. Restrict construction activities to daylight hours in order to negate or reduce the visual impacts of lighting.</li> <li>5. Suitable control measures over the Contractor’s yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented.</li> </ol>	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
Storage of materials (including hazardous materials)	<ol style="list-style-type: none"> <li>1. Choice of location for storage areas must consider prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary.</li> <li>2. Storage areas must be designated, demarcated and fenced if necessary.</li> <li>3. Storage areas must be secure to minimise the risk of crime. They must also be safe from access by unauthorised persons i.e., children/animals etc.</li> <li>4. Fire prevention facilities must be present at all storage facilities.</li> <li>5. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume, and this must be situated away from drainage lines in a site with the approval of the Project Manager. The bund</li> </ol>	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer

	<p>wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events.</p> <ol style="list-style-type: none"> <li>6. All fuel storage areas must be roofed to avoid creation of dirty stormwater.</li> <li>7. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of stormwater from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.</li> <li>8. Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.</li> <li>9. Storage areas containing hazardous substances/materials must be clearly signposted.</li> <li>10. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures.</li> <li>11. An approved waste disposal contractor must be employed to remove, transport and recycle waste oil, if practical. The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.</li> <li>12. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.</li> <li>13. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately, and the cause of the spill investigated. Preventative measures must be identified and submitted to the Principal Contractor and ECO for information. Emergency response procedures to be followed and implemented.</li> <li>14. Emergency and spillage plans need to be developed and submitted to the</li> </ol>		
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	relevant authorities for approval.		
Drainage of the construction camp	<p>Surface drainage measures must be established in the construction camps so as to prevent:</p> <ul style="list-style-type: none"> <li>• Ponding of water;</li> <li>• Erosion as a result of accelerated runoff; and</li> <li>• Uncontrolled discharge of polluted runoff.</li> </ul>	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
<b>Construction Traffic and Access</b>			
Construction traffic	<ol style="list-style-type: none"> <li>1. Construction routes and required access roads must be clearly defined and carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks.</li> <li>2. Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the R700 regional road and gravel farm roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.</li> <li>3. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities.</li> <li>4. Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work).</li> <li>5. Access of all construction and material delivery vehicles must be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</li> <li>6. Dust suppression of internal gravel roads and the access road must be undertaken.</li> <li>7. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance.</li> <li>8. Vehicles and equipment must be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</li> <li>9. Servicing must be done in dedicated service areas on site or else off site if</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<p>no such area exists.</p> <ol style="list-style-type: none"> <li>10. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution.</li> <li>11. Soils compacted by construction must be deep ripped to loosen compacted layers and re-graded to even running levels.</li> <li>12. All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.</li> <li>13. Vehicles carrying material that can be wind-blown must be covered with a suitable material.</li> <li>14. All drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.</li> <li>15. Implement penalties for reckless driving to enforce compliance to traffic rules.</li> <li>16. All construction vehicles must be roadworthy, and drivers must have the relevant licenses for the type of vehicles they are operating.</li> <li>17. All vehicle drivers need to strictly adhere to the rules of the road.</li> <li>18. The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.</li> <li>19. The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.</li> <li>20. The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase.</li> <li>21. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.</li> <li>22. Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods.</li> <li>23. The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible.</li> </ol>		
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	<ol style="list-style-type: none"> <li>24. Staff and general trips should occur outside of peak traffic periods.</li> <li>25. Design and maintenance of the internal gravel roads and maintenance of the access road.</li> <li>26. If required, any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) or raised to accommodate the abnormal load vehicles.</li> <li>27. Gravel roads used will need to be maintained in an appropriate condition. Re-gravelling may be necessary as a maintenance measure (also relevant to the operation phase).</li> </ol>		
<p>Access to the site</p>	<ol style="list-style-type: none"> <li>1. The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and sub-contractors.</li> <li>2. Planning of access routes to the site for construction purposes must be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements must be made. The Contractor must clearly mark all access roads. Roads not to be used must be marked with a "NO ENTRY for construction vehicles" sign.</li> <li>3. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.</li> <li>4. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes. The development (including the development footprint and contractor's equipment camp) must also be secured and fenced and clearly demarcated.</li> <li>5. Electrical fencing must be constructed in a manner which allows for the passage of small and medium sized mammals and small avifauna. Steel palisade fencing (20 cm gaps min) is a good option in this regard as it allows most medium-sized mammals to pass between the bars, but remains an effective obstacle for humans. Alternatively, the lowest strand or bottom of the fence must be elevated to 30cm above the ground which should be sufficient to allow smaller animals, reptiles and tortoises to pass</li> </ol>	<p>Construction phase</p>	<p>Principal Contractor and Environmental Liaison Officer</p>



	<p>through (tortoises retreat into their shells when electrocuted and eventually succumb from repeated shocks), but still remain effective as a security barrier.</p> <ol style="list-style-type: none"> <li>6. Stripping of vegetation for access roads must be restricted and existing roads must be used as far as possible.</li> <li>7. The movement of all vehicles within the site must be on designated roadways.</li> <li>8. 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 must be in accordance with the prescribed standards and must be appropriately maintained for the duration of the construction period.</li> </ol>		
Maintenance of the road	<ol style="list-style-type: none"> <li>1. Where necessary suitable measures must be taken to rehabilitate damaged areas.</li> <li>2. Contractors must ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop.</li> <li>3. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.</li> <li>4. The contractor must ensure that damage caused by construction related traffic to the R700 and gravel farm roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer
Noise	<p>Movement of heavy construction vehicles through residential areas must be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas must not take place over weekends.</p>	Construction phase	Principal Contractor and Environmental Liaison Officer
General mitigation regarding construction traffic and access	<ol style="list-style-type: none"> <li>1. The Contractor must meet safety requirements under all circumstances. All equipment transported must be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<p>containers and trucks used must be in place.</p> <ol style="list-style-type: none"> <li>2. The Contractor must ensure that all the necessary precautions against damage to the environment and injury to persons are taken.</li> <li>3. Care for the safety and security of community members crossing access roads must receive priority at all times.</li> <li>4. No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor.</li> <li>5. All relevant permits for abnormal loads must be applied for from the relevant authority (pre-construction).</li> <li>6. Stagger component delivery to site.</li> <li>7. Reduce the construction period.</li> <li>8. Use mobile batch plants and quarries in close proximity to the site.</li> <li>9. Staff and general trips must occur outside of peak traffic periods.</li> <li>10. Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase</li> </ol>		
<b>Environmental education and Training</b>			
Environmental training	<ol style="list-style-type: none"> <li>1. The project manager must appoint an ECO prior to construction.</li> <li>2. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered must include: <ul style="list-style-type: none"> <li>• What is meant by “Environment”?</li> <li>• Why the environment needs to be protected and conserved?</li> <li>• How construction activities can impact on the environment?</li> <li>• What can be done to mitigate against such impacts?</li> <li>• Awareness of emergency and spills response provisions</li> <li>• Social responsibility during construction e.g., being considerate to local residents</li> </ul> </li> <li>3. Training must be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues.</li> <li>4. It is the Contractor’s responsibility to provide the site foreman with no less than 1 hour’s environmental training and to ensure that the foreman has</li> </ol>	Construction phase	DPT Hennenman (Pty) Ltd

	<p>sufficient understanding to pass this information onto the construction staff.</p> <ol style="list-style-type: none"> <li>5. Training must be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary.</li> <li>6. Use must be made of environmental awareness posters on site.</li> <li>7. The need for a “clean site” policy also needs to be explained to the workers.</li> <li>8. Staff operating equipment (such as loaders, etc.) must be adequately trained and sensitized to any potential hazards associated with their tasks.</li> </ol>		
Monitoring of environmental training	The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and/or a translator must be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	Construction phase	Principal Contractor and Environmental Control Officer
<b>Soils and Geology</b>			
Mitigation for soil compaction	The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.	Construction phase	Principal Contractor and Environmental Liaison Officer
Soil pollution	<ol style="list-style-type: none"> <li>1. All waste generated on site during construction must be stored in waste bins and removed from site on a regular basis.</li> <li>2. Vehicles accessing the site must regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil must be removed and transported to a designated waste site.</li> <li>3. Broken or old batteries or components of the PV plant must be stored in a demarcated area in quarantine for the shortest period possible until it can be collected and taken to a special chemical waste facility.</li> <li>4. Refuelling points must be well managed and if any soils are contaminated, it must be stripped and disposed of at a registered hazardous waste</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<p>dumping site.</p> <ol style="list-style-type: none"> <li>5. Any excess or waste material or chemicals must be removed from the site and discarded in an environmentally friendly way. The ECO must enforce this rule rigorously.</li> <li>6. Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.</li> <li>7. Spill kits must be on-hand to deal with spills immediately.</li> <li>8. All vehicles must be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site must make provision for drip trays that will be used to capture any spills. Drip trays must be emptied into a holding tank and returned to the supplier.</li> <li>9. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li> <li>10. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Spillage and contamination of soil should be avoided.</li> </ol>		
<p>Guidelines for the stripping and storage of topsoil</p>	<ol style="list-style-type: none"> <li>1. The Contractor must, prior to the commencement of earthworks determine the average depth of topsoil and agree on this with the ECO. The full depth of topsoil must be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This must include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas.</li> <li>2. Care must be taken not to mix topsoil and subsoil during stripping.</li> <li>3. Should any topsoil become polluted the Contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with clean topsoil.</li> <li>4. Removed polluted topsoil must be transported to a licensed landfill site.</li> <li>5. The topsoil must be conserved on site in and around the pit area.</li> </ol>	<p>Construction phase</p>	<p>Principal Contractor and Environmental Liaison Officer</p>

Soil stripping	<ol style="list-style-type: none"> <li>1. No soil stripping must take place on areas within the site that the Contractor does not require for construction works or areas of retained vegetation.</li> <li>2. Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.</li> <li>3. Subsoil and overburden in all construction and laydown areas must be stockpiled separately to be returned for backfilling in the correct soil horizon order.</li> <li>4. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer
Guidelines for soil stockpiles	<ol style="list-style-type: none"> <li>1. Stockpiles must not be situated such that they obstruct natural water pathways.</li> <li>2. Topsoil must be stored for later use.</li> <li>3. Stockpiles must not exceed 2m in height unless otherwise permitted by the Engineer.</li> <li>4. If stockpiles are exposed to windy conditions or heavy rain, they must be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.</li> <li>5. Stockpiles must be kept clear of weeds and alien vegetation growth by regular weeding.</li> <li>6. Should topsoil be stockpiled for longer than 6 months it must be vegetated.</li> <li>7. Where contamination of soil is expected, analysis must be done prior to disposal of soil to determine the appropriate disposal route. Proof from an approved waste disposal site where contaminated soils are dumped if and when a spillage/leakage occurs must be attained and given to the project manager.</li> <li>8. Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land.</li> <li>9. If an activity will mechanically disturb the soil below surface in any way,</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer

	<p>then any available topsoil must first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</p> <ol style="list-style-type: none"> <li>10. Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement.</li> <li>11. Check that topsoil covers the entire disturbed area. The depth of topsoil stripping is dependent on the specific field conditions. The maximum depth must be 30cm. If additional unconsolidated material exists below 30cm and needs to be removed for construction purposes, it must be stripped and stockpiled separately from the upper 30cm topsoil. Such material must only be used for fill below a topsoil layer, and not used for spreading on the surface. If there is less than 30cm of unconsolidated soil material above a limiting layer of rock or hardpan, then the entire depth must be stripped and stockpiled as topsoil, even if it contains a high proportion of coarse fragments.</li> <li>12. Topsoil must be retained in the area below the panels. It is not desirable to strip and stockpile this topsoil for the whole of the operational phase. It will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil must be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire surface before the panels are mounted.</li> <li>13. Vegetate or cover all stockpiles after stripping/removing soils.</li> <li>14. Storage of potential contaminants must be undertaken in bunded areas.</li> <li>15. All contractors must have spill kits available and be trained in the correct use thereof.</li> <li>16. All contractors and employees must undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping".</li> <li>17. No cleaning or servicing of vehicles, machines and equipment may be undertaken in or near water resources.</li> <li>18. Have action plans on site, and training for contractors and employees in</li> </ol>		
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	the event of spills, leaks and other impacts to the aquatic systems located in the surrounding area.		
Erosion	<ol style="list-style-type: none"> <li>1. Undertake a periodic site inspection to record the occurrence of erosion and re-vegetation progress of all areas that require re-vegetation. This must be undertaken every four months.</li> <li>2. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site to stabilize disturbed soil against erosion.</li> <li>3. Cover disturbed soils as completely as possible, using vegetation or other materials.</li> <li>4. Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.</li> <li>5. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> <li>6. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>7. Gravel roads to the construction sites must be well drained to limit soil erosion.</li> <li>8. Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> <li>9. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> </ol>	Construction phase	Environmental Control Officer
Storage of fuel on site	<ol style="list-style-type: none"> <li>1. Topsoil and subsoil must be protected from contamination. This must be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities.</li> <li>2. Fuel and material storage must be away from stockpiles.</li> <li>3. Concrete and chemicals must be mixed on an impervious surface and provisions must be made to contain spillages or overflows into the soil.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer

	<p>4. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.</p>		
Mixing of concrete on site	<ol style="list-style-type: none"> <li>1. The concrete batching plant must be contained within a bunded area.</li> <li>2. Concrete mixing must only take place within designated areas.</li> <li>3. Ready mixed concrete must be utilised where possible.</li> <li>4. No vehicles transporting concrete to the site may be washed on site.</li> <li>5. If a batching plant is necessary, run-off must be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the stormwater system.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer
Earth works	<ol style="list-style-type: none"> <li>1. Soils compacted during construction must be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil must be re-spread over landscaped areas.</li> <li>2. It is recommended that a suitably qualified engineering geologist or geotechnical engineer inspect all foundation trenches prior to construction in order to identify and evaluate any soil characteristics in variance with that found during the detailed geotechnical investigation.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer
<b>Erosion Control</b>			
Erosion control actions that need to be implemented during construction	<ol style="list-style-type: none"> <li>1. Wind screening and stormwater control must be undertaken to prevent soil loss from the site.</li> <li>2. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion.</li> <li>3. Other erosion control measures that can be implemented are as follows: <ul style="list-style-type: none"> <li>○ Brush packing with cleared vegetation</li> <li>○ Mulch or chip packing</li> <li>○ Planting of vegetation</li> <li>○ Hydroseeding/hand sowing</li> </ul> </li> <li>4. Sensitive areas need to be demarcated prior to construction so that the</li> </ol>	Construction phase	Environmental Control Officer



	<p>necessary precautions can be implemented.</p> <ol style="list-style-type: none"> <li>5. All erosion control mechanisms need to be regularly maintained.</li> <li>6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces must be undertaken.</li> <li>7. Retention of vegetation where possible to avoid soil erosion.</li> <li>8. Vegetation clearance must be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.</li> <li>9. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed. This must be done through seeding with indigenous grasses.</li> <li>10. No impediment to the natural water flow other than approved erosion control works is permitted.</li> <li>11. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings.</li> <li>12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.</li> <li>13. Cover disturbed soils as completely as possible, using vegetation or other materials.</li> <li>14. Implement stringent erosion and dust control practices.</li> <li>15. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> <li>16. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>17. Gravel roads to the construction sites must be well drained to limit soil erosion.</li> <li>18. Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> <li>19. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the</li> </ol>		
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	<p>construction camp and Work Areas.</p> <ol style="list-style-type: none"> <li>20. Clearing of vegetation must be limited to areas immediately needed for construction. Vegetation stripping must occur in parallel with the progress of construction to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment. Only selected plant species must be used in the re-vegetation process.</li> <li>21. Manage water effectively on, to, within, and from this site.</li> <li>22. Employ sediment capture techniques and stormwater attenuation techniques.</li> <li>23. All development activities must be restricted to the footprint areas of the proposed development. The Environment Site Officer (ESO) must demarcate and control these areas. Storage of building equipment, fuel and other materials must be limited to demarcated areas.</li> <li>24. The Environment Control Officer (ECO) must advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO must enforce any measures that he/she deem necessary. Regular environmental training must be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation.</li> <li>25. Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.</li> <li>26. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> <li>27. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>28. Gravel roads to the construction sites must be well drained to limit soil erosion.</li> <li>29. Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> <li>30. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.</li> <li>31. Rehabilitation outside of the development area after construction has</li> </ol>		
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	been completed must be considered a high priority and all areas rehabilitated must be audited after construction has ceased by a suitably qualified environmentalist.		
<b>Water Use and Quality</b>			
Water use	<ol style="list-style-type: none"> <li>1. Develop a sustainable water supply management plan prior to construction to minimise the impact to natural systems by managing water use, avoiding depletion of aquifers and minimising impacts to water users.</li> <li>2. Water must be used sparingly and reused, recycled or treated where possible.</li> </ol>	Construction phase	Contractors Engineer and Project Manager
	Consultation must be undertaken with key stakeholders to understand any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area.	Construction phase	Environmental Control Officer
Management of water quality	<ol style="list-style-type: none"> <li>1. The quality and quantity of effluent streams discharged to the environment including stormwater must be managed and treated to meet applicable effluent discharge guidelines.</li> <li>2. Quality of water being discharged must be tested on a monthly basis.</li> <li>3. Discharge to surface water must not result in contaminant concentrations in excess of local ambient water quality criteria outside a scientifically established mixing zone.</li> <li>4. Efficient oil and grease traps or sumps must be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits must be available with emergency response plans.</li> </ol>	Construction phase	Environmental Control Officer
Stormwater management	<ol style="list-style-type: none"> <li>1. A comprehensive stormwater management plan for hard surfaces is to make up part of the final project design, which must include appropriate ways of handling stormwater within the site.</li> <li>2. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and</li> </ol>	Construction phase	Environmental Control Officer

	<p>silt or chemical pollutants.</p> <ol style="list-style-type: none"> <li>3. Silt fences must be used to prevent any soil entering the stormwater drains.</li> <li>4. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration.</li> <li>5. Promote a water saving mind set with construction workers in order to ensure less water wastage.</li> <li>6. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency.</li> <li>7. Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution.</li> <li>8. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase.</li> <li>9. Earth, stone and rubble is to be properly disposed of, or utilised on site so as not to obstruct natural water pathways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers.</li> <li>10. There must be periodic checking of the site's drainage system to ensure that the water flow is unobstructed.</li> <li>11. If a batching plant is necessary, run-off must be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the stormwater system or nearby streams, rivers, wetlands or erosion channels or dongas.</li> </ol>		
Protection of groundwater resources	<ol style="list-style-type: none"> <li>1. No unauthorised groundwater abstraction may occur on the site.</li> <li>2. Should any water be discharged from site, the water is to comply with national effluent standards. No contaminated water must be discharged from site.</li> <li>3. No activities must be allowed to encroach into a watercourse or feature without a Water Use License being in place from the Department of Water and Sanitation (DWS).</li> </ol>	Construction phase	Environmental Control Officer

Sanitation	<ol style="list-style-type: none"> <li>1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers) at appropriate locations on site.</li> <li>2. The facilities must be regularly serviced and appropriately maintained to reduce the risk of surface or groundwater pollution.</li> <li>3. Ablution or sanitation facilities must not be located within 100m of any watercourses or features.</li> </ol>	Construction phase	Environmental Control Officer
Concrete mixing	Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth.	Construction phase	Environmental Control Officer
Public areas	<ol style="list-style-type: none"> <li>1. Food preparation areas must be provided with adequate washing facilities and food refuse must be stored in sealed refuse bins which must be removed from site on a regular basis.</li> <li>2. The Contractor must take steps to ensure that littering by construction workers does not occur and persons must be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines.</li> <li>3. No washing or servicing of vehicles on site.</li> </ol>	Construction phase	Environmental Control Officer
<b>Surface and ground water</b>			
Sanitation on site	<ol style="list-style-type: none"> <li>1. Water saving devices and technologies such as the use of dual flush toilets must be considered.</li> <li>2. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer
Use and storage of hazardous materials	<ol style="list-style-type: none"> <li>1. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled.</li> <li>2. Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer

	<p>vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.</p> <ol style="list-style-type: none"> <li>3. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material.</li> <li>4. Any hazardous substances must be stored at least 20m from any of the water bodies on site.</li> <li>5. The Contractor (monitored by the Environmental Control or Liaison Officer) must be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry.</li> <li>6. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licensed commercial facility.</li> </ol>		
Concrete mixing	Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth.	Construction phase	Principal Contractor and Environmental Control Officer
Public areas	No washing or servicing of vehicles on site.	Construction phase	Principal Contractor and Environmental Control Officer
Water resources	<ol style="list-style-type: none"> <li>1. Site staff must not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities.</li> <li>2. Municipal water (or another source approved by the ECO) must instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.</li> <li>3. Relevant departments and other emergency services must be contacted in</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer

	order to deal with spillages and contamination of aquatic environments.		
Site specific mitigation measures for surface water	<ol style="list-style-type: none"> <li>1. No development should be allowed in vegetation unit 1 (Seasonal Drainage Channel). The area should be fenced off prior to construction and zoned as a no-go area.</li> <li>2. The drainage channel and appropriate buffer zones must be fenced off prior to construction and declared as a No-Go area.</li> <li>3. Fences must not restrict the dispersal or exploratory movements of remaining faunal species. Palisade fencing with a minimum of 15cm gap is recommended along the seasonal Drainage Channel area.</li> <li>4. The few alien vegetation individuals must be controlled.</li> <li>5. Disturbed areas around the channel as well as the proposed buffer zones must be re-vegetated with an indigenous (to the area) grass seed mixture.</li> <li>6. No hazardous materials should be stored within 300 m of the channel.</li> <li>7. Provision of adequate toilet facilities must be implemented to prevent the possible contamination of ground (borehole) and surface water in the area.</li> <li>8. No cleaning of equipment should be done closer than 300m of the edge of the buffer zone. This includes the establishment of temporary and permanent offices and ablution facilities.</li> <li>9. All vehicles and equipment should be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area at least 300m away from the edge of the watercourse buffer zone to prevent ingress of hydrocarbons into topsoil.</li> <li>10. No dumping or storage of waste should take place within the watercourse areas.</li> <li>11. Drainage must be controlled to ensure that runoff from the site will not culminate in off-site pollution or result in rill and gully erosion or any erosion of the watercourse.</li> <li>12. Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage.</li> <li>13. The release of storm water must be designed such that the force of the water is reduced to prevent unnecessary erosion.</li> </ol>	Construction phase	Principal Contractor and Environmental Control Officer

	<p>14. No dumping of waste should take place within the watercourse areas. If any spills occur, they should be cleaned up immediately.</p> <p>15. Adequate toilet facilities must be provided for all staff to prevent pollution of the environment.</p>		
Site specific mitigation measures for groundwater	<p>1. Inventories must be made of all substances that are potentially hazardous to groundwater, which will be stored, used or transported over the sites. The risk of each substance to the groundwater must be considered.</p> <p>2. All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of must be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.</p> <p>3. A groundwater monitoring programme (quality and groundwater levels) must be designed and installed for the site, where ground water will be utilised. Monitoring boreholes must be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing. Full construction details of monitoring boreholes must be recorded when they are drilled (e.g. screen and casing lengths, diameters, total depth, etc). Sampling of monitoring boreholes must be done according to recognised standards.</p>	Construction phase	Principal Contractor and Environmental Control Officer
<b>Waste Management</b>			
General considerations	<p>1. Construction methods and materials must be carefully considered in view of waste reduction, re-use and recycling opportunities.</p> <p>1. Construction contractors must provide specific detailed waste management plans to deal with all waste streams.</p> <p>2. Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control.</p> <p>3. Adequate weather and vermin proof waste bins and skips (covered at minimum with secured netting or shade cloth) must be placed on site.</p>	Duration of the activity	Principal Contractor



	<p>Separate bins must be provided for general and hazardous waste.</p> <p>4. 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>		
Litter management	<ol style="list-style-type: none"> <li>1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site.</li> <li>2. The Contractor must supply waste collection bins where such is not available and all solid waste collected must be disposed of at registered/licensed landfill.</li> <li>3. A housekeeping team must be appointed to regularly maintain the litter and rubble situation on the construction site.</li> <li>4. If possible and feasible, all waste generated on site must be separated into glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling.</li> <li>5. Littering by the employees of the Contractor must not be allowed under any circumstances. The ECO must monitor the neatness of the work sites as well as the Contractor campsite.</li> <li>6. Skip waste containers must be maintained on site. These must be kept covered and arrangements made for them to be collected regularly.</li> <li>7. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours.</li> <li>8. Where a registered waste site is not available close to the construction site, the Contractor must provide a method statement with regard to waste management.</li> <li>9. A certificate of disposal must be obtained by the Contractor and kept on file, if relevant.</li> <li>10. Under no circumstances may any waste be burnt on site.</li> <li>11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours.</li> </ol>	Construction phase	Environmental Liaison Officer
Hazardous waste management	<ol style="list-style-type: none"> <li>1. All waste hazardous materials must be carefully stored as advised by the</li> </ol>	Construction phase	Environmental Liaison Officer

	<p>ECO, and then disposed of offsite at a licensed landfill site, where practical. Incineration may be used where relevant.</p> <ol style="list-style-type: none"> <li>2. Contaminants to be stored safely to avoid spillage.</li> <li>3. Machinery must be properly maintained to keep oil leaks in check.</li> <li>4. All necessary precaution measures must be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills must immediately be cleaned up and all affected areas rehabilitated.</li> <li>5. 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.</li> <li>6. SABS approved spill kits to be available and easily accessible.</li> </ol>		
Sanitation	<ol style="list-style-type: none"> <li>1. Staff must be sensitised to the fact that they must use the available mobile chemical toilets at all times. No indiscriminate sanitary activities on site must be allowed.</li> <li>2. Ablution facilities must be within 50m from workplaces. There must be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated separately where possible.</li> <li>3. Toilets must be serviced regularly, and the ECO must inspect toilets regularly.</li> <li>4. Open areas, neighbours fences or the surrounding bush must not be used as toilet facilities.</li> <li>5. The construction of “Long Drop” toilets is forbidden.</li> <li>6. Potable water must be provided for all construction staff.</li> </ol>	Construction phase	Environmental Liaison Officer
Remedial actions	<ol style="list-style-type: none"> <li>1. An effective monitoring system must be put in place to detect any leakage or spillage during their transportation, handling, installation and storage.</li> <li>2. Corrective action must be undertaken immediately if a complaint is made,</li> </ol>	Duration of the project	Environmental Liaison Officer and Principal Contractor

	<p>or potential/actual leak or spill of polluting substance is identified.</p> <ol style="list-style-type: none"> <li>3. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible.</li> <li>4. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.</li> <li>5. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil.</li> <li>6. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material.</li> <li>7. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure.</li> <li>8. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use.</li> <li>9. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment and stored in adequate containers until appropriate disposal.</li> <li>10. In the event of a major spill or leak of contaminants, the relevant administering authority must be notified immediately as per the notification of emergencies/incidents.</li> <li>11. Routine serving and maintenance of vehicles must not take place on site (except for emergencies, in which case an appropriate drip tray must be used to contain any fuel or oils).</li> <li>12. Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.</li> <li>13. Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated as hazardous waste. Clean stormwater contained within the bunds may be reused.</li> <li>14. The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded and stored in</li> </ol>		
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	<p>compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions.</p> <p>15. Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.</p> <p>16. Upon completion of construction, the area must be cleared of potentially polluting materials.</p>		
<b>Flora</b>			
Destruction and fragmentation of habitat	<ol style="list-style-type: none"> <li>1. Vegetation removal must be limited to the construction site.</li> <li>2. Vegetation removal must be phased in order to reduce impact of construction.</li> <li>3. All flora not interfering with the operation of the facility construction must be left undisturbed clearly marked and indicated on the site plan.</li> <li>4. Construction site and laydown areas must be clearly demarcated, and no encroachment must occur beyond demarcated areas.</li> <li>5. Materials must not be delivered to the site prematurely which could result in additional areas being cleared or affected.</li> <li>6. No vegetation to be used for firewood.</li> <li>7. Strict and regular auditing of the construction process must be undertaken to ensure containment of the construction and laydown areas.</li> <li>8. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.</li> <li>9. During construction, sensitive habitats outside of the site must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.</li> <li>10. Ensure minimum destruction and damage to the environment. The ECO must enforce any measures that he/she deem necessary. Regular environmental training must be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation.</li> </ol>	Pre-construction and Construction phase	Environmental Liaison Officer/ Principal Contractor

	<ol style="list-style-type: none"> <li>11. Monitoring must be implemented during construction to ensure that minimal impact is caused to the fauna and flora of the area.</li> <li>12. Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance.</li> </ol>		
Rehabilitation	<ol style="list-style-type: none"> <li>1. All damaged areas must be rehabilitated upon completion of the contract.</li> <li>2. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.</li> <li>3. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction.</li> <li>4. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit.</li> <li>5. Rehabilitation must take place in a phased approach as soon as possible.</li> <li>6. Rehabilitation process must make use of species indigenous to the area.</li> <li>7. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.</li> </ol>	Construction phase	Environmental Liaison Officer/ Principal Contractor
Utilisation of resources	Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited.	Construction phase	Environmental Liaison Officer
Exotic/Alien vegetation	<ol style="list-style-type: none"> <li>1. Alien vegetation on the site must be controlled.</li> <li>2. The Contractor is responsible for implementing a programme of weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. This must include monitoring and eradication.</li> <li>3. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines.</li> </ol>	Construction phase	Environmental Liaison Officer/ Principal Contractor

	<p>The control of these species must begin prior to the construction phase considering that small populations of these species was observed during the field surveys, which can be coordinated between the ESO and the ECO.</p> <ol style="list-style-type: none"> <li>4. Institute strict control over materials brought onto site, which must be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Existing <i>Eucalyptus camaldulensis</i> trees must be eradicated.</li> <li>5. Rehabilitate disturbed areas outside the project development footprint as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.</li> <li>6. Implement the monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme must be implemented to ensure that the species' do not spread to surrounding natural ecosystems.</li> </ol>		
Herbicides	<ol style="list-style-type: none"> <li>1. Herbicide use must only be allowed according to contract specifications. The application must be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment must be properly investigated and only environmentally friendly herbicides must be used.</li> <li>2. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.</li> </ol>	Construction phase	Environmental Liaison Officer
Site specific mitigation measures for flora in terms of site clearing and preparation	<ol style="list-style-type: none"> <li>1. No development should be allowed in vegetation unit 1 (Seasonal Drainage Channel). The area should be fenced off prior to construction and zoned as a no-go area.</li> </ol>	Construction phase	Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>2. The entire area to be developed must be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area.</li> <li>3. To minimise the effect on the vegetation, insects, small mammals, and environment it is recommended that the construction be done within the winter period as far as possible, when most plants are dormant and animals less active.</li> <li>4. Where vegetation of areas not to be developed needs to be “opened” to gain access it is recommended that the herbaceous species are cut short rather than removing them.</li> <li>5. Vegetation clearance should be restricted to the approved development areas allowing remaining animals the opportunity to move away from the disturbance. The Environmental Control Officer (ECO) should recommend, and the ECO should monitor these areas.</li> <li>6. Any disturbed or eroded areas within the PV sites should be appropriately revegetated. Only indigenous (to the area) grass species are recommended.</li> <li>7. Storage of equipment, fuel and other materials should be limited to demarcated areas. They should be established at least 300 meters away from any no-go area or buffer zones previously mentioned.</li> <li>8. No animals should be intentionally killed or destroyed and poaching and hunting should not be permitted on the site.</li> <li>9. A Re-vegetation and Rehabilitation Manual should be prepared for the use of contractors, landscape architects and groundsmen to rehabilitate areas that became degraded due to construction activities.</li> <li>10. Alien invasive plants present within the various vegetation units must be removed and eradicated throughout all stages of the project.</li> <li>11. All stormwater and runoff generated by the development activities must be appropriately managed.</li> <li>12. Monitoring of all these activities must be done on a weekly basis by the ECO during the construction phase of the development to ensure that minimal impact is caused to the fauna and flora of the area. Any transgressing of rules must be reported to and by the ECO.</li> </ol>		
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<b>Fauna</b>			
Protection of fauna on site	<ol style="list-style-type: none"> <li>1. All temporary stockpile areas, litter and dumped material and rubble must be removed and disposed of at a licensed land fill facility. Proof of safe disposal must be obtained and kept on record for monitoring purposes.</li> <li>2. The careful position of soil piles, and runoff control, during all phases of development, and planting of some vegetative cover after completion (indigenous groundcover, grasses etc.) will limit the extent of erosion occurring on the site.</li> <li>3. Undeveloped areas that were degraded due to human activities must be rehabilitated using indigenous to the area vegetation.</li> <li>4. Hazardous chemicals must be stored on an impervious surface accompanied by Safety Data Sheets (SDS) and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom.</li> <li>5. Limit human activity in the no-development areas as well as the completed areas to the minimum required for ongoing operation.</li> <li>6. Any alien plant observed should be reported to the environmental manager and should be removed as soon as possible.</li> <li>7. Regular monitoring (monthly) for damage to the environment as well as establishment of alien plant species must be conducted.</li> </ol>	Construction phase	Environmental Control Officer
<b>Avifauna</b>			
Displacement, disturbance, loss of avian habitats and species	<ol style="list-style-type: none"> <li>1. Limit the construction footprint and retain indigenous vegetation wherever possible.</li> <li>2. Limit access to the remainder of area, outside of the development footprint.</li> <li>3. Avoid undertaking construction in the breeding breeding season (summer).</li> <li>4. Lay-down areas must be placed only on disturbed zones.</li> <li>5. Construct in shortest timeframe possible.</li> <li>6. Control noise to minimum.</li> </ol>	Construction phase	Environmental Liaison Officer



Air Quality			
Dust control measures	<ol style="list-style-type: none"> <li>1. Wheel washing and damping down of un-surfaced and un-vegetated areas.</li> <li>2. Retention of vegetation where possible will reduce dust travel.</li> <li>3. Clearing activities must only be done during agreed working times and permitting weather conditions to avoid drifting of sand and dust into neighbouring areas.</li> <li>4. Damping down of all exposed soil surfaces with a water douser or sprinklers when necessary to reduce dust.</li> <li>5. The Contractor must be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities.</li> <li>6. Any complaints or claims emanating from the lack of dust control must be attended to immediately by the Contractor.</li> <li>7. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled.</li> <li>8. Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>9. A speed limit must be enforced on dirt roads (preferably 40km/h).</li> <li>10. Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.</li> </ol>	Construction phase	Environmental Liaison Officer
Odour control	<ol style="list-style-type: none"> <li>1. Regular servicing of vehicles in order to limit gaseous emissions.</li> <li>2. Regular servicing of onsite toilets to avoid potential odours.</li> </ol>	Pre-construction and construction	Environmental Liaison Officer
Rehabilitation	The Contractor must commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.	Pre-construction and construction	Environmental Liaison Officer
Fire prevention	<ol style="list-style-type: none"> <li>1. No open fires must be allowed on site under any circumstance.</li> </ol>	Pre-construction, construction and	Environmental

	<ol style="list-style-type: none"> <li>2. No firewood or kindling may be collected from the site or the surrounds, without explicit approval from the ECO.</li> <li>3. The Contractor must always have operational fire-fighting equipment available on site. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.</li> <li>4. All staff must be trained in firefighting and how to use the fire-fighting equipment.</li> <li>5. A firebreak must be implemented before the construction phase. The firebreak must be controlled and constructed around the perimeters of the site.</li> <li>6. Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly.</li> <li>7. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.</li> <li>8. The contractor must enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.</li> </ol>	operation	Liaison Officer
<b>Noise and Vibrations</b>			
Mitigation of noise and vibrations	<ol style="list-style-type: none"> <li>1. The construction phase must aim to adhere to the relevant noise regulations and limit noise generating activities to normal daylight working hours and avoid weekends and public holidays.</li> <li>2. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities must be located away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed into the system.</li> <li>3. Truck traffic must be routed away from noise sensitive areas, where possible.</li> <li>4. Noise levels must be kept within acceptable limits.</li> <li>5. Noisy operations must be combined so that they occur where possible at</li> </ol>	Pre-construction, construction and operation	Environmental Liaison Officer

	<p>the same time.</p> <ol style="list-style-type: none"> <li>6. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas must not be allowed.</li> <li>7. Construction workers to wear necessary ear protection gear.</li> <li>8. Noise from labourers must be controlled.</li> <li>9. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.</li> <li>10. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport.</li> <li>11. Applying regular and thorough maintenance schedules to equipment and processes must be undertaken. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine.</li> <li>12. The movement of heavy vehicles associated with the construction phase must be timed to avoid weekends, public holidays, and holiday periods where feasible.</li> <li>13. All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits.</li> <li>14. A CLO must be appointed, and a grievance mechanism implemented.</li> <li>15. The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible.</li> <li>16. Communication, complaints, and grievance channels must be implemented, and contact details of the CLO must be provided to the local community in the study area.</li> </ol>		
Site specific mitigation measures for	1. During construction care must be taken to ensure that noise from	Environmental	Environmental

noise and vibration	<p>construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles must be kept in good operating order and where appropriate have effective exhaust mufflers.</p> <p>2. Gravel roads used during construction must be kept in good order. Corrugations and drainage ruts must not be allowed to develop as these can contribute to mechanical rattling and banging noise on vehicles traversing these roads.</p>	Liaison Officer	Liaison Officer
<b>Energy Use</b>			
The use of energy and actions that need to be implemented during construction	<p>1. Energy saving lighting must be implemented across the board.</p> <p>2. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations.</p>	Construction phase	Environmental Liaison Officer
<b>Employment</b>			
Labour	<p>1. The use of labour intensive construction measures must be implemented where appropriate.</p> <p>2. Where feasible, training and skills development programmes must be initiated prior to the commencement of the construction phase.</p> <p>3. No informal vending stations must be allowed on or near the construction site.</p> <p>4. DPT Hennenman (Pty) Ltd and the contractor(s) must, in consultation with representatives from the contractor, develop a code of conduct for the construction phase. The code must identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code must be dismissed. All dismissals must comply with the South African labour legislation.</p> <p>5. A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) must be created and companies listed thereon must be invited to bid for project-related work</p>	Construction phase	Principal Contractor

	<p>where applicable.</p> <ol style="list-style-type: none"> <li>6. The project would contribute to an upgrade in the shared infrastructure of the Matjhabeng Local Municipality as well as in the maintenance of this infrastructure. The Matjhabeng Local Municipality would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved.</li> <li>7. A local employment policy must be adopted to maximise opportunities made available to the local labour force.</li> <li>8. Labour must be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the Matjhabeng Local Municipality, Free State Province, South Africa, or elsewhere.</li> <li>9. Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and products from local suppliers where feasible.</li> </ol>		
Effective communication	<p>Before construction commences, representatives from the local municipality, community leaders, community-based organisations, and the surrounding landowners, must be informed of the details of the contractors, size of the workforce and construction schedules.</p>	Pre-construction phase	Developer
Recruitment plan	<ol style="list-style-type: none"> <li>1. Recruitment must comply with national employment and labour laws.</li> <li>2. Where reasonable and practical, DPT Hennenman (Pty) Ltd's service providers must appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories.</li> <li>3. The Project Manager must ensure that all staff working on the proposed project is in possession of a South African Identity Card or a relevant work permit.</li> <li>4. Ensure adequate advertising in the project community areas, local papers for skilled labour.</li> <li>5. Local community leaders must be utilised to source labour.</li> </ol>	Construction phase	Principal Contractor

	<ol style="list-style-type: none"> <li>6. The recruitment process must be equitable and transparent. A concerted effort must be made to guard against nepotism and/or any form of favouritism during the process.</li> <li>7. The recruitment of skilled labour must follow standard advertising process in national newspapers and interview-based selection.</li> <li>8. Record of official complaints by employees to authorities i.e. Labour and Social Security.</li> <li>9. As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria must be used. The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.</li> <li>10. Establish and maintain a healthy worker-management relationship.</li> <li>11. Suppliers must as far as possible be sourced locally.</li> </ol>		
Enhancement of opportunities for businesses and service providers	<ol style="list-style-type: none"> <li>1. A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) must be created and companies listed thereon must be invited to bid for project related work where applicable.</li> <li>2. Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.</li> </ol>	Construction phase	Principal Contractor
<b>Occupational Health and Safety</b>			
Work safety	<ol style="list-style-type: none"> <li>1. All staff must undergo a general health and safety induction and simplified environmental awareness training.</li> <li>2. Implementation of safety measures, work procedures and first aid must be implemented on site.</li> <li>3. Workers must be thoroughly trained in using potentially dangerous equipment.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>4. Contractors must ensure that all equipment is maintained in a safe operating condition.</li> <li>5. A safety officer must be appointed.</li> <li>6. A record of health and safety incidents must be kept on site.</li> <li>7. Any health and safety incidents must be reported to the Project Manager immediately.</li> <li>8. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures.</li> <li>9. Workers have the right to refuse work in unsafe conditions.</li> <li>10. The Contractor must take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc.</li> <li>11. A record must be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against DPT Hennenman (Pty) Ltd or the Contractor.</li> <li>12. The Contractor must ensure that all construction workers are well educated about HIV/AIDS and the risks surrounding this disease. The location of the local clinic where more information and counselling is offered must be indicated to workers.</li> <li>13. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers/local residents.</li> <li>14. The contractor must provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site.</li> <li>15. Where necessary, the contractors must make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks.</li> </ol>		
Work facilities	Eating areas must be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Construction phase	Principal Contractor and Environmental Liaison Officer

<p>Management of construction site and construction workers</p>	<ol style="list-style-type: none"> <li>1. All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.</li> <li>2. The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified in the EIA Report. The location of this construction equipment camp/s must be approved by the project Environmental Liaison Officer.</li> <li>3. Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak.</li> <li>4. Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area if it will not be used as part of the operational plant.</li> <li>5. Ensure waste storage facilities are maintained and emptied on a regular basis.</li> <li>6. 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>7. 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.</li> <li>8. Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly, and associated waste disposed of at a registered/permited waste disposal site. Ablutions must be removed from site when construction is completed.</li> <li>9. 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.</li> <li>10. A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.</li> <li>11. Workers must be aware of the importance of not polluting rivers or</li> </ol>	<p>Construction phase</p>	<p>Principal Contractor and Environmental Liaison Officer</p>
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	<p>wetlands (especially those located outside of the site) and the significance of not undertaking activities that could result in such pollution, and this awareness must be promoted throughout the construction phase.</p> <p>12. Contractors 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>13. On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.</p>		
Hazardous substances	The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified in the EIA Report. The location of this construction equipment camp/s must be approved by the project EO.	Construction phase	Principal Contractor and Environmental Liaison Officer
Machine and equipment	As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Construction phase	Principal Contractor and Environmental Liaison Officer
Construction equipment safety	All equipment used for construction, including drills, TLB's must be in good working order with up-to-date maintenance records.	Construction phase	Principal Contractor and Environmental Liaison Officer
Procedure in the event of a petrochemical spill	<ol style="list-style-type: none"> <li>1. A spill kit needs to be kept on site to address any unforeseen spillages.</li> <li>2. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO.</li> <li>3. The problem must be assessed, and the necessary actions required must be undertaken.</li> <li>4. The immediate response must be to contain the spill.</li> <li>5. The source of the spill must be identified, controlled, treated or removed wherever possible.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer
Fire management	<ol style="list-style-type: none"> <li>1. All construction staff must be trained in fire hazard control and firefighting techniques.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>2. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances.</li> <li>3. Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced.</li> <li>4. No open fires must be allowed on site.</li> <li>5. Smoking may only be conducted in demarcated areas.</li> <li>6. Road borders must be regularly maintained to ensure that vegetation remain short to serve as an effective firebreak.</li> <li>7. A firebreak must be implemented before the construction phase. The firebreak must be controlled and implemented around the perimeters of the project site.</li> <li>8. Adequate fire-fighting equipment must be provided and readily available on site and all staff must be trained in firefighting and how to use the fire-fighting equipment.</li> <li>9. Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly.</li> <li>10. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.</li> </ol>		
Safety of surrounding residents	<p>All I&amp;AP's must be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are:</p> <ul style="list-style-type: none"> <li>• Blasting</li> <li>• Risk to residence along haulage roads/access routes</li> </ul> <p>On-going communication with the affected and surrounding landowners is important to be maintained during the construction and operational phases of the solar energy facility. Any issues and concerns raised must be addressed as far as possible in as short a timeframe as possible.</p>	Construction and operational phase	Principal Contractor and Environmental Liaison Officer
Emergency evacuation plan	<ol style="list-style-type: none"> <li>1. Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding</li> </ol>	Construction phase	Principal Contractor and Environmental

	<p>land users in the case of an emergency.</p> <p>2. All permanent staff must undergo safety training.</p>		Liaison Officer
Maintenance	The development and surrounding areas are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Construction phase	Principal Contractor and Environmental Liaison Officer
<b>Security</b>			
Security actions that need to be implemented during construction	<ol style="list-style-type: none"> <li>1. A security company must be employed to guard the construction site and monitor access. This company must also be utilised for the operation phase. Implement appropriate security procedures to ensure that workers do not remain onsite after working hours.</li> <li>2. The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the sites. The fencing of the sites should be maintained throughout the construction period.</li> <li>3. The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.</li> <li>4. Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site must be prohibited. Any persons found to be engaged in such activities must receive disciplinary or criminal action taken against them. No alcohol/ drugs to be present on site.</li> <li>5. Construction workers must be easily identifiable by wearing uniforms and identification tags/induction cards.</li> <li>6. No firearms are allowed on site or in vehicles transporting staff to / from site (unless used by security personnel).</li> <li>7. Trespassing on private/ commercial properties adjoining the site is forbidden.</li> <li>8. Driving under the influence of alcohol is prohibited.</li> <li>9. All employees must undergo the necessary safety training and wear the necessary protective clothing.</li> <li>10. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>11. Working hours must be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.</li> <li>12. Provide transportation for workers to prevent loitering within or near the project site outside of working hours.</li> <li>13. Access in and out of the construction site must be strictly controlled by a security company appointed to the project.</li> <li>14. A community liaison officer (CLO) must be appointed as a grievance mechanism. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.</li> <li>15. The EPC Contractor must implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security.</li> <li>16. The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.</li> <li>17. The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.</li> </ol>		
<b>Social Environment</b>			
<p>Social environment actions that need to be implemented during construction</p>	<ol style="list-style-type: none"> <li>1. All contact with the affected parties must be courteous at all times. The rights of the affected parties must be respected at all times.</li> <li>2. A complaints register must be kept on site. Details of complaints must be incorporated into the audits as part of the monitoring process. This must be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor.</li> <li>3. Damage to infrastructure must not be tolerated and any damage must be rectified immediately by the Contractor. A record of all damage and remedial actions must be kept on site.</li> <li>4. All existing private access roads used for construction purposes, must be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits must be enforced in such areas and all drivers must be sensitised to this effect.</li> <li>5. Care must be taken not to damage irrigation equipment, power and</li> </ol>	<p>Construction phase</p>	<p>Principal Contractor and Environmental Liaison Officer</p>

	<p>telephone lines, channels and areas under crop production.</p> <ol style="list-style-type: none"> <li>6. DPT Hennenman (Pty) Ltd must hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers.</li> <li>7. Contractors appointed by DPT Hennenman (Pty) Ltd 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.</li> <li>8. All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. Heavy vehicles must be inspected regularly to ensure their road worthiness.</li> <li>9. Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the R700 regional road and gravel farm roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.</li> <li>10. Implement penalties for reckless driving to enforce compliance to traffic rules.</li> <li>11. Avoid heavy vehicle activity during “peak” hours (when children are taken to school, or people are driving to work).</li> <li>12. The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.</li> <li>13. The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.</li> <li>14. The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase.</li> <li>15. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any</li> </ol>		
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	complaints or grievances with the construction process.		
Influx of people	<ol style="list-style-type: none"> <li>1. Ensure that employment procedures/policies are communicated to local stakeholders, especially community representative organisations and ward councillors.</li> <li>2. Have clear rules and regulations for access to the construction site to control loitering.</li> <li>3. Develop and implement a local procurement policy which prioritises “locals first” to prevent the movement of people into the area in search of work.</li> <li>4. Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.</li> <li>5. Provide transportation for workers (from Theunissen and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site.</li> <li>6. Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.</li> <li>7. Prevent the recruitment of workers at the project site.</li> <li>8. Establish clear rules and regulations for access to the proposed site.</li> <li>9. Inform local community organisations and policing forums of construction times and the duration of the construction phase.</li> <li>10. Establish procedures for the control and removal of loiterers from the construction site.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer
Change to municipal infrastructure	<ol style="list-style-type: none"> <li>1. Where possible, construction workers must be housed within the local community to reduce the possible additional strain on local resources.</li> <li>2. Contractors to supply and install infrastructure needed to access municipal services, e.g., water and sewerage pipelines. On site, sufficient portable services must be available (e.g., portable toilet facilities) and serviced regularly to prevent contamination.</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer
Integration with local communities	<ol style="list-style-type: none"> <li>1. Local women must be empowered. This could be achieved by employing</li> </ol>	Construction phase	Principal Contractor

	<p>them to work on the project, which in turn would decrease their (financial) vulnerability.</p> <ol style="list-style-type: none"> <li>2. Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers.</li> <li>3. Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues.</li> </ol>		and Environmental Liaison Officer
Potential loss of productive farmland	<ol style="list-style-type: none"> <li>1. Livestock grazing on the proposed site need to be relocated.</li> <li>2. The proposed site needs to be fenced off prior to the construction phase and all construction related activities must be confined in this fenced off area.</li> <li>3. All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and must be continuously monitored by the ECO.</li> <li>4. Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.</li> </ol>	Construction phase	Principal Contractor
<b>Heritage</b>			
Mitigation of the impact that the new development may have on potential archaeological features or finds on the site	<ol style="list-style-type: none"> <li>1. The contractors and workers must be notified that archaeological sites might be exposed during the construction activities.</li> <li>2. Should significant archaeological materials – such as well-preserved subsurface artefacts or fossils – be exposed during construction, the on-duty Environmental Control Officer should protect these (preferably in primary exposed context) and should immediately consult a professional archaeologist. In this circumstance, the South African Heritage Resources Authority should be immediately alerted so that appropriate mitigation measures by a professional archaeologist can be implemented, at the expense of the developer. In such a scenario, mitigation measures would normally involve the application for an excavation permit and the digital documentation of the occurrences with modern archaeological recording</li> </ol>	Construction phase	Principal Contractor and Environmental Liaison Officer

	<p>standards, as well as the collection of a reflective sample of material to be deposited in a local approved curation facility.</p> <ol style="list-style-type: none"> <li>3. All discoveries must be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken.</li> <li>4. Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site other than by the ECO under the instructions of a qualified heritage specialists as per the protocols required by NHRA.</li> <li>5. Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological, or palaeontological artefacts, as set out in the NHRA, Section 51(1).</li> <li>6. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Sityhilelo Ngcatsha/Phillip Hine 021 462 5402) must be alerted immediately as per section 35(3) of the NHRA to determine an appropriate way forward. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule.</li> <li>7. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqalabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule.</li> <li>8. The following conditions apply with regards to the appointment of specialists: i) If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2</li> </ol>		
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	rescue operation may be required subject to permits issued by SAHRA..		
Palaeontology	<ol style="list-style-type: none"> <li>1. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Section 13 of the Palaeontological Impact Assessment, Appendix D6) must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out by a palaeontologist.</li> <li>2. Recording and sampling of significant new fossil finds must be undertaken by a professional palaeontologist.</li> </ol>	Construction phase	Principal Contractor, Environmental Liaison Officer & Environmental Control Officer
<b>Community Engagement</b>			
Community engagement	<ol style="list-style-type: none"> <li>1. A communication guideline to be drafted and agreed upon with authority representatives and affected communities.</li> <li>2. Open and transparent community engagement to be followed as culturally appropriate.</li> <li>3. Records (written) to be kept of all community engagements (e.g. complaints, resolutions, etc)</li> </ol>	Construction phase	Environmental Liaison Officer
<b>Visual Impact</b>			
Visual issues and actions that need to be implemented during the construction phase	<ol style="list-style-type: none"> <li>1. Ensure that vegetation is not unnecessarily removed during the construction phase.</li> <li>2. Retain and maintain natural vegetation immediately adjacent to the development footprint.</li> <li>3. Vegetation cover (i.e., either natural or cultivated) immediately adjacent to the development footprint must be maintained.</li> <li>4. Reduce the construction period through careful logistical planning and productive implementation of resources.</li> </ol>	Construction phase	Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>5. Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.</li> <li>6. Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site.</li> <li>7. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.</li> <li>8. Dust suppression must be implemented during construction especially near roads where dust may cause reduced visibility. Due to a scarcity of water in the region, contractors must source alternative ways to implement dust suppression. One such way could be the use of fine gravel stone on roads with heavy traffic.</li> <li>9. Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.</li> <li>10. Any additional external lighting of the facility must be limited.</li> <li>11. Existing roads must be utilised wherever possible. New roads must be planned to take due cognisance of the topography to limit cut and fill requirements. The construction/upgrade of roads must be undertaken properly, with adequate drainage structures in place to minimise the risk of erosion.</li> <li>12. Implement good housekeeping through the removal of rubble, litter and construction material, if it is not removed daily to a registered landfill site, then it must be stored appropriately until removal can take place.</li> <li>13. Rehabilitate cleared areas as soon as possible.</li> <li>14. Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility by a lighting engineer. The correct specification and placement of lighting and light fixtures for the PV plant and the ancillary infrastructure will go far to contain rather than spread the light. Mitigation measures include: <ul style="list-style-type: none"> <li>• Shielding the sources of light by physical barriers (walls, vegetation, or structures.)</li> <li>• Limiting mounting heights of lighting fixtures, or alternatively using footlights or bollard level lights.</li> </ul> </li> </ol>		
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	<ul style="list-style-type: none"> <li>• Making use of minimum lumen or wattage lights.</li> <li>• Making use of downlighters, or shielded fixtures.</li> <li>• Making use of low-pressure sodium lighting or other types of low impact lighting.</li> <li>• Making use of motion detectors for security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.</li> </ul> <p>15. Limit construction activities between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting.</p> <p>16. Reduce and control dust during construction by utilising dust suppression measures.</p> <p>17. Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works within an area.</p> <p>18. Fires and fire hazards need to be managed appropriately.</p> <p>19. Screening must be implemented by erection of the security fence, and by retaining existing and establishing additional vegetation. The growth of vegetation will improve screening into the operational phase.</p>		
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**Table 2-5:** Proposed Mitigation Measures during the Operational Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING OPERATION (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
<b>Construction Site Decommissioning</b>			
Removal of equipment	<ol style="list-style-type: none"> <li>1. All structures comprising the construction camp are to be removed from site.</li> <li>2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc., and these must be cleaned up.</li> <li>3. All hardened surfaces within the construction camp area must be ripped, all imported materials removed, and the area must be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document.</li> </ol>	When beneficiaries take occupation at the commencement of operation	Principal Contractor. Developer, Environmental Control Officer and Environmental Liaison Officer
Temporary services	<ol style="list-style-type: none"> <li>1. The Contractor must arrange the cancellation of all temporary services.</li> <li>2. Temporary roads must be closed and access across these, blocked.</li> <li>3. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO.</li> </ol>	When beneficiaries take occupation at the commencement of operation	Principal Contractor. Developer, Environmental Control Officer and Environmental Liaison Officer
Associated infrastructure	<ol style="list-style-type: none"> <li>1. Surfaces are to be checked for waste products from activities such as concreting or asphaltting and cleared in a manner approved by the Engineer.</li> <li>2. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed.</li> <li>3. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited.</li> <li>4. The site is to be cleared of all litter.</li> </ol>	When beneficiaries take occupation at the commencement of operation	Principal Contractor. Developer, Environmental Control Officer and Environmental Liaison Officer

	<ol style="list-style-type: none"> <li>5. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer.</li> <li>6. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer.</li> <li>7. All leftover building materials must be returned to the depot or removed from the site.</li> <li>8. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor stormwater management.</li> </ol>		
Rehabilitation plan	Rehabilitate and re-vegetate cleared areas with indigenous plant species.	When beneficiaries take occupation at the commencement of operation	Principal Contractor. Developer, ECO and Environmental Liaison Officer
<b>Operation and Maintenance</b>			
Maintenance	<ol style="list-style-type: none"> <li>1. All applicable standards, legislation, policies and procedures must be adhered to during operation.</li> <li>2. Regular ground inspection of the power plant must take place to monitor their status.</li> <li>3. Regular inspection of Battery Management System including the inert fire system.</li> </ol>	Operational phase	Developer
Replacement of solar panels as part of the maintenance process	<p>Should panels be required to be replaced, the following will apply:</p> <ol style="list-style-type: none"> <li>1. Materials and panels are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas must occur.</li> <li>2. Full clean-up of all materials must be undertaken after the removal and replacement of the solar panel arrays and associated infrastructure is</li> </ol>	Operational phase	Developer

	<p>complete, and disturbed areas appropriately rehabilitated.</p> <ol style="list-style-type: none"> <li>3. Most of the materials used for solar panel systems can be recycled. The majority of the glass and semiconductor materials can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site.</li> <li>4. Waste material which cannot be recycled must be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.</li> </ol>		
Public awareness	The emergency preparedness plan must be ready for implementation always should an emergency situation arise.	Operational phase	Developer
<b>Soil Erosion and Geology</b>			
Soil erosion and compaction	<ol style="list-style-type: none"> <li>1. Avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads.</li> <li>2. Facilitate re-vegetation of denuded areas throughout the site.</li> <li>3. Undertake a periodic (bi-annual) site inspection to record the progress of all areas that require re-vegetation.</li> <li>4. Cover disturbed soils as completely as possible, using vegetation or other materials, during maintenance activities.</li> <li>5. Minimize the amount of land disturbance and implement stringent erosion and dust control practices. Implement dust suppression as needed.</li> <li>6. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the site.</li> <li>7. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>8. Gravel roads associated with the development must be well drained to limit soil erosion.</li> <li>9. Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> </ol>	Operational phase	Developer

	<ol style="list-style-type: none"> <li>10. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from maintenance and operation activities within and adjacent to site.</li> <li>11. Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion.</li> <li>12. Erosion control mechanisms must be established as soon as possible.</li> <li>13. If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted.</li> <li>14. Continuously monitor erosion and compaction on site.</li> <li>15. Vehicle traffic must not be allowed on the rehabilitated areas, except on allocated roads, due to adverse impacts of dispersive/compaction characteristics of soils and its implications on the long term.</li> <li>16. Perform scheduled maintenance to be prepared for storm events. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can block structures.</li> <li>17. Maintain the stormwater run-off control system. Monitor erosion and remedy the stormwater control system in the event of any erosion occurring.</li> <li>18. Facilitate re-vegetation of denuded areas throughout the site.</li> <li>19. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil must first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</li> </ol>		
<b>Surface and Groundwater</b>			
Stormwater	<ol style="list-style-type: none"> <li>1. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working.</li> </ol>	Operational phase	Developer

Monitoring and reporting	<p>Specific activities that must be monitored include:</p> <ul style="list-style-type: none"> <li>• Erosion potential (specifically in and around roads and stormwater discharge points).</li> <li>• Stormwater management and design</li> <li>• Identified problem areas</li> </ul>	Operational phase	Developer
Site specific mitigation measures for surface water	<ol style="list-style-type: none"> <li>1. The release of stormwater must be designed such that the force of the water is reduced to prevent unnecessary erosion.</li> <li>2. No dumping of waste should take place within the channel area. If any spills occur, they should be cleaned up immediately.</li> <li>3. Remove all substances which can result in groundwater (or surface water) pollution.</li> </ol>	Operational phase	Developer
Site specific mitigation measures for groundwater	<ol style="list-style-type: none"> <li>1. Inventories must be made of all substances that are potentially hazardous to groundwater, which will be stored, used or transported over the site.</li> <li>2. All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of must be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater.</li> </ol>	Operational phase	Developer
<b>Biodiversity (Fauna and Flora)</b>			
Vegetation	<ol style="list-style-type: none"> <li>1. Indigenous vegetation must be maintained, and all alien species removed as they appear and disposed of appropriately.</li> <li>2. Vegetative re-establishment must, as far as possible, make use of indigenous or locally occurring plant varieties.</li> <li>3. Continued monitoring and eradication of alien invasive plant species must be undertaken.</li> <li>4. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.</li> <li>5. Storage of equipment, fuel and other materials must be limited to</li> </ol>	Operational phase	Developer



	<p>demarcated areas.</p> <ol style="list-style-type: none"> <li>6. Maintenance activities must remain within defined areas. No disturbance must occur outside these areas.</li> <li>7. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation.</li> </ol>		
Other fauna	<ol style="list-style-type: none"> <li>1. No faunal species must be harmed by maintenance staff during any routine maintenance at the development.</li> <li>2. Poisons for the control of problem animals must be avoided since the wrong use thereof can have disastrous consequences for avifauna. The use of poisons for the control of rats, mice or other vermin must only be used after approval from an ecologist.</li> </ol>	Operational phase	Developer
Site specific mitigation measures	<ol style="list-style-type: none"> <li>1. All temporary stockpile areas, litter and dumped material and rubble must be removed and discarded in an environmentally friendly way.</li> <li>2. Undeveloped areas that were degraded due to human activities must be rehabilitated with indigenous vegetation.</li> <li>3. Hazardous chemicals must be stored on an impervious surface and protected from the elements. These chemicals must be strictly controlled, and records kept of when it was used and by whom.</li> <li>4. Palisade fencing with adequate gaps (&gt;15cm) is recommended for the conserved private open space around the seasonally inundated seepage wetlands and seasonal stream on the site.</li> <li>5. During the post-construction phase, artificial lighting must be restricted to security areas and not directed towards the conserved areas (Seasonal Drainage Channel) in order to minimize the potential negative effects of the lights on the natural nocturnal activities.</li> <li>6. Regular monitoring must be undertaken to determine and degradation of the vegetation and or animal habitat.</li> </ol>	Operational phase	Developer
<b>Avifauna</b>			

<p>Displacement, disturbance, loss of avifauna and nesting on site</p>	<ol style="list-style-type: none"> <li>1. All areas outside of disturbance footprint are No Go areas.</li> <li>2. Demarcate the disturbance footprint, and minimise disturbance to this footprint as much as practically possible</li> <li>3. Identified breeding sites must be clearly indicated on a map of the site(s) and all staff must be made aware of these areas. Any additional mitigation measures recommended by the avifaunal specialist must be implemented (where relevant).</li> <li>4. Breeding sites of SCC must be left intact and undisturbed (where relevant).</li> <li>5. Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist.</li> <li>6. Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction.</li> <li>7. Minimise outdoor lighting needed to operate the facility to the maximum extent practicable.</li> <li>8. Minimise perching opportunities within the facility by installing anti-perching devices, netting or other deterrents wherever possible</li> <li>9. All fencing must be of a single-fence design to avoid avian species getting trapped between double-fencing.</li> <li>10. All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning.</li> <li>11. No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.</li> <li>12. Limit ongoing human activity to the minimum required for ongoing operation.</li> <li>13. Control noise to minimum.</li> <li>14. Rehabilitate with indigenous vegetation.</li> <li>15. Limit roadways and vehicle speeds.</li> </ol>	<p>Operational phase</p>	<p>Developer</p>
<p>Collisions with panels and electrocution</p>	<ol style="list-style-type: none"> <li>1. Make the sites unattractive to avifauna, i.e. by minimising any available perching and nesting structures, closing open water bodies, reducing</li> </ol>	<p>Operational phase</p>	<p>Developer</p>

	<p>attractive or disorientating lighting, and by implementing an operational monitoring programme with carcass searching.</p> <ol style="list-style-type: none"> <li>2. The perimeter and internal fencing should consist of a single-fence design, and be in line with the Birdlife SA guideline on Fences &amp; Birds.</li> <li>3. Operational phase monitoring of mortalities should be undertaken in line with current Best Practice Guidelines and if unacceptably high levels of mortalities are recorded, adaptive mitigation measures such as deterrent devices may need to be considered.</li> <li>4. Implement bird-friendly design i.e., creating separation between conductors of differing electric potential, by placing insulation over conductors, or by redirecting birds to perch or nest away from conductors.</li> <li>5. Panels to be flat at night, preferably low sheen/matt surfaces, quarterly fatality monitoring.</li> </ol>		
<b>Waste Management</b>			
Recycling and waste management	<ol style="list-style-type: none"> <li>1. The site must be kept clear of litter at all times.</li> <li>2. Solid waste separation and recycling must take place for the duration of the operational phase for the development.</li> <li>3. All waste must be removed promptly to ensure that it does not attract vermin or produce odours.</li> <li>4. In house treatment procedures must be followed strictly.</li> <li>5. Solid waste must be collected on a regular basis and disposed of at the closest municipal landfill site.</li> <li>6. No waste may be burned or buried on site or disposed of by any other method on site.</li> <li>7. Any excess or waste material or chemicals must be removed from the site and discarded in an environmentally friendly way.</li> <li>8. Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.</li> <li>9. Spill kits must be on-hand to deal with spills immediately.</li> <li>10. All vehicles must be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site must make provision for drip trays that will be used to capture any spills. Drip trays must be emptied into a</li> </ol>	Operational phase	Developer

	<p>holding tank and returned to the supplier.</p> <ol style="list-style-type: none"> <li>11. Broken or old batteries or components of the PV facility must be stored in a demarcated area in quarantine for the shortest period possible until it can be collected and taken to a special chemical waste facility.</li> <li>12. Once the batteries become obsolescent, either due to the facility decommissioning or the batteries reaching their useful design life and require replacement, the used batteries will be broken down and recycled as far as possible and unrecoverable wastes disposed of through appropriate channels.</li> <li>13. Ensure that all hazardous storage containers and storage areas comply with the relevant SABS standards to prevent leakage. Regularly inspect all vehicles for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil.</li> <li>14. No dumping of waste must take place within the surrounding wetlands or their buffer zones (32m). If any spills occur, they must be cleaned up immediately.</li> <li>15. Contain all dirty water in the dirty water system and contain all dirty stormwater up to a 1:50 year flood line as a minimum. Ensure that all activities impacting on groundwater resources of the subject property are managed according to the relevant DWS Licensing regulations and groundwater monitoring and management requirements.</li> <li>16. Appropriate sanitary facilities must be provided for the duration of the proposed development and all waste removed to an appropriate waste facility.</li> <li>17. Excess waste or chemicals must be removed from site and discarded in an environmentally friendly way.</li> <li>18. Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off.</li> <li>19. Spill kits must be on-hand to deal with spills immediately.</li> <li>20. All vehicles must be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site must make provision for drip trays to capture spills. Drip trays must be emptied into a holding tank and returned to the supplier.</li> </ol>		
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	<p>21. Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) and chemical dust suppressants of access roads, and ensure that these are continuously monitored to ensure effective implementation.</p> <p>22. A speed limit (preferably 40 km/hour) must be enforced on dirt roads.</p>		
<b>Health and Safety</b>			
Emergency evacuation plan	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.	Operational phase	Developer
Maintenance	The PV facility is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Operational phase	Developer
Fire safety	Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company.	Operational phase	Developer
Storage and handling of hazardous waste, hazardous substances and dangerous goods	<ol style="list-style-type: none"> <li>1. Transformer oil containers must be regularly maintained to ensure that leaks do not occur.</li> <li>2. Transport of all hazardous substances must be in accordance with the relevant legislation.</li> <li>3. The bund wall surrounding the transformer oil containers must be regularly maintained to ensure that any spills are completely contained.</li> <li>4. Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.</li> <li>5. Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.</li> <li>6. Develop and adhere to a procedure for the safe handling of battery cells</li> </ol>	Operational phase	Developer

	<p>during the undertaking of maintenance activities.</p> <ol style="list-style-type: none"> <li>7. Ensure that service providers dispose of used batteries properly by requesting and retaining receipts for disposal/refurbishment.</li> <li>8. Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary.</li> <li>9. Emergency response arrangements and systems, such as foam pourers, firefighting systems and cooperation with emergency responders must be implemented. Preventive measures could include maintenance procedures to prevent the occurrence of loss of containment, as well as strict control of ignition sources and other measures which may be required according to standards such as those prescribed by the South African National Standards System.</li> </ol>		
<b>Risks associated with the BESS</b>			
<p>Gas release with subsequent fire and explosion</p>	<ol style="list-style-type: none"> <li>1. The battery management system (BMS) is essential to the safety and performance of the entire ESS system: it has a controlling and monitoring function, hence its specifications and functions need to be checked, tested and validated. Controlling and monitoring the state of charge (SoC) of the battery cell through its parameters (current, voltage, temperature) during charging and discharging is a critical function based on which functional safety for fault protection is designed.</li> <li>2. In order to ensure normal operation, optimum power output and service life, the system will require cooling at high temperatures and heating in cold weather.</li> <li>3. The BESS must be located away from critical buildings or equipment. Where spatial separation is not possible, provide exterior protection such as a passive thermal barrier, or active fire protection such as drenchers. An appropriate distance must be maintained between containers to safeguard against propagation.</li> <li>4. Install battery and battery management systems/electrical switch gear in separate rooms.</li> <li>5. Put battery and battery management systems/electrical switch gear in</li> </ol>	<p>Operational phase</p>	<p>Developer</p>

	<p>separate rooms, with fire resistive construction (two-hour fire rated) to adequately cut-off the room from surrounding exposures.</p> <ol style="list-style-type: none"> <li>6. Provide signage on site specifying how electrical and chemical fires must be dealt with by first responders, and the potential risks to first responders (e.g. toxic fumes). Provide suitable firefighting equipment on site.</li> <li>7. Provide fire-rated compartmentation and adequate separation between battery units.</li> <li>8. Provide adequate fire doors that are maintained in the closed position and equipped with automatic closure mechanisms. Where insulated metal panels (IMPs) are used, these must contain a mineral wool core and be installed in accordance with the terms of their approval. Only non-combustible IMPs must be installed.</li> <li>9. Ensure proper management of cable/service penetrations. Cable penetrations must be adequately sealed to meet the fire resistance of the compartment (two-hour fire resistance rating). Heating, ventilation and air conditioning ducts must have fire dampers provided that automatically close on activation of the fire alarm. Establish a permit to access system to manage changes to service or cable penetrations under an audited system.</li> <li>10. Extensive monitoring of the battery states such as voltage, temperature, current etc. as well as redundant monitoring and control in terms of a fail-safe battery-management-system (BMS) is crucial for a safe operation of BESS. Maintenance and inspection schedules must be set up. The BMS, the inverter control unit and the BESS supervisory control and data acquisition (SCADA) system must closely monitor the BESS. If one of these fails, the BESS needs to be shut down.</li> <li>11. Automatic fire detection must be in place, with early warning smoke detection or very early warning highly sensitive smoke detection. The system design must include continuous remote monitoring.</li> <li>12. Consider automatic fire sprinklers and water mist for active fire protection.</li> <li>13. Operators are trained and competent to operate the BESS. Training should include the discussion of the following:</li> </ol>		
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	<ol style="list-style-type: none"> <li>14. Potential impact of electrolyte spills on groundwater;</li> <li>15. Suitable disposal of waste and effluent;</li> <li>16. Key measures in the EMPr relevant to worker's activities;</li> <li>17. How incidents and suggestions for improvement can be reported.</li> <li>18. Training records should be kept on file and be made available during audits.</li> <li>19. Battery supplier user manuals safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times.</li> <li>20. Compile method statements for approval by the Technical/SHEQ Manager for the operation and management and replacement of the battery units / electrolyte for the duration of the project life cycle. Method statements should be kept on site at all times.</li> <li>21. Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Signage should also specify how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. the inhalation of toxic fumes, etc.).</li> <li>22. Firefighting equipment should readily be available at the BESS area and within the site.</li> <li>23. Maintain strict access control to the BESS area.</li> <li>24. Ensure all maintenance contractors / staff are familiar with the supplier's specifications.</li> <li>25. Undertake daily risk assessment prior to the commencement of daily tasks at the BESS. This should consider any aspects which could result in fire or spillage, and appropriate actions should be taken to prevent these.</li> <li>26. Standard Operating Procedures (SOPs) should be made available by the Supplier to ensure that the batteries are handled in accordance with required best practices.</li> <li>27. Spill kits must be made available to address any incidents associated with the flow of chemicals from the batteries into the surrounding environment.</li> <li>28. The assembly of the batteries on-site should be avoided as far as possible. Activities on-site for the BESS should only be limited to the placement of</li> </ol>		
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	<p>the container wherein the batteries are placed.</p> <p>29. Undertake periodic inspections on the BESS to ensure issues are identified timeously and addressed with the supplier where relevant.</p> <p>30. The applicant in consultation with the supplier must compile and implement a Leak and Detection Monitoring Programme during the project life cycle of the BESS.</p> <p>31. Batteries must be strictly maintained by the supplier or suitably qualified persons for the duration of the project life cycle. No unauthorised personnel should be allowed to maintain the BESS.</p> <p>32. Damaged and used batteries must be removed from site by the supplier or any other suitably qualified professional for recycling or appropriate disposal.</p> <p>33. The applicant should obtain a cradle to grave battery management plan from the supplier during the planning and design phase of the system. The plan must be kept on site and adhered to.</p> <p>34. To ensure that BESS remain at an acceptable risk level, owners and operators of both permanent or portable BESS must follow design standards and best practices, regularly maintain the system's equipment (as well as safety systems and related equipment), train personnel, and communicate with local emergency responders on the storage system's hazards.</p>		
<p>Appropriate operation and maintenance of the battery energy storage system (BESS)</p>	<ol style="list-style-type: none"> <li>1. Compile (and adhere to) a procedure for the safe handling of the battery cells.</li> <li>2. Ensure that battery supplier user guides, safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times.</li> <li>3. Operate, maintain and monitor the BESS as per the supplier specifications.</li> <li>4. Compile method statements for approval by the Technical/SHEQ Manager for battery cell, electrolyte and battery cell / container replacement. Maintain the method statements on site.</li> <li>5. Ensure that all maintenance contractors / staff are familiar with the supplier's specifications.</li> <li>6. Provide signage on site specifying the types of batteries in use and the risk</li> </ol>	<p>Operational phase</p>	<p>Developer</p>

	<p>of exposure to hazardous material and electric shock.</p> <ol style="list-style-type: none"> <li>7. Maintain strict access control to the battery storage area.</li> <li>8. Undertake regular visual checks of the BESS equipment to identify signs of damage or leaks.</li> <li>9. Provide environmental awareness training to all personnel on site. Training must include a discussion of: <ul style="list-style-type: none"> <li>• Potential impact of electrolyte spills on groundwater;</li> <li>• Suitable disposal of waste and effluent; and</li> <li>• How incidents and suggestions for improvement can be reported.</li> </ul> </li> </ol>		
<b>Visual Impact</b>			
Maintenance and lighting	<ol style="list-style-type: none"> <li>1. Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint.</li> <li>2. Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient.</li> <li>3. Screening can be established near sensitive receptors, upon request, rather than to mitigate the impact at the source.</li> <li>4. Maintenance and good housekeeping of the plant must be undertaken.</li> <li>5. Maintain general appearance of the facility as a whole.</li> <li>6. Lighting must be kept to a minimum and restricted as follows: <ul style="list-style-type: none"> <li>• Shield the source of light by physical barriers (walls, vegetation etc.)</li> <li>• Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights.</li> <li>• Make use of minimum lumen or wattage in fixtures.</li> <li>• Make use of down-lighters, or shield fixtures.</li> <li>• Make use of low-pressure sodium lighting or other types of low impact lighting.</li> <li>• Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.</li> <li>• The use of night vision or thermal security cameras are very effective</li> </ul> </li> </ol>	Operational phase	Developer

	<p>and can replace security lighting entirely.</p> <ol style="list-style-type: none"> <li>7. Security lighting must make use of down-lights to minimise light spill, and motion detectors where possible so that lighting at night is minimised.</li> <li>8. Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility by a lighting engineer.</li> <li>9. Where sensitive visual receptors are likely to be affected (e.g., residents of homesteads in close proximity to the power plant), it is recommended that the developer enter into negotiations with property owners regarding the potential screening of visual impacts at the receptor site. This may entail the planting of vegetation or trees. Visual screening has been found to be most effective when placed at the receptor itself.</li> <li>10. Similar screening (e.g., vegetation barriers or vegetation berms) may be considered along boundaries of the power plant that is adjacent to roads, mitigating the potential visual impact on observers travelling along the road.</li> <li>11. Rehabilitated areas must be monitored for rehabilitation failure and remedial action must be implemented as and when required.</li> <li>12. Roads must be maintained to eliminate erosion and suppress dust.</li> <li>13. Create a “Green Energy” awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy.</li> <li>14. Regular maintenance of exteriors and associated infrastructure must be undertaken. Maintain general appearance of the facility as a whole.</li> </ol>		
<b>Employment</b>			
Labour	Training of labourers to benefit individuals beyond completion of the project.	Operational phase	Developer
Recruitment plan	<ol style="list-style-type: none"> <li>1. Recruitment must comply with national employment and labour laws.</li> <li>2. The Project Manager must ensure that all staff working on the proposed project are in possession of a South African Identity Card or a relevant work permit.</li> <li>3. Ensure adequate advertising in the project community areas, local papers for skilled labour.</li> </ol>	Operational phase	Developer

	<ol style="list-style-type: none"> <li>4. Local community leaders must be utilised to source labour.</li> <li>5. The recruitment process must be equitable and transparent. A concerted effort will be made to guard against nepotism and/or any form of favouritism during the process.</li> <li>6. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection.</li> <li>7. Record of official complaints by employees to authorities i.e. Labour and Social Security.</li> <li>8. Where feasible, efforts must be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria.</li> <li>9. The recruitment selection process must seek to promote gender equality and the employment of women wherever possible.</li> <li>10. Establish, maintain a healthy worker-management relationship.</li> <li>11. It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community.</li> <li>12. Vocational training programs must be established to promote the development of skills.</li> </ol>		
Grievance mechanism	<ol style="list-style-type: none"> <li>1. A grievance mechanism as part of the management system must be established.</li> <li>2. The grievance procedure does not replace normal manager-employee dialogue, but is another open form of communication.</li> <li>3. The procedure must assist employees to resolve grievance situations quickly and effectively in order to restore harmonious working conditions for all employees.</li> <li>4. Management is responsible for listening and responding to all employee concerns raised through this procedure.</li> <li>5. In all cases, matters will be dealt with in as confidential a manner as possible.</li> </ol>	Construction and operational phase	Developer
<b>Social Environment</b>			

Corporate social investment	<ol style="list-style-type: none"> <li>1. Consult with the community to determine their needs. Following a top-down approach without community consultation can result in irrelevant interventions that are disregarded by the community.</li> <li>2. A Community Needs Analysis must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful.</li> <li>3. Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused.</li> <li>4. The programmes must be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).</li> </ol>	Operational phase	Developer
Sense of place and tourism	<ol style="list-style-type: none"> <li>1. Job opportunities must be afforded to local individuals as far as possible to enhance their sense of place.</li> <li>2. Tourists visiting the area must be made aware of South Africa's movement towards renewable energy. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which must be open to school fieldtrips, the local community, and tourists.</li> </ol>	Operational phase	Developer
<b>Heritage Resources</b>			
Mitigation of the impact that the new development may have on potential archaeological artifacts and fossils on the site	<ol style="list-style-type: none"> <li>1. The contractors and workers must be notified that archaeological sites might be exposed during maintenance activities.</li> <li>2. Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, must cease immediately and the Environmental Control Officer (ECO) must be notified as soon as possible.</li> <li>3. All discoveries must be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the operations manager will advise the necessary actions to be taken.</li> </ol>	Operational phase	Developer

	<ol style="list-style-type: none"><li>4. Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site.</li><li>5. Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).</li><li>6. If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol (Section 13 of the Palaeontological Impact Assessment, Appendix D6) must be implemented by the ECO/site manager in charge of these developments. These discoveries ought to be protected (if possible, in situ) and the ECO/site manager must report to SAHRA (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: <a href="http://www.sahra.org.za">www.sahra.org.za</a>) so that mitigation (recording and collection) can be carry out by a palaeontologist.</li></ol>		
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**Table 2-6:** Proposed Mitigation Measures during the Decommissioning Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING DECOMMISSIONING (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	Timeframe	Responsibility
<b>Ongoing Stakeholder involvement</b>			
General	<ol style="list-style-type: none"> <li>1. Closure must be planned from inception through adequate social planning and infrastructure development that can be maintained by the communities after closure and opportunities to redirect skills must be sought.</li> <li>2. Community to be notified, as culturally appropriate, timeously of the planned decommissioning.</li> <li>3. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: <ul style="list-style-type: none"> <li>• What activities will take place during the decommissioning phase.</li> <li>• How these activities will impact upon the communities and/or their properties.</li> <li>• Regarding the timeframes of scheduled activities.</li> </ul> </li> <li>4. Regular interaction between DPT Hennenman (Pty) Ltd and community leader(s) during the decommissioning phase must be undertaken.</li> <li>5. A reporting office/channel to be established should community members experience problems with contractors/sub-contractors during the decommissioning phase.</li> <li>6. A register to be kept of problems reported by community members and the steps taken to address/ resolve it.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
<b>Community Health and Safety Responsibility</b>			
Community health and safety responsibility	<ol style="list-style-type: none"> <li>1. Demarcated routes to be established for vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes.</li> <li>2. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd

	<p>3. Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.</p>		
<b>General site considerations</b>			
<p>General site decommissioning considerations</p>	<ol style="list-style-type: none"> <li>1. All temporary fencing and danger tape must be removed once the construction phase has been completed.</li> <li>2. All hardened surfaces within the construction camp area must be diced, all imported materials removed, and the area must be top soiled and re-vegetated.</li> <li>3. Temporary roads (if any) must be closed and access across these blocked.</li> <li>4. The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these must be cleaned up.</li> <li>5. No staff must be accommodated on the site. If practical, construction (decommissioning) workers must stay in one of the nearby towns/villages and transported daily to the site.</li> <li>6. Educate construction (decommissioning) workers regarding risks and correct disposal of cigarettes.</li> <li>7. A speed limit must be enforced (preferably 40 km/hour).</li> <li>8. Travelling at night must be avoided or limited as much as possible.</li> <li>9. Implement an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.</li> <li>10. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li> <li>11. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must</li> </ol>	<p>Following completion of construction activities in an area: decommissioning phase</p>	<p>Principal Contractor and DPT Hennenman (Pty) Ltd</p>



	12. A method statement must be developed to guide the safe decommissioning of Battery storage which will consider appointment of accredited battery recyclers.		
<b>Waste Management</b>			
Waste management	<ol style="list-style-type: none"> <li>1. All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept.</li> <li>2. The panels need to be disposed of appropriately and returned to the manufacturer to be recycled.</li> <li>3. Rubble or waste that could accompany the construction effort, if the development is approved, must be removed during and after construction. Measures must be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil.</li> <li>4. The applicant must ensure that the final disposal site can accept the waste and the anticipated volumes thereof. Any hazardous waste must be disposed of at a hazardous waste disposal site.</li> <li>5. Any excess or waste material or chemicals must be removed from the site and discarded in an environmentally friendly way.</li> <li>6. Hazardous chemicals to be stored on an impervious surface protected from rainfall and stormwater run-off.</li> <li>7. Spill kits must be on-hand to deal with spills immediately.</li> <li>8. All vehicles must be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site must make provision for drip trays that will be used to capture any spills. Drip trays must be emptied into a holding tank and returned to the supplier.</li> <li>9. After decommissioning all materials must be disposed of in a responsible manner.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
<b>Surface and Groundwater Responsibility</b>			
Surface and groundwater responsibility	<ol style="list-style-type: none"> <li>1. Removal of any historically contaminated soil as hazardous waste.</li> <li>2. Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd

	<ol style="list-style-type: none"> <li>3. Removal of all substances which can result in groundwater (or surface water) contamination.</li> <li>4. Re-vegetation of exposed soil surfaces must be undertaken to ensure no erosion in these areas.</li> <li>5. Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.</li> <li>6. Compaction of soils must be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish must be cleared and follow-up undertaken. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area).</li> <li>7. If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted.</li> <li>8. Reseed any areas where earthworks have taken place with indigenous vegetation to prevent further erosion.</li> <li>9. Erosion control mechanisms must be established as soon as possible.</li> <li>10. Vehicle traffic must not be allowed on the rehabilitated areas, except on allocated roads. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term.</li> <li>11. Perform scheduled maintenance to be prepared for storm events. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures.</li> <li>12. After decommissioning all materials have to be disposed of in a responsible manner.</li> <li>13. After decommissioning, the site has to be rehabilitated by sowing indigenous grass species. The control and monitoring of declared invaders must continue after decommissioning.</li> </ol>		
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<b>Biodiversity Responsibility</b>			
<p>Loss of habitat, including the spread of alien invasive species and disturbance</p>	<ol style="list-style-type: none"> <li>1. Maintain footprint strictly during decommissioning.</li> <li>2. Existing access roads must be used.</li> <li>3. All infrastructure must be removed from the site.</li> <li>4. Re-vegetation of affected areas must be made a priority to avoid erosion. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.</li> <li>5. Suitable stormwater/wind controls must be put in place until rehabilitation is complete.</li> <li>6. Peripheral impacts around the development footprint, on the surrounding vegetation of the area, must be avoided, the rehabilitation of the site must be prioritised after the decommissioning phase. Indigenous vegetation species that are present in this area must be sown.</li> <li>7. Poisons for the control of problem animals must be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin must only be used after approval from an ecologist.</li> <li>8. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.</li> <li>9. Monitoring must be implemented during the decommissioning phase to ensure that minimal impact is caused to the fauna and flora of the area.</li> <li>10. Constant removal of alien invasive species in and around the plant must be undertaken.</li> <li>11. 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.</li> <li>12. After decommissioning, the site has to be rehabilitated by sowing indigenous species. The control and monitoring of declared invaders have to continue after decommissioning and until appropriately rehabilitated.</li> <li>13. Use existing facilities (e.g., impacted areas) to the extent possible to</li> </ol>	<p>Decommissioning phase</p>	<p>DPT Hennenman (Pty) Ltd</p>

	<p>minimise the amount of new disturbance.</p> <ol style="list-style-type: none"> <li>14. Disturbance in the surrounding drainage channel must be avoided.</li> <li>15. Decommissioning activities must remain within defined areas. No disturbance must occur outside these areas.</li> <li>16. Control of alien invasive species involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA (Conservation of Agricultural Resources Act) or in terms of Working for Water guidelines.</li> <li>17. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.</li> <li>18. Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds.</li> <li>19. Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss.</li> <li>20. All areas outside of disturbance footprint are No Go areas.</li> <li>21. Breeding sites of SCC must be left intact and undisturbed (where relevant).</li> <li>22. Breeding sites of SCC are to be clearly demarcated with construction tape as per the instruction of the avifaunal specialist.</li> <li>23. Should any SCC be found breeding within the site boundary at any point during operation of the facility, the area must be cordoned off as far as practically possible, and an avifaunal specialist must be contacted within 7 days for further instruction.</li> <li>24. Minimise outdoor lighting needed.</li> <li>25. All water reservoirs and open water must be covered with netting or mesh to avoid birds drowning.</li> <li>26. No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.</li> <li>27. After decommissioning, infrastructure must be removed and disposed of in a responsible manner and the site has to be rehabilitated with</li> </ol>		
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	indigenous species.		
Negative effect on avifauna including disturbance and habitat loss	<ol style="list-style-type: none"> <li>1. No staff should be accommodated on the site (except security). If practical, construction workers must stay in one of the nearby towns and transported daily to the site.</li> <li>2. The ECO must regularly inspect the site, including storage facilities and compounds and eradicate any invasive plants and animals.</li> <li>3. Maintain proper firebreaks around the entire development footprint.</li> <li>4. Educate construction workers regarding risks and correct disposal of cigarettes.</li> <li>5. A speed limit must be enforced (preferably 40 km/hour).</li> <li>6. Demarcate disturbance footprint during construction, to the minimum practically possible to minimise disturbance and habitat loss.</li> <li>7. Minimise outdoor lighting needed.</li> <li>8. No chemicals detrimental to the health of animal species are to be used for the cleaning of the PV panels.</li> <li>9. Retain as much of the indigenous vegetation as possible.</li> <li>10. Keep vegetation clearing to the minimum practically possible to minimise habitat loss.</li> <li>11. Indigenous vegetation which does not interfere must be left undisturbed.</li> <li>12. Travelling at night must be avoided or limited as much as possible.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
Edge effect	<ol style="list-style-type: none"> <li>1. The Contractor must be responsible for implementing a programme of weed control.</li> <li>2. Present invasive plant species must be eradicated at the site.</li> <li>3. By no means must any declared invaders, be planted or allowed to establish if the development is approved.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
Erosion and loss of topsoil	<ol style="list-style-type: none"> <li>1. Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.</li> <li>2. Undertake a periodic site inspection to record the occurrence of and re-</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd

	<p>vegetation progress of all areas that require re-vegetation.</p> <ol style="list-style-type: none"> <li>3. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil must first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.</li> <li>4. Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.</li> <li>5. Minimize the amount of land disturbance and implement stringent erosion and dust control practices.</li> <li>6. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction (decommissioning) camp and Work Areas.</li> <li>7. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.</li> <li>8. Control the flow of runoff to move the water safely off the site without destructive gully formation.</li> <li>9. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction (decommissioning) camp and Work Areas.</li> </ol>		
<b>Air Pollution Responsibility</b>			
Air pollution responsibility	<ol style="list-style-type: none"> <li>1. Regular maintenance of equipment to ensure reduced exhaust emissions.</li> <li>2. A speed limit must be enforced on dirt roads (preferably 40km/h).</li> <li>3. Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
<b>Noise and Vibrations</b>			

Noise and vibrations	<ol style="list-style-type: none"> <li>1. The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development.</li> <li>2. Any noisy fixed facilities must be located away from noise sensitive areas.</li> <li>3. Truck traffic must be routed away from noise sensitive areas, where possible.</li> <li>4. Noise levels must be kept within acceptable limits.</li> <li>5. Noisy operations must be combined so that they occur where possible at the same time.</li> <li>6. Workers to wear necessary ear protection gear.</li> <li>7. Noisy activities to take place during allocated hours.</li> <li>8. Noise from labourers must be controlled.</li> <li>9. Noise suppression measures must be applied to all construction equipment. Equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.</li> <li>10. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport.</li> <li>11. Applying regular and thorough maintenance schedules to equipment and processes.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
Site specific mitigation measures	<ol style="list-style-type: none"> <li>1. During decommissioning care must be taken to ensure that noise from vehicles and plant equipment does not intrude on the surrounding residential areas.</li> <li>2. Gravel roads used must be kept in good order. Corrugations and drainage ruts must not be allowed to develop.</li> </ol>	Decommissioning phase	DPT Hennenman Solar (Pty) Ltd
<b>Decommissioning Traffic</b>			

Decommissioning traffic	<ol style="list-style-type: none"> <li>1. Routes and required access roads must be clearly defined.</li> <li>2. The removal of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities.</li> <li>3. Access of all vehicles must be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure.</li> <li>4. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance.</li> <li>5. Vehicles and equipment must be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc.</li> <li>6. Servicing must be done in dedicated service areas on site or else off site if no such area exists.</li> <li>7. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution.</li> <li>8. Dust suppression of internal gravel roads and the access road.</li> <li>9. Component delivery to/ removal from the sites can be staggered and trips can be scheduled to occur outside of peak traffic periods.</li> <li>10. The use of mobile batching plants and quarries near the sites would decrease the impact on the surrounding road network, if available and feasible.</li> <li>11. Staff and general trips should occur outside of peak traffic periods.</li> <li>12. Design and maintenance of the internal gravel roads and maintenance of the access road.</li> <li>13. Soils compacted by construction vehicles must be deep ripped to loosen compacted layers and re-graded to even running levels.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
Access	<ol style="list-style-type: none"> <li>1. The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-contractors.</li> <li>2. Contractor must clearly mark all access roads. Roads not to be used must be marked with a "NO ENTRY for construction vehicles" sign.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd



Noise	Movement of heavy vehicles through residential areas must be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas must not take place over weekends.	Decommissioning phase	DPT Hennenman (Pty) Ltd
General	<ol style="list-style-type: none"> <li>1. The Contractor must meet safety requirements under all circumstances. All equipment transported must be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used must be in place.</li> <li>2. The Contractor must ensure that all the necessary precautions against damage to the environment and injury to persons are taken.</li> <li>3. Care for the safety and security of community members crossing access roads must receive priority at all times.</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd
<b>Visual Impact</b>			
Visual impact	<ol style="list-style-type: none"> <li>1. Ensure that vegetation is not unnecessarily cleared or removed during the construction period.</li> <li>2. Reduce the decommissioning period through careful logistical planning and productive implementation of resources.</li> <li>3. Plan the placement of lay-down areas and potential temporary construction camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible.</li> <li>4. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.</li> <li>5. Implement good housekeeping through the removal of rubble, litter and construction material, if it is not removed daily to a registered landfill site, then it must be stored appropriately until removal can take place.</li> <li>6. Dust suppression must be implemented especially near roads where dust may cause reduced visibility. Due to a scarcity of water in the region, contractors must source alternative ways to implement dust suppression. One such way could be the use of fine gravel stone on roads with heavy</li> </ol>	Decommissioning phase	DPT Hennenman (Pty) Ltd

	<p>traffic.</p> <ol style="list-style-type: none"><li>7. Restrict activities to daylight hours in order to negate or reduce the visual impact associated with lighting.</li><li>8. Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of decommissioning activities.</li></ol>		
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**Table 2-7:** Proposed Mitigation Measures during the Post Closure Phase

<b>POTENTIAL ENVIRONMENTAL IMPACT DURING POST CLOSURE (NATURE OF THE IMPACT)</b>	<b>RECOMMENDED MITIGATION MEASURES</b>		
	<b>Management and mitigation measures</b>	<b>Timeframe</b>	<b>Responsibility</b>
<p>Due to the permanent nature of the proposed development, it is unlikely that closure will be implemented. No impacts are therefore anticipated for the post closure phase of the proposed development.</p>			

### 3 ENVIRONMENTAL AWARENESS PLAN

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The successful implementation of the conditions of the EMPr and EA is dependent on the adequate distribution of the requirements of the said conditions to all stakeholder associated with the proposed 20MW Solar Facility near Hennenman. An Environmental Awareness Plan must be commissioned by the Developer prior to commencement of pre-construction activities, to familiarise all the members of the Project Management Team and their respective employees with the conditions of the EMPr and EA.

The implementation of the Environmental Awareness Plan must include the following:

- Compilation of summaries of the conditions of the EMPr and EA;
- Distribution of summaries and full documents to members of the Project Management Team;
- Induction of all employees (the SHE Representative must induct all construction workers) and visitors prior to commencement of site clearing and construction activities making them aware of:
  - Legal obligations as per NEMA, EMPr and EA;
  - Roles and responsibilities;
  - Mitigation measures applicable to their functions on site; and
  - Potential penalties for non-compliance.

The Environmental Awareness Plan must take into account the preferred language of the employees on site and must be presented in a language that they will understand.

## 4 AUDITING

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The key to the successful implementation of the EMPr is appropriate monitoring and review to ensure effective functioning of the EMPr and to identify and implement corrective measures in a timely manner. In the event where discrepancies are identified, the problem must be investigated and attended to. All the results obtained during environmental monitoring must be documented for audit purposes.

An audit of the environmental monitoring and management actions undertaken is essential to ensure that it is effective in operation, is meeting specified goals, and performs in accordance with relevant regulations and standards. Audits must be conducted during the construction phase of the facility to ensure compliance with the management measures contained in the EMPr. The construction audit schedule is as follows:

- Monthly internal audits by the SHE representative / ECO;
- One post-construction audit by an independent external auditor;
- Annual internal audits for the first five years of the operational phase; and
- Audits every five years of the overall compliance to the EA and EMPr conditions and recommendations for amendments for the remainder of the life of the 20MW Solar Facility.

The audits will incorporate the monthly reports submitted by the SHE Representative. The frequency of the operational phase audits may be increased should the findings of the audits find that the conditions of the EMPr and EA are not being complied with.

## 5 EMPr AMENDMENT

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Amendments to the EMPr may be required as the project proceeds. The EMPr must be reviewed annually during the operational phase and any proposed amendments to the EMPr, as may be specified in the audit reports, must be confirmed with the Developer prior to being issued as a formal amendment application to DFFE. Copies of the amendments will be issued to all registered I&APs, where relevant.

# Appendices

# **Appendix A: CV of the EAP**



## CURRICULUM VITAE OF LISA DE LANGE (OPPERMAN)

Mobile +27 (0)84 920 3111 | Email: lisa@environamics.co.za

### Professional Profile

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An enthusiastic, dynamic and adaptable environmental consultant with 7 years of experience in the field of environmental management with a specific focus on renewable and non-renewable developments. Expertise lies in the professional undertaking of environmental legislative processes required for projects within the energy and large-scale infrastructure sectors in South Africa, as well as the undertaking of financial close tasks for these projects including permitting and amendments to Environmental Authorisations. Demonstrates strong skills in qualitative research methodologies including environmental impact assessments, problem solving, project management and the interpretation and manipulation of spatial data through the use of ArcGIS. Possesses excellent interpersonal, communication, facilitation and negotiation skills and the ability to develop positive relationships with internal and external stakeholders, including affected communities and authorities, as well as clients and specialists. Has the proven ability to produce professional reports and is attentive to detail. Has a practical approach to problem solving and the organisation skills required to ensure that deadlines, budgets and project deliverables are achieved. Proficient in managing professional time and productivity independently in a consulting environment. Enjoys being part of and adding value to a team and excels in pressurised and challenging working environments.

### Core Competencies

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Project Management	Networking and Relationship Building Overall project management Time management including deadlines, project progress and specialist deliverables Management of a junior EAP
Environmental Impact Assessments (including full Scoping and EIAs and Basic Assessments – including Basic Assessment processes within the Renewable Energy Development Zones (REDZ) and the Strategic Transmission Corridors)	Specialist management with an understanding of the reporting requirements needed for projects within the energy sector  Public participation (including stakeholder engagement and consultation, key stakeholder focus group meetings and public meetings)  Solving of issues raised by I&As related to concerns on energy projects  Advising of suitability of development within areas to be avoided  Understanding of different impacts and challenges associated with different renewable and non-renewable energy technologies

Social Impact Assessments	<p>Compilation of Social Impact Assessments for large scale renewable energy developments, including wind and solar</p> <p>Undertaking social interviews and face-to-face consultations</p> <p>Data gathering for social plans for major SoEs.</p>
Geographic Information Systems (GIS)	<p>Spatial data analysis</p> <p>Data manipulation</p> <p>Data interpretation</p> <p>Data sourcing</p> <p>Mapping of facility layouts, including wind and solar developments</p> <p>Mapping of environmental sensitivities and understanding of specialist datasets</p>
Public Participation, Stakeholder Engagement and Stakeholder Management	<p>Conducting of Public Participation Processes</p> <p>Excellent verbal and written communication</p> <p>Public speaking and presentation skills</p> <p>Providing responses to difficult queries during meetings</p> <p>Conflict management</p>
Environmental Legislation	<p>Compliance with the requirements of the EIA Regulations and other environmental legislation</p>
Environmental Screening and fatal flaw identification (environmental pre-feasibility)	<p>Desktop identification of potential project related issues (including environmental and social)</p> <p>Mapping of site-specific features</p> <p>Provision of limitations and challenges for development at a pre-feasibility phase</p> <p>Interpretation and analysis of findings</p>
Permitting and auditing	<p>Flora permits</p> <p>EMPr updates</p> <p>Section 54 audits</p>

I have been involved in highly controversial renewable and non-renewable energy projects which required intense consultation with both I&APs, Organs of State, NGOs and NPOs (such as BirdLife South Africa (specifically for the development of wind farms) and Ground Works), as well as problem solving in terms of environmental concerns and challenges.

## **Career Summary**

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**Feb. 2015 – Apr 2021**

**SAVANNAH ENVIRONMENTAL (PTY) LTD**  
**Environmental Assessment Practitioner and GIS**

**Consultant**

- Provision of consulting and advisory services in terms of environmental impact assessment processes within the environmental assessment and management context for projects in the energy, and large-scale infrastructure sectors.
- Consulting and advisory services are provided to public and private sector clients, including national and provincial government departments, international development agencies and funding institutions involved in infrastructure development in South Africa.
- Compilation of Environmental Impact Assessments and Basic Assessment, as well as pre-feasibility studies with a main focus on renewable and non-renewable energy developments.
- Compilation of maps using ArcGIS 10.2, including the composition of spatial data.
- Compilation of Social Impact Assessments for large-scale infrastructure projects.
- Supports management in business development through client networking, sourcing of new projects, compiling project proposals and tenders.

**Apr. 2021 – Current**  
**CONSULTANTS (PTY) LTD**

**ENVIRONAMICS ENVIRONMENTAL**

**Senior Environmental Assessment Practitioner**

- Provision of consulting and advisory services in terms of environmental impact assessment processes within the environmental assessment and management context for projects in the energy, and large-scale infrastructure sectors.
- Consulting and advisory services are provided to public and private sector clients, including national and provincial government departments, international development agencies and funding institutions involved in infrastructure development in South Africa.
- Compilation of Environmental Impact Assessments and Basic Assessment, as well as pre-feasibility studies with a main focus on renewable and non-renewable energy developments.
- Supports management in business development through client networking, sourcing of new projects, compiling project proposals and tenders.
- Management of junior EAPs

## **Education and Qualifications**

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**2014** B.Sc. (Hons) Environmental Management and Geography  
North-West University, Potchefstroom, South Africa

**2011 – 2013** BA. Psychology, Geography and Environmental Studies  
North-West University, Potchefstroom,  
South Africa

## **Professional Development and Registrations**

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**2017** Environmental Legal Compliance and Auditing, Janice  
Tooley at the Protea Hotel OR Tambo, Johannesburg

**2022** Registered as a Professional Environmental Assessment  
Practitioner with EAPASA

# Appendix B: Bird incident form

Bird Incident Form	
PV facility name:	
Observer name:	
Date:	Time:
The incident:	Type:
	Likely cause:
The animal:	Species:
	Age class:
	Sex:
	Condition of remains:
Location:	GPS:
	Nearest PV hardware:
Remarks:	
Photos:	

## APPENDIX C: ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. DESIGN PHASE</b>					
1. Potential impacts resulting from the lack of overall compliance with the conditions of the EA (issued by the DEA).	Prevent non-compliance with the conditions of the EA.	1.1. Audit the implementation of the EMPr requirements.	Audit report on compliance with actions and monitoring requirements.	• Weekly	• Project Developer
		1.2. Establish clear and transparent reporting of the activities undertaken with regard to all recommendations included in the EMPr.	Audit report on compliance with actions and monitoring requirements.	• Weekly	• Project Developer
<b>B. CONSTRUCTION PHASE</b>					
2. Potential risk of fire due to construction activities or behaviour of staff on site during the construction phase.	Prevent fire on site resulting of workers smoking or starting fires (i.e. cooking, heating purposes).	1.1. Designate smoking areas, as well as areas for cooking, where the fire hazard could be regarded as insignificant.	Ad-hoc checks to ensure workers are smoking or cooking in designated areas only.	• Daily	• ECO & Contractor
		1.2. Educate workers on the dangers of open and/or unattended fires.	Ensure fire safety requirements are well understood and respected by construction personnel. Carry out Environmental Awareness Training. Conduct audits of the signed attendance registers.	• On-going • Once-off training and ensure that all new staff are inducted • Monthly	• ECO & Contractor • ECO/ Contractor • ECO
		1.3. Open fires must be prohibited. Appropriate fire safety training must also be provided to staff that are to be on the site for the duration of the construction phase.	Ensure fire safety requirements are well understood and respected by construction personnel. Provide basic fire safety training.	• On-going	• ECO & Contractor
		1.4. Ensure that cooking takes place in a designated area shown on the site map. Ensure that no firewood or kindling may be gathered from the site or surrounds.	Check compliance with specified conditions using a report card and allocate fines when necessary.	• On-going	• ECO & Contractor
		1.5. Fire-fighting equipment must be made available at various appropriate locations on the construction site.	Ensure fire safety requirements are well understood and respected by workers.	• On-going • Bi-annually	• ECO & Contractors • Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
			Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.		
3. Inappropriate behaviour of civil contractors and sub-contractors during the construction phase.	Prevent unnecessary impacts on the surrounding environment by ensuring that contractors are aware of the requirements of the EMPr.	3.1. Ensure that the EMPr and the EA (should it be granted), are included in all tender documentation and contractors and sub-contractor's contracts.	Check compliance with specified conditions using a report card and allocate fines when necessary.	On-going	ECO & Contractor
		3.2. Contractors and sub-contractors must use the ablution facilities situated in a designated area within the site; and no bathing/washing must be permitted outside the designated area.	Check compliance with specified conditions using a report card and allocate fines when necessary.	On-going	ECO & Contractor
	3.3. All litter will be deposited in a clearly labelled, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	Check compliance with specified conditions using a report card and allocate fines when necessary.	On-going	ECO & Contractor	
	3.4. No person other than qualified specialist or personnel authorised by the Project Developer, will disturb or remove plants outside the demarcated construction area.	Check compliance with specified conditions using a report card and allocate fines when necessary.	On-going	ECO & Contractor	
	3.5. No person other than qualified specialist or personnel authorised by the Project Developer, will disturb animals on the site.	Check compliance with specified conditions using a report card and allocate fines when necessary.	On-going	ECO & Contractor	
	3.6. Educate workers on site about suitable behaviour on site and initiate environmental awareness. Staff must be informed that no trapping, snaring or feeding of any animal will be allowed.	Carry out Environmental Awareness Training.  Conduct audits of the signed attendance registers	Once-off training and ensure that all new staff are inducted.  Monthly	Contractor/ ECO  ECO	
	Ensure that contractors and sub-contractors do not induce impacts on the surrounding environment as a result of unplanned pollution on site.				
	Ensure that actions by on-site contractors and sub-contractors and workers are properly managed in order to minimise impacts to surrounding environment.				

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
4. Inappropriate planning and of site camp establishment.	Ensure that environmental issues are taken into consideration in the planning for site establishment.	4.1. All construction activities, materials, equipment and personnel must be restricted to the actual construction area specified (as required to undertake the construction work). The construction area must be demarcated by the Contractor.	Monitor compliance and record non-compliance and incidents.	Before construction	ECO
		4.2. The Contractor must install and maintain Construction Site Information Boards in the position, quantity, design, and dimensions specified by the Project Developer.	Monitor compliance and record non-compliance and incidents.	Before construction	ECO
		4.3. General building materials must be stored in appropriate designated areas on site such that there will be no runoff from these areas towards sensitive systems. The site camp must be removed after construction.	Monitor compliance and record non-compliance and incidents.	Before construction	ECO
5. Increased animal road mortality.	Reduction in animal mortality.	5.1. The construction staff must be made aware of the presence of fauna and within the proposed project area. The construction personnel and staff must also be made aware of the general speed limits on site and must be alert at all times for potential crossings and must be trained on how to react in these situations.	Carry out Environmental Awareness Training.  Conduct audits of the signed attendance registers.	Once-off training and ensure that all new staff are inducted.  Monthly	Contractor/ ECO  ECO
		5.2. To ensure that animals are not attracted to the site (and potentially resulting in increased road mortality), the waste collection bins and skips must be covered with suitable material, where appropriate, and the site camp must be kept clean on a daily basis.	Monitor the activities via visual inspections, and record and report any non-compliance.	Daily	Contractor & ECO
		5.3. Establish a monitoring programme to record the number of faunal road mortalities and collisions. If it is established that the number of collisions and faunal fatalities increase within an area, particularly with regards to smaller species (reptiles), then measures such as exclusion fences within these areas only must be installed.	Appropriate monitoring and recording must be undertaken.  Exclusion fences must be installed, if needed to direct animals to safe road crossings.	Weekly  As required	ECO  ECO & Contractor



Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring		
			Methodology	Frequency	Responsibility
6. Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	6.1. Encourage the use of energy saving equipment at the site camp site (such as low voltage lights and low-pressure taps) and promote recycling. Construction personnel must be made aware of energy conservation practices as part of the Environmental Awareness Training programme.	Contractor to monitor energy usage via audits. Carry out Environmental Awareness Training. Conduct audits of the signed attendance registers.	Monthly  Once-off training and ensure that all new staff are inducted.  Monthly	Contractor  Contractor/ ECO  ECO
7. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during the construction phase.	7.1. Water conservation must be practiced as follows: <ul style="list-style-type: none"> <li>• Cleaning methods utilised for cleaning vehicles, floors, etc. must aim to minimise water use (e.g., sweep before wash-down).</li> <li>• Ensure that regular audits of water systems are conducted to identify possible water leakages.</li> </ul> 7.2. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible.	Monitor via site audits and record non-compliance and incidents.	Monthly	ECO
		7.3. Make construction personnel aware of the importance of limiting water wastage, as well as reducing water use.	Carry out Environmental Awareness Training with a discussion on water usage and conservation.  Conduct audits of the signed attendance registers.	Once-off training and ensure that all new staff are inducted.  Monthly	Contractor/ ECO  ECO
Impact	Mitigation/Management	Mitigation/Management	Monitoring		

	Objectives	Actions	Methodology	Frequency	Responsibility
<b>C. OPERATIONAL PHASE</b>					
8. Potential risk of fire due to behaviour of staff on site during the operational phase.	Ensure appropriate and efficient fire prevention during the operational phase.	8.1. Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.	Random inspections during a month to ensure workers are smoking or starting fires in designated areas only.	Monthly	Facility Manager
		8.2. Educate workers on the dangers of open and/or unattended fires.	Ensure fire safety requirements are well understood and respected by operational personnel.	On-going	Facility Manager
			Carry out Environmental Awareness Training.	Once-off training and ensure that all new staff are inducted.	Facility Manager
			Conduct audits of the signed attendance registers.	Monthly	Facility Manager
8.3. Open fires must be prohibited. Appropriate fire safety training must also be provided to staff that are to be on the site for the duration of the operational phase.	Ensure fire safety requirements are well understood and respected by operational personnel. Provide basic fire safety training.	On-going	Project Developer		
8.4. Ensure that adequate fire-fighting equipment is available and easily accessible on site.	Ensure fire safety requirements are well understood and respected by workers.  Assurance of functionality of fire extinguishers via inspections and certification by an accredited fire service company.	On-going  Bi-annually	Facility Manager  Project Developer		
9. Increased energy consumption during the operational phase.	Reduce energy consumption where possible.	9.1. Encourage the use of energy saving equipment at the PV facility (such as low voltage lights and low-pressure taps) and promote recycling. Operational personnel must be made aware of energy conservation practices as part of the environmental awareness training programme.	Monitor energy usage via site investigations.  Conduct training for all operational personnel.	Monthly  As and when required and ensure that all new staff are inducted.	Facility Manager  Project Developer

10. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during operations.	10.1 Water conservation to be practiced in line with Energy Saving Policies as follows: 10.2 Cleaning methods utilised for cleaning vehicles, floors, the offices etc. must aim to minimise water use (e.g., sweep before wash-down). <ul style="list-style-type: none"> <li>• Where possible, encourage the re-use of water.</li> <li>• Ensure that regular audits of water systems are conducted to identify possible water leakages.</li> </ul> 10.3 Consider installing water saving devices (e.g., dual flush toilets, automatic shut-off taps, etc.).	Record water usage during the operational phase, conduct audits and record non-compliance and incidents.	Monthly	Facility Manager
		10.4 Carry out environmental awareness training with a discussion on water usage and conservation and make operational personnel aware of the importance of limiting water wastage.	Conduct training for all operational personnel.	As and when required during operations and ensure that all new staff are inducted.	Facility Manager
11. Non respect of waste management practices.	Minimise the production of general waste.  Ensure compliance with relevant waste management legislation.  Minimise pollution of the environment.	11.1 Control and implement waste management plans. Ensure that relevant legislative requirements are respected. 11.2 Determine specific areas on site for temporary management of waste.	Control of waste management practices throughout operation phase.	Monthly	Facility Manager
		11.3 Promote waste reduction, re-use, and recycling opportunities on site during the operation phase. 11.4 Ensure an adequate and sustainable use of resources.	Monitor waste generation and collection throughout operation.	Monthly	Facility Manager
12. Excessive generation of wastewater on site during the operation phase.	Maintain reasonable levels of wastewater generation.	12.1 Wastewater must be collected and disposed of at a suitable licenced disposal facility. Proof of disposal (i.e., waste disposal slips or waybills) must be retained on file for auditing purposes.	Wastewater generation to be monitored throughout the operational phase.  Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	Quarterly	Facility Manager

#### **D. DECOMMISSIONING PHASE**

13. Ensure that the construction mitigation and management measures are adhered to during the decommissioning phase.

## APPENDIX D: ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. CONSTRUCTION PHASE</b>					
1. Impacts due to establishment of alien invasive plants.	Avoid establishment and spread of alien invasive plants due to the project activities.	1.1 Establish an ongoing monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	Prepare monitoring programme which will monitor the presence of alien invasive species on the site. If any alien invasive species are detected then the distribution of these must be mapped (GPS co- ordinates of plants or concentrations of plants), number of individuals (whole site), age and/or size classes of plants and aerial cover of plants. The results must be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	Once-off	ECO and Contractor
		1.2 Do not import soil stockpiles from areas with alien plants.	Monitor the presence of alien invasive species on the development site.	On-going	ECO and Contractor
		1.3 Rehabilitate disturbed areas as quickly as possible.	Rehabilitate disturbed areas and monitor the presence of alien invasive species on the development site.	On-going	ECO and Contractor
		1.4 Keep disturbance of indigenous vegetation to a minimum.	Monitor and manage vegetation clearing	On-going	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		1.5 Immediately control any alien plants that become established using registered control methods.	If any alien invasive species are detected then the distribution of these must be mapped (GPS co- ordinates of plants or concentrations of plants), number of individuals (whole site), age and/or size classes of plants and aerial cover of plants. The results must be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. Any alien invasive must be cleared from site.	On-going	ECO and Contractor
		1.6 Machinery/plant equipment used for construction must be cleaned prior to coming to site	Clean equipment prior to it coming on site.	On-going	ECO and Contractor
		1.7 The shallow topsoil layer must be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, the topsoil layers, which contain seed and vegetative material, must be reinstated last to allow plants to rapidly re-colonise the bare soil areas	Stockpile the topsoil layer (0.5m top layer of soil) separately and used on site following the construction phase.  Establish an effective record keeping system for each area where soil is disturbed for constructional purposes. These records must be included in environmental performance reports and must include all the records below: Record the GPS coordinates of each area.  Record the date of topsoil stripping.	Daily (stockpiling) and once-off for the reinstatement of the topsoil layer	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
			<p>Record the GPS coordinates of where the topsoil is stockpiled. Record the date of cessation of constructional (or operational) activities at the particular site. Photograph the area on cessation of constructional activities.</p> <p>Record date and depth of re-spreading of topsoil.</p> <p>Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.</p>		
<b>B. OPERATIONAL PHASE</b>					
5.2 Impacts due to establishment of alien invasive plants.	Avoid establishment and spread of alien invasive plants.	2.1 Continue with ongoing monitoring programme to detect and quantify any alien species that may become established and identify the problem species during operational phase.	Annual audit of project area and immediate surroundings. If any alien invasive species are detected then the distribution of these must be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site), age and/or size classes of plants and aerial cover of plants. The results must be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area.	Annual	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		2.2 Immediately control any alien plants that become established using registered control methods.	Take action to control alien plants as advised by a specialist.	Immediately	Operations and Maintenance Contractor
<b>C. DECOMMISSIONING PHASE</b>					
3. Rehabilitation of flora on site and alien plant removal programme.	Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to operational.	3.1 All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally- sourced seed of indigenous grass species that were recorded on site pre-construction.	Final external audit of area to confirm that area is rehabilitated to an acceptable level.	Once off	Lead Contractor with advice from specialist
		3.2 Maintain alien plant removal programme for 5 years after rehabilitation.	Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 5 years after decommissioning and rehabilitation. Final external audit of area to confirm that area is free of alien invasive plants after 5 years.	Once off  Yearly	Operations and Maintenance Contractor with advice from specialist



## APPENDIX F: OPEN SPACE MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. DESIGN PHASE</b>					
1. Loss of vegetation and habitat fragmentation.	Keeping the area cleared of vegetation to a minimum.	1.1 Clearing of vegetation must be kept to a minimum and take into consideration the sensitivities on site.	Ensure that solar panel/array design and layout is uniform and well- adapted to the surrounding environment and that no areas are cleared of vegetation that are not required as part of the construction of the various infrastructure.	Once-off during design	Project Developer
2. Permanent barriers to animal movement and habitat fragmentation.	The reduction in the impact that barrier will have on animal movement within the area.	2.1 Fencing must allow for the passage of small and medium sized mammals and all forms of mesh fencing must be avoided.	This must be monitored by the ECO during the construction phase to determine where these measures must be installed.	Once-off during design	Contractor
		2.2 All remaining areas that are not impacted upon by the proposed development footprint must remain unfenced to allow for movement corridors between the remainder of the farm.	This must be monitored by the ECO during the construction phase to determine whether this has been done.	Once-off during design	Project Developer
		2.3 Pigtales and/or flappers must be installed on the overhead cables where known flight paths of birds occur.	This must be monitored by the ECO during the construction phase to determine where these measures must be installed.	Once-off during design	Contractor
<b>B. CONSTRUCTION PHASE</b>					
3. Potential visual intrusion of construction activities on	Limiting negative visual impact caused by	3.1 Preparation of the solar field area (clearance of vegetation, grading, contouring and compacting) and solar field construction must be phased in a way that makes practical sense in order to	Plan activities during the construction phase so that it is optimally phased.	As required	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
existing views of sensitive visual receptors.	construction activities.	minimise the area of soil exposed and the shortest duration of exposure.			
4. Visual impacts of construction activities on the regional environment.	Limiting negative visual impact caused by construction activities.	4.1 Maintain good housekeeping on site to avoid litter and minimise waste.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
		4.2 Demarcate clearance areas and minimise surface disturbance.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
		4.3 Rehabilitation of temporarily cleared sites must start as soon as possible.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
		4.4 Implement dust suppression management actions.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
5. Permanent barriers to animal movement and habitat fragmentation.	The reduction in the impact that barrier will have on animal movement within the area.	5.1 Pigtailed and/or flappers must be installed on the overhead cables where known flight paths of birds occur.	The flight paths and birds observed in the area must be monitored by the ECO during the construction phase to determine where these measures must be installed.	Daily	ECO and Contractor
		5.2 Fencing must allow for the passage of small and medium sized mammals and all forms of mesh fencing must be avoided.	This must be monitored by the ECO during the operational phase to determine whether this is effective.	Once-off during design	Contractor
<b>C. OPERATIONAL PHASE</b>					
4. Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors.	Maintain an appropriate visual quality of solar energy facility to reduce visual impact on the rural landscape	a. Painted features must be maintained and repainted.	Continually as required.	During the operational phase	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
7. Potential impact of night lighting of a large solar energy facility on the nightscape of the region.	Ensure design and layout of facility and security lighting is managed. It will minimise light spill beyond project boundaries.	<p>7.1 Develop a lighting plan that will minimise light spill beyond project boundaries, avoid up-lighting and minimise lights in line with safety and security. The lighting plan must include and consider the following:</p> <ul style="list-style-type: none"> <li>• A lighting plan that documents the design, layout and technology used for lighting purposes must be prepared, indicating how nightscape impacts will be minimised;</li> <li>• The lighting plan must include a process for promptly addressing and mitigating complaints about potential lighting impacts;</li> <li>• Lighting of the facility must not exceed, in number of lights and brightness, the minimum required for safety and security;</li> <li>• Uplighting and glare (bright light) must be minimised using appropriate screening;</li> <li>• Low-pressure sodium light sources must be used to reduce light pollution;</li> <li>• Light fixtures must not spill light beyond the project boundary;</li> <li>• Timer switches or motion detectors must be used to control lighting in areas that are not occupied continuously; and</li> <li>• Lights must be switched off when not in use whenever it is in line with safety and security.</li> </ul>	Develop lighting plan and ensure that requirements are adhered to.	Monthly for the first year and then yearly	Project Developer

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
8. Visual impacts due to the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors.	Reduce effects of the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors.	8.1 Painted features must be maintained and repainted when colour fades or paint flakes.	Ensure a good maintenance of the paint on all painted surface of the solar facility and associated buildings.	Twice a year	Operations and Maintenance Contractor
9. Permanent barriers to animal movement and habitat fragmentation.	Avoid or reduce bird collisions with or due to infrastructure related to the project.	9.1 The impact on birds must be monitored by environmental staff member during the first six months of the operational phases for each of the projects and in conjunction with any efforts made by Eskom through management measures included in their OEMP in minimising bird collisions.	<ul style="list-style-type: none"> <li>Record any evidence of bird collisions, injury or other bird-related incidents (with GPS coordinates).</li> <li>Where necessary, a bird specialist must oversee the recording and reporting of incidents, help with species identification, assess the significance of any impacts, and if required, suggest mitigation.</li> </ul>	Weekly for the first month, thereafter, monthly	Project Developer
		9.2 Avifaunal specialist to recommend if annual monitoring is required based on a review of the record of evidence as per 9.1 above.	Monitor the flight paths of birds occurring on site, noting which birds are seen.	Annually	Project Developer

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		9.3 Any avian mortality or injury at the facility must be duly recorded and reported.	Record any bird fatalities and undertake the necessary reporting to EWT or relevant authority.	When required	Project Developer
<b>D. DECOMMISSIONING PHASE</b>					
10. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.		10.1 Disturbed and transformed areas must be contoured to approximate naturally occurring slopes to avoid lines and forms that will contrast with the existing landscapes	Final external audit of area to confirm that area is rehabilitated to an acceptable level.	Once off	Project Developer
		10.2 Stockpiled topsoil must be reapplied to disturbed areas and these areas must be re-vegetated using a mix of native species in such a way that the areas will form as little contrast in form, line, colour and texture with the surrounding undisturbed landscape.	Final external audit of area to confirm that area is rehabilitated to an acceptable level.	Once off	Project Developer
		10.3 Edges of re-vegetated areas must be feathered to reduce form and line contrasts with surrounding undisturbed landscape.	Final external audit of area to confirm that area is rehabilitated to an acceptable level.	Once off	Project Developer
		10.4 Working at night must be avoided.	This must be monitored to ensure that it is being undertaken.	Continuous	Project Developer
		10.5 Night lighting of reclamation sites must be minimised within requirements of safety and efficiency.	This must be monitored to ensure that it is being undertaken.	Continuous	Project Developer

## APPENDIX G: TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. DESIGN PHASE</b>					
1. Increase traffic generation.	Manage impact that additional traffic generation will have on road network.	1.1 Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government Free State Department of Public Works, Roads and Transport	Ensure permits are obtained.	Once-off during final design phase	Contractor
		1.2 Registration details must be supplied for all vehicles that will use the Transnet Service Road to obtain official permit. All permit applications must be submitted.	Ensure permits are obtained.	Once-off during final design phase	Contractor
		1.3 Provide a Transport Traffic Plan to SANRAL	Prepare and submit plan.	Once-off during final design phase	Contractor
2. Decrease in quality surface condition of the roads.	Limit the deterioration of surface road condition.	2.1. A Road Maintenance Plan must be developed for the section of the Transnet Service Road that will be used and addresses the following: <ul style="list-style-type: none"> <li>– Grading requirements;</li> <li>– Dust suppressant requirements;</li> <li>– Drainage requirements;</li> <li>– Signage; and</li> <li>– Speed limits.</li> </ul>	Prepare plan.	Once-off during final design phase	Contractor
<b>B. CONSTRUCTION PHASE</b>					

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
3. Increase traffic generation.	Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	3.1. Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government Free State (PGNW) Department of Public Works, Roads and Transport	Ensure permits are obtained.	During construction	Contractor and ECO
		3.2 Registration details must be supplied for all vehicles that will use the Transnet Service Road to obtain official permit. All permit applications must be submitted.	Ensure permits are obtained.	Once-off during final design phase	Contractor
		3.3 Ensure that roadworthy and safety standards are implemented at all time for all construction vehicles	Monitoring of condition of vehicles coming to site.	During construction	Contractor and ECO
		3.4 Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time (06:00-10:00 and 16:00-20:00).	Monitor and management traffic generated and when trips are made.	During construction	Contractor and ECO
4. Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	Avoidance of accidents.	4.1 Roadkill monitoring programme (inclusive of wildlife collisions record keeping) must be established and a product such as Animex fences installed, if needed, to direct animals to safe road crossings.	Appropriate monitoring must be undertaken and Clear-vu fences installed, if needed to direct animals to safe road crossings.	Weekly	Contractor and ECO
		4.2 Adhere to all speed limits applicable to all roads used. All heavy load vehicles maintain a speed limit of 40 km/hr in proposed section of the Transnet Freight Rail service road.	Ensure that speed limits are adhered to.	Daily	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		4.3 Implement clear and visible signalisation indicating movement of vehicles and when turning off or onto the Transnet Service Road to ensure safe entry and exit.	Implement clear signalisation.	On-going	Contractor and ECO
5. Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment.	Limit the release of noise, pollutants and dust emissions.	5.1 Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.	Ensure generation of dust to an adequate level.	On-going	Contractor and ECO
		5.2 Make provision for the repairing of subgrade deterioration (pot holes, dust holes) that might result due to loading of heavy construction vehicles on the proposed section. This requirement can be a condition based frequency consensus must be made with the Technical Supervisor Earthworks.	Make provision for repairs required to road.	Agree to with Transnet	Contractor and ECO
		5.3 Construction vehicles must have their lights on at all times. Lights to be properly set to no blind train drivers.	Ensure lights are on and properly set.	On-going	Contractor and ECO
		5.4 Postpone or reduce dust-generating activities during periods with strong wind.	Ensure dust management measures are in place to decrease the dust generated.	On-going	Contractor and ECO
		5.5 Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased.	Ensure dust management measures are in place to decrease the dust generated.	On-going	Contractor and ECO
		5.6 Ensure that all construction vehicles are roadworthy and respect the vehicle safety standards implemented by the	Manage the air pollutants form construction vehicles	On-going	Contractor and ECO



Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		Project Developer.	through checking the condition of vehicles.		
		5.7 Avoid using old and noisy construction equipment and ensure equipment is well maintained.	Manage the air pollutants form construction vehicles through checking the condition of vehicles.	On-going	Contractor and ECO
6. Decrease in quality surface condition of the roads.	Limit the deterioration of surface road condition.	6.1 Construction activities will have a higher impact than the normal road activity and therefore the road must be inspected on a weekly basis for structural damage.	Ensure that road maintains current condition through photographic surveys and monitoring.	Weekly	Contractor and ECO
		6.2 Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.	Ensure dust management measures are in place to decrease the dust generated.	On-going	Contractor and ECO
7. Soil contamination from leakage from battery (during transport and on-site construction).	Avoid soil contamination during transportation and construction of batteries on site.	7.1 The transport vehicle must be identified with symbols: the vehicle, must be correctly identified, following international conventions, symbols and colours, identifying the fact that corrosive and hazardous products are being transported.	Check those trucks transporting batteries to site are appropriately identified with the required symbols.	On-going	Contractor and ECO
		7.2 PPE must be provided for the transport team and they must be trained in the use of the equipment, in case of any accident.	Provide PPE to transport team.	On-going	Contractor and ECO
		7.3 Drivers and personnel on site dealing with the battery storage's hazardous wastes must always be trained in emergency procedures, including fire, spilling, etc. and	Ensure that drivers and personnel are trained in handling the battery.	Monthly	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		how to contact emergency response teams. Besides this, they must be aware of the specific kind of hazardous material is being transported and how to deal with it.			
<b>C. OPERATIONAL PHASE</b>					
8. Increase traffic generation.	Minimise the impact of the operational activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	8.1 Adhere to requirements made within Transport Traffic Plan.	Monitor the requirements as set out in the Plan as ensure that it is adhered to.	On-going	Operations and Maintenance Contractor
		8.2 Limit access to the site to personnel.	Maintain register of who comes to site and restrict access to personnel.	On-going	Operations and Maintenance Contractor
		8.3 Ensure that where possible, staff members carpool to site.	Monitor the requirements.	On-going	Operations and Maintenance Contractor
9. Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction	Limit the release of noise, pollutants and dust emissions.	9.1 Limit noisy maintenance/operational activities to daytime only.	Restrict noisy work for to the day time.	Monthly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
Equipment.					
10. Decrease in quality of surface condition of the roads.	Maintain condition of road.	10.1 Implement requirements of the Road Maintenance Plan.	Adhere to requirements of the Road Maintenance Plan.	On-going	Operations and Maintenance Contractor
<b>D. DECOMMISSIONING PHASE</b>					
11. Ensure that the construction mitigation and management measures are adhered to during this phase.					

## APPENDIX H: STORM WATER MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. DESIGN PHASE</b>					
1. Impact of the project if a detailed storm water management plan is not correctly prepared.	Watercourses present on site must retain their existing functioning and character throughout the lifetime of the solar facility.	1.1 Ensure that the development envelope avoids the watercourses (if any) shown in figures.	Check compliance with specified conditions.	Once-off during design followed by regular control	Contractor
		1.2 Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site, such that they <ul style="list-style-type: none"> <li>1.2.1 do not result in concentrated flows into natural water courses i.e. provision must be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural water courses;</li> <li>1.2.2 do not result in any necessity for concrete or other lining of natural water courses to protect them from concentrated flows off the development;</li> <li>1.2.3 do not divert flows out of their natural flow pathways, thus depriving downstream water courses of water.</li> </ul>	Check compliance with specified conditions.	Once-off during design followed by regular control	Contractor
<b>B. CONSTRUCTION PHASE</b>					
2. Diversion and impedance surface water flows – Changes	Prevent interference with natural run-off patterns,	2.1 Stormwater and any run-off generated by the hard surfaces must be discharged into retention swales or areas with rock rip-rap. These could be used to enhance the sense of place, if they are planted with indigenous vegetation.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
to the hydrological regime and increased potential for erosion. And Diversion and increased velocity of surface water flows – reduction in permeable surfaces.	diverting flows and increasing the velocity of surface water flows.	2.2 The energy dissipation structures must be placed in a manner that flows are managed prior to being discharged back into the natural waters courses, thus not only preventing erosion, but would support the maintenance of natural base flows within these systems, i.e., hydrological regime (water quantity and quality) is maintained.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		2.3 Any irrigation of the development area for landscaping or dust control purposes must be controlled, such that it does not result in any measurable increase in moisture being passed into natural drainage lines.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		2.4 Drainage along the sides of the roads must be designed so that it does not result in concentrated flows into water courses.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	Contractor and ECO
3. Impact of changes to water quality.	Prevent contamination of watercourse and decrease in water quality.	3.1 Chemical storage containers must be regularly inspected so that any leaks are detected early and be surrounded by bunds.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.2 Littering and contamination of water sources during construction must be prevented by effective construction camp management.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		3.3 Emergency plans must be in place in case of spillages onto road surfaces and watercourses.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.4 No stockpiling must take place within a watercourse.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.5 All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.6 Stockpiles must be located away from river channels i.e. greater than 32 m or outside of the 1:100 floodline whichever is greater.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.7 Erosion and sedimentation into water bodies must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed riverbanks.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		3.8. The construction camp and necessary ablution facilities meant for construction workers must be beyond any buffer shown in Figure.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.9. No ad hoc crossing of channels by vehicles during construction are allowed and access routes across the site must be strictly demarcated.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	ECO
		3.10 No waste materials or sediments are left in the channel after construction.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	Contractor and ECO
		3.11 Access routes across the site are strictly demarcated and selected with a view to minimising impacts on drainage lines.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi-weekly	Contractor and ECO
<b>C. OPERATIONAL PHASE</b>					
4. Impact due to release of wash water in the environment after use.	Prevent runoff into drainage lines onsite.	4.1 An operational phase stormwater management plan must be designed and implemented, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.	ECO must monitor activities and record and report non-compliance.	Continuously during operational phase (i.e. regular interval to be determined by the ECO)	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>D. DECOMMISSIONING PHASE</b>					
<p>5. The solar facility would be expected to run for a minimum period of 20 years, after which it would either be decommissioned, alternatively upgraded or an application submitted to obtain a new license. Should the plant be decommissioned, the solar field would be rehabilitated to its original (pre-development) state.</p> <p>In the (unlikely) event that none of the mitigation measures outlined for the Construction and Operational Phases of the project had been implemented, the period of time for recovery to take place would be extended. In the event that decommissioning occurred, and assuming implementation of mitigation measures, the hydrological regime should fully recover over time to present day conditions.</p>					



## APPENDIX I: EROSION MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>A. CONSTRUCTION PHASE</b>					
1. Increased wind erosion and resultant deposition of dust.	Prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	1.1 Sand, stone and cement must be stored in demarcated areas, and are covered or sealed to prevent wind erosion and resultant deposition of dust on the surrounding indigenous vegetation.	Check that sand, stone and cement are stored and handled as instructed.	Daily	ECO and Contractor
	To have no erosion on and downstream of the site as a result of run-off from the site, or of wind erosion.	1.2 During construction, efforts must be made to retain as much natural vegetation as possible on the site, to reduce disturbed areas and maintain plant cover, thus reducing erosion risks. All measures required for the treatment of runoff generated on the building platform during construction must be in place before site clearing commences.	Check that sand, stone and cement are stored and handled as instructed.	Daily	ECO and Contractor
2. Excessive loss of natural vegetation in development footprint area.	Prevent loss of natural vegetation through erosion.	2.1 Vegetation clearing during construction must be restricted to the footprint of the solar field and planned infrastructure only. It must be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.	ECO to be on site to monitor vegetation clearing.  Regular monitoring for erosion to ensure that no erosion problems are	Daily	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
			occurring at the site. All erosion problems observed must be rectified as soon as possible.		
		2.2 The shallow topsoil layer must be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, the topsoil layers, which contain seed and vegetative material, must be reinstated last to allow plants to rapidly re-colonise the bare soil areas.		Daily (stockpiling) and once-off for the reinstatement of the top soil layer	ECO and Contractor
		2.3 Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Re-seed with seeds of indigenous grass.	Once off	ECO with advice from specialist (if required)
<b>B. OPERATIONAL PHASE</b>					
3. Excessive loss of natural vegetation in development footprint area and resulting impacts on species of special concern.	Prevent loss of natural vegetation through erosion.	3.1 To prevent erosion, indigenous grasses that seed themselves below the solar arrays must be left to form a ground cover and kept short.	ECO to advise on seed to be used.	Monthly	Operations and Maintenance Contractor
		3.2 The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. Other erosion control measures that can be implemented are as follows: 1) Brush packing with cleared vegetation, 2) Planting of vegetation, 3) Hydro seeding/hand sowing. All erosion control mechanisms need to be regularly maintained.	Monitor efficiency of erosion control measures.	Weekly or monthly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
4. Manage habitat fragmentation (loss of landscape connectivity) and loss of Faunal Habitat.	Minimise habitat fragmentation and loss of connectivity.	4.1 Regular monitoring for erosion to ensure that no erosion problems are occurring at the site as a result of the roads and other infrastructure. All erosion problems observed must be rectified as soon as possible.	Regular monitoring for erosion to ensure that no erosion problems are occurring at the site. All erosion problems observed must be rectified.	Monthly	Operations and Maintenance Contractor
5. Increased wind erosion and resultant deposition of dust.	To have no erosion on and downstream of the site as a result of run-off from the site, or of wind erosion.	5.1 Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.	Include periodical site inspection in environmental performance reporting that inspects the effectiveness and integrity of the run-off control system and specifically records occurrence or not of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	Monthly during construction phase, quarterly thereafter.	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>C. DECOMMISSIONING PHASE</b>					
<p>6. No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.</p> <p>7. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. Monitoring: Final external audit of area to confirm that area is rehabilitated to an acceptable level (once off event to be conducted by ECO).</p>					

## APPENDIX J: HARZADOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
<b>CONSTRUCTION PHASE</b>					
11.1. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of concrete	Avoid soil contamination and risk of damage to vegetation and/or fauna through spillage of concrete	Concrete mixing area (if any) must be defined in the site map and restricted to this area. If any concrete mixing takes place on site, this is being done on board or plastic sheeting, which is to be removed from the site once concreting is completed; or in areas to be covered by further construction.	Check that sand, stone and cement are stored and handled as instructed	Daily	Contractor and ECO
		Any excess sand, stone and cement must be removed from site at the completion of the construction period and disposed of at a proper landfill site	Check that sand, stone and cement are stored and handled as instructed	Daily	Contractor and ECO
11.2. Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils	Avoid soil contamination and risk of damage to vegetation and/or fauna through spillage of fuels and oils	Check construction equipment daily (by Contractor) to ensure that no fuel spillage takes place from construction vehicles or machinery, and monitored weekly by ECO and ensure drip trays are present.	Check that no spills have taken place	Daily	Contractor and ECO
		Spilled fuel, oil or grease must be retrieved and contaminated soil removed, cleaned and replaced.	Check that no spills have taken place	Daily	Contractor and ECO
		Contaminated soil to be collected by the Contractor (under observation of ECO) and disposed of at a waste site designated for this purpose.	Check that no spills have taken place	Daily	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.</p> <p>In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree of contamination, excavation and removal to a hazardous waste disposal site might be necessary. If the spillage is widespread, a specialist will need to be immediately appointed to deal with the issue, the DEA notified and the notification process stipulated in the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 331, 2 May 2014) must be followed.</p>	Ensure that a well maintained Portable bioremediation kit (to remedy chemical spills) is available on site and that site workers and contractors know its location and instructions	Daily	Contractor and ECO
		Bunded containment to be provided below and around any fuel storage containers.	Check that no spills have taken place	Daily	Contractor and ECO
11.3 Soil contamination from leakage from battery (during transport and onsite construction)	Avoid soil contamination during transport and construction of battery storage facility	Batteries must be transported inside containers	Check that this is undertaken	During transport of batteries	Contractor and ECO
		Containers must be well packed to the transport vehicle	Check that this is undertaken	During transport of batteries	Contractor and ECO
		A minimum set of equipment necessary to combat any simple spillage or leakage problems must be provided and the transport team trained on how to use it	Ensure that transport team know how to manage spills	During transport of batteries	Contractor and ECO
		The construction of the facility must adhere to the appropriate international standards and SANS requirements and must be located on an impermeable barrier/layer (e.g. concrete surface with acid lining)	Ensure that the facility adheres to the relevant SANS and international requirements	On-going	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>Secondary containment may need to be constructed and must have a capacity of at least 110% of the largest storage tank's capacity. The secondary containment must include the following:</p> <ul style="list-style-type: none"> <li>▪ The off-loading point must be located in the bunded area to ensure that any potential spill during the offloading of the electrolyte solutions is contained;</li> <li>▪ Divert rainwater away from the bunded area to avoid rainwater mixing with electrolyte spillage potentially present within the secondary containment;</li> <li>▪ Ensure that the containment area is sloped to a sump; and</li> <li>▪ All drains must be covered.</li> <li>▪ Although highly unlikely, any spill/leakage from the battery storage facility must be attended to immediately and be handled in an environmental friendly manner (i.e. no discharge into the ground or any surface water body) and must be disposed of at an appropriate licenced hazardous waste disposal facility. According to the MSDSs attached in Appendix A:</li> <li>▪ Small Spills: Absorb spill with absorbent, inert material, place in a labelled container for disposal by licensed Hazardous Waste Contractor. Clean area with water and detergent. Dispose of cleanup materials in appropriate containers. Wear safety glasses with splash shields. Wear</li> </ul>	<p>Provide secondary containment according to the specifications</p> <p>Immediately attend to any spillage</p>	On-going	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>appropriate gloves to prevent skin exposure.</p> <ul style="list-style-type: none"> <li>• Large Spills: Isolate and contain spill using absorbent pillows, mats or rolls. Keep unauthorized persons away from spill area. Contact Hazardous Materials Clean-up Contractor immediately for onsite response.</li> <li>• Empty containers may still contain trace amounts of this material and are still hazardous. This substance is hazardous to the environment. Do not dump into drains. Dispose of only through proper hazardous waste methods.</li> </ul>			
<b>OPERATIONAL PHASE</b>					
11.4 Contamination of soil and risk of damage to vegetation and/or fauna through spillage of fuels and oils	Avoid soil contamination and risk of damage to vegetation and/or fauna through spillage of fuels and oils	Maintenance equipment must be checked to ensure that no fuel spillage takes place from vehicles or machinery.	Implement specifications for maintenance equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor
		Spilled fuel, oil or grease is retrieved during operations where possible and contaminated soil removed, cleaned and replaced.	Implement specifications for removal and disposal of contaminated soil equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor
		Contaminated soil to be collected and disposed of at a waste site designated for this purpose.	Implement specifications for removal and disposal of contaminated soil equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor



Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required.</p> <p>In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree of contamination, excavation and removal to a hazardous waste disposal site might be necessary. If the spillage is widespread, a specialist will need to be immediately appointed to deal with the issue, the DFFE notified and the notification process stipulated in the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 331, 2 May 2014) must be followed.</p>	Ensure that a well-maintained Portable bioremediation kit (to remedy chemical spills) is available on site and that site workers and contractors know its location and instructions	Monthly	Operations and Maintenance Contractor
		Bunded containment to be provided below and around any fuel storage containers.	Implement specifications for maintenance equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor

#### DECOMMISSIONING PHASE

11.5 No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.