PROJECT DETAIL

Reference No:	14/12/16/3/3/1/1552
Project Title:	The development of a power line as part of the Waterloo Solar Energy Facility near Vryburg, North West Province
Authors:	DPS79 Solar Energy (RF) (Pty) Ltd. (Contact Person: Mr. Andrew Johnson)
Report Status :	Draft Environmental Management Programme
Submission date:	21 April 2016

When used as a reference this report should be cited as: Environamics (2016) The proposed Waterloo Solar Park near Vryburg, North West Province.

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LIST OF ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
DEA	Department of Environmental Affairs
DM	District Municipality
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
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
NLM	Naledi 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 IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SHE	Safety, Health and Environment

1 INTRODUCTION

The purpose of the Environmental Management Programme (EMPr) is to ensure that the potential social and environmental impacts, risks and liabilities identified during the Basic Assessment and Environmental Impact Assessment processes are effectively managed during the construction and operational phases of the Waterloo Solar Park. The EMPr specifies the mitigation and management measures to which the Developer is committed in relation to the establishment of the Photovoltaic Solar Energy 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 982(23), an EMPr has been compiled as part of the Basic Assessment Report (BAR) and approved Environmental 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 982.

1.1 BACKGROUND

This EMPr has been compiled for the Waterloo Solar Park near Vryburg, North West 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;
- Construction of supporting infrastructure in the form of office and ablution facilities
- Construction of internal roads;
- Fencing; and
- Construction of a storm water management system.

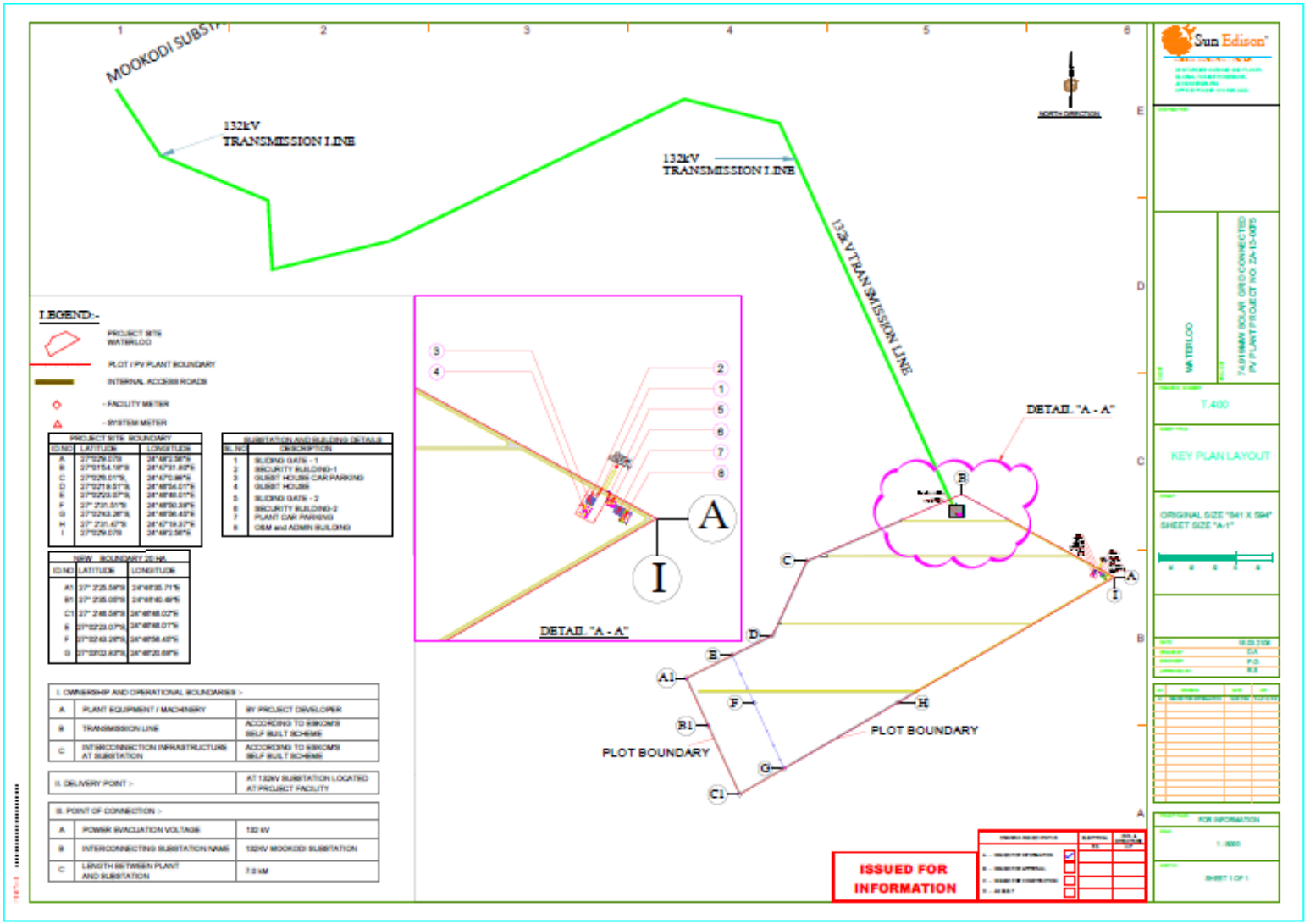

Figure 1: Layout plan indicating site boundary, plant boundary and internal roads.

1.2 OBJECTIVES OF THE EMPR

The key objectives of the EMPr are to:

- Formalise and disclose the programme for environmental and social management;
- 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 and Basic Assessment processes 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;
- Rehabilitation; and
- Decommissioning.

1.3 ENVIRONMENTAL IMPACTS

The proposed development was assessed to have an overall low impact on the receiving environment. 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

Impact	Significance (with mitigation)	Impact management outcomes
Construction phase		
Impacts on fauna and flora	Negative Low	To avoid or reduce the loss of fauna and flora
Impacts on Avifauna	Negative Low	To avoid the loss or fragmentation of habitats for avifauna.
Impacts on Agricultural Potential	Negative low	To enhance erosion control and prevent soil loss
Temporary employment opportunities	Positive Medium	To enhance the use of local skills and uplift the local community
Impacts on surface water	Negative Low	To avoid the pollution and-degradation of surface water resources
Impacts on heritage resources	Negative Low	To avoid any loss of potential heritage resources
Impacts on existing service infrastructure	Negative Low	To avoid any damage to existing service infrastructure
Operational phase		
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 associated with the geology	Negative Low	To avoid soil erosion
Impacts on surface water	Negative Low	To avoid the pollution and-degradation of surface water resources
Pressure on existing service infrastructure	Negative Low	To avoid any damage to existing service infrastructure
Cumulative biophysical impacts resulting from similar development in the area	Negative Low	These types of developments are not located on ecological sensitive areas.
Decommissioning phase		
Impacts on agricultural potential	Negative Low	To avoid soil erosion

Impacts on surface water	Negative Low	To avoid the pollution and-degradation of surface water resources
Socio-economic impacts (loss of employment)	Negative Low	Loss of local employment will occur

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 and Basic Assessment Processes and prepare all required reports such as the EMPr. All correspondence to the EAP can be directed to:

Contact person: Marélie Griesel

Postal Address: PO Box 6484, Baillie Park, 2526

Telephone: 018 290 8228 (w) 086 762 8336 (f)

Electronic Mail: admin@environamics.co.za

Regulation 13(1)(a) and (b) determines that an independent and suitably qualified and experienced EAP should conduct the Basic Assessment. In terms of the independent status of the EAP a declaration was included as part of the Basic Assessment reports. This EMPr was prepared by Marélie Griesel who has an Honour's degree in Environmental Management and more than 4 years of experience in environmental impact assessment (refer to Appendix A for the EAP's CV).

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 Environmental Affairs (DEA). 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.982. It consists of five sections demonstrating compliance to the specifications of the regulations as illustrated in Table 1-1.

Table 1.2: Structure of the report

Requirements for the contents of an EMPR as specified in the Regulations		Section in report
Appendix 4(1) - An EMPr must comply with section 24N of the Act and include-		
(a)	details of -	1.4
	(i) The EAP who prepared the EMPr;	
	(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 Basic Assessment process for all phases of the development including-	1.2 & 1.3
	(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	
(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 -	2.8
	(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;	

(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—	3
	(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.	
(n)	any specific information that may be required by the competent authority.	N/A

This EMPr should 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 should 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 will also be publicly disclosed during the Public Participation Process of this project. An opportunity will be offered 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

Approach	Description
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 DEFINITION USED IN THIS EMPR

Key definitions used in this EMPr are listed in Table 2-2.

Table 2-2: Key definitions used in this EMPr

Term	Definition
DEA	Department of Environmental Affairs.
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 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 management	It is the responsibility of the entire Project Management Team to deal with 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.
Incident	An undesired event that may result in a significant environmental impact, although can be managed through internal response and procedures.
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.
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	A representative of the Developer or it's Agent, appointed

Environmental Representative (SHE representative)	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. 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 .

2.2 ROLES AND RESPONSIBILITIES

The roles and responsibilities of the different legal appointments anticipated for the construction of the proposed Waterloo Solar Park 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.

2.2.1 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, Basic 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.

2.2.2 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 shall discuss and negotiate with the Principal Contractor/s the contents of the Health and Safety Plan of the 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.

2.2.3 Principal Contractor/s

The Principal Contractor/s appointed for the construction of the different phases of Waterloo Solar Park 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 shall be applied from the date of commencement of and for the duration of execution of the works. This plan shall, 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 renderer'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 shall 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 shall 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 shall evaluate the relevance of the Health and Safety Plan and revise the same as required, following which a revised plan shall 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 Naledi 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.

2.2.4 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 Naledi 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.

2.2.5 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.

2.2.6 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 Naledi Local Municipality (CoMLM) 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.

2.2.7 ECO

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;
- 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 Naledi Municipality's Environmental Manager, and the DEA, where deemed necessary;
- Compiling monthly progress reports during the construction phase for submission to the Developer and/or his Agent;
- Advising the Developer on environmental issues and recommendations for the proposed development;

- Arranging for liaison with 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 promptly followed up and closed out.

2.3 LIFECYCLE OF THE SOLAR ENERGY FACILITY

2.3.1 Construction

The EMPr has recommended mitigation and management measures to avoid or minimise impacts and optimise the benefits arising from the positive impacts during construction activities. 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 Naledi Local Municipality 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.

2.3.2 Operation

The operational phase of the residential development will involve the following:

- Maintenance and washing of PV panels;
- Maintenance of the storm water management system;
- Solid waste removal.

2.3.3 Rehabilitation

Rehabilitation activities associated with Waterloo Solar Park centre around the rehabilitation of disturbed areas outside of the infrastructure footprint, such as the construction camp and lay down 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.

2.3.4 Decommissioning

The PV facility will be operational for between 20 – 25 year from where the technology of the panels will be upgraded or the site will be decommissioned.

2.4 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 impact managed;
- On–going weekly inspections of operational controls and general state of operation; and
- Internal monthly audits 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.

Many potential impacts are difficult to monitor quantitatively, such as soil erosion and waste management. Howeve,r 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.

2.5 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 waste water generated as a result of the proposed developments;
- Monthly internal audit reports;
- Quarterly 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.

2.6 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 the DPS79 Solar Energy (RF) (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.

2.6.1 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.

2.7 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.

2.8 MITIGATION AND MANAGEMENT MEASURES

The mitigation and management measures identified to address the anticipated and potential impacts identified during the Environmental Impact Assessment and Basic Assessment processes are 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**
General Management Measures			
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 should 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.	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.	Prior to issuing of EA	Developer and/or appointed Agent
Site demarcation and compliance	1. Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barrier where applicable.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	2. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. 3. The Contractor and ECO must ensure compliance with conditions described in the EA. 4. Records of compliance/non-compliance with the conditions of the authorisation must be kept and be available on request. 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.		
Establishment of a Construction camp	1. Site establishment shall take place in an orderly manner and all required amenities shall be installed at camp sites before the main workforce move onto site. 2. All construction equipment must be stored within this construction camp. 3. All associated oil changes etc (no servicing) must take place within this camp on a sealed surface	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	such as a concrete slab. 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. 5. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 6. The Contractor must provide sufficient ablution facilities, in the form of portable/VIP toilets, at the Construction Camps, and shall conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 50 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets shall be provided to accommodate the number of personnel working in the area. 7. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. No fires will be allowed and the Contractor must make alternative arrangements for heating. LP Gas may be used, provided that all required		

	safety measures are in place. The Contractor shall 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.		
Appointment of labour	1. Where reasonable and practical DPS79 Solar Energy (RF) (Pty) Ltd. should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. 2. Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. 3. Before the construction phase commences DPS79 Solar Energy (RF) (Pty) Ltd. should meet with representatives from the NLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase. 4. The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	procedures that DPS79 Solar Energy (RF) (Pty) Ltd. intends following for the construction phase of the project. 5. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.		
Training of site staff	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. 2. Where feasible a training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase. 3. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. 4. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. 5. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. 6. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	pollution of local soil and water resources and receive the necessary safety training. 7. Staff must be trained in the hazards and required precautionary measures for dealing with these substances 8. Spillage packs must be available at construction areas.		
Public consultation of the site	1. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. 2. Identify relevant stakeholders and engage them at applicable stages of the EIA process. 3. Inform the public about the proposed PV process. 4. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 5. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures 6. Determine stakeholder satisfaction levels. 7. The NLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project. 8. DPS79 Solar Energy (RF) (Pty) Ltd. should	Prior to commencement of site preparation and construction	Main Contractor

	consider the option of establishing a monitoring forum that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site.		
Site clearing	1. Site clearing must take place in a phased manner, as and when required. 2. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. 3. The area to be cleared must be clearly demarcated and this footprint strictly maintained. 4. Spoil that is removed from the site must be removed to an approved spoil site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.	Site preparation prior to construction	Main Contractor
Establishment of a Social and Environmental Management System	1. Performance Standard One underscores the importance of managing social and environmental performance throughout the life of a project. 2. An effective social and environmental	Prior to construction	Main Contractor

	management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers and the local communities directly affected by the project. The client will establish and maintain 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. The management system will incorporate the following elements: • Social and Environmental Assessment • Management program • Organizational capacity • Training • Community Engagement • Monitoring and Reporting		

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**
Construction Camp			
Site of the construction camp	1. The size of the construction camp should be minimised. 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. 3. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented.	Construction phase	Main Contractor, Environmental Liaison Officer and Environmental Control Officer
Storage of materials (including hazardous materials)	1. Choice of location for storage areas must take into account prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. 2. Storage areas must be designated, demarcated and fenced if necessary.	Construction phase	Main Contractor, Environmental Liaison Officer and Environmental Control Officer

	3. Storage areas should be secure so as to minimise the risk of crime. They should also be safe from access by unauthorised persons i.e. children/animals etc. 4. Fire prevention facilities must be present at all storage facilities. 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 should include a bund wall high enough to contain at least 110% of any stored volume, and this should be sited away from drainage lines in a site with the approval of the Project Manager. The bund 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. 6. All fuel storage areas must be roofed to avoid creation of dirty stormwater. 7. These storage facilities (including any tanks) must be on an impermeable surface that is protected		

	from the ingress of storm water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources. 8. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes. 9. Storage areas containing hazardous substances/materials must be clearly signposted. 10. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. 11. An approved waste disposal contractor must be employed to remove 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.		

	12. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site. 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 MC and ECO for information. Emergency response procedures to be followed and implemented. 14. Emergency and spillage plans need to be developed and submitted to the relevant authorities for approval.		
Drainage of the construction camp	Surface drainage measures must be established in the Construction Camps so as to prevent: o Ponding of water; o Erosion as a result of accelerated runoff; and, o Uncontrolled discharge of polluted runoff.	Construction phase	Main Contractor, Environmental Liaison Officer and Environmental Control Officer
Construction Traffic and Access			

Construction traffic	1. Construction routes and required access roads must be clearly defined. 2. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities. 3. Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. 4. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 5. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 6. Servicing must be done in dedicated service areas on site or else off site if no such area exists. 7. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. 8. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. 9. All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict	Construction phase	Main Contractor and Environmental Liaison Officer

	speed limits		
Access to the site	1. The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-contractors. 2. Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor and the Landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a “NO ENTRY for construction vehicles" sign.	Construction phase	Main Contractor and Environmental Liaison Officer
Maintenance of the road	1. Where necessary suitable measures shall be taken to rehabilitate damaged areas. 2. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop. 3. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. 4. The contractor must ensure that damage caused by construction related traffic to the Amalia Road is repaired before the completion of the construction phase. The costs associated with	Construction phase	Main Contractor and Environmental Liaison Officer

	the repair must be borne by the contractor		
Noise	Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	Construction phase	Main Contractor and Environmental Liaison Officer
General mitigation regarding construction traffic and access	1. The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. 2. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. 3. Care for the safety and security of community members crossing access roads should receive priority at all times.	Construction phase	Main Contractor and Environmental Liaison Officer
Environmental education and Training			
Environmental training	1. The project manager must appoint an ECO prior to construction. 2. Ensure that all site personnel have a basic level of environmental awareness training. The	Construction phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include: o What is meant by "Environment" o Why the environment needs to be protected and conserved o How construction activities can impact on the environment o What can be done to mitigate against such impacts? o Awareness of emergency and spills response provisions o Social responsibility during construction e.g. being considerate to local residents 3. Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues. 4. It is the Contractor's responsibility to provide the site foreman with no less that 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. 5. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where		

	necessary. 6. Use should be made of environmental awareness posters on site. 7. The need for a "clean site" policy also needs to be explained to the workers. 8. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks.		
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 should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	Construction phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Soils and Geology			
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	Main Contractor and Environmental Liaison Officer
Chemical soil pollution	1. All waste generated on site during construction should be stored in waste bins and removed from site on a regular basis.	Construction phase	Main Contractor and Environmental Liaison Officer

	2. Vehicles accessing the site should regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil should be removed and transported to a designated waste site. 3. No broken or old batteries or components of the PV plant should be dumped on or around the site but should be removed immediately and taken to a special chemical waste facility.		
Guidelines for the stripping and storage of topsoil	1. The Contractor should, prior to the commencement of earthworks determine the average depth of topsoil, and agree on this with the ECO. The full depth of topsoil should be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This should include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. 2. Care must be taken not to mix topsoil and subsoil during stripping. 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.	Construction phase	Main Contractor and Environmental Liaison Officer

	4. Removed polluted topsoil should be transported to a licensed landfill site. 5. The topsoil must be conserved on site in and around the pit area.		
Soil stripping	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. 2. Subsoil and overburden in all construction and lay down areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 3. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes.	Construction phase	Main Contractor and Environmental Control Officer
Guidelines for soil stockpiles	1. Stockpiles should not be situated such that they obstruct natural water pathways. 2. Stockpiles should not exceed 2m in height unless otherwise permitted by the Engineer. 3. If stockpiles are exposed to windy conditions or heavy rain, they should be covered either by vegetation or geofabric, depending on the duration of the project. Stockpiles may further be	Construction phase	Main Contractor and Environmental Control Officer

	protected by the construction of berms or low brick walls around their bases. 4. Stockpiles should be kept clear of weeds and alien vegetation growth by regular weeding. 5. 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 should be attained and given to the project manager.		
Storage of fuel on site	1. Less than 30 cubic meters of fuel is permitted to be stored on site at any one time. 2. Topsoil and subsoil to be protected from contamination. This should be monitored on a monthly basis by a visual inspection of diesel/oil spillage and pollution prevention facilities. 3. Fuel and material storage must be away from stockpiles. 4. Concrete and chemicals must be mixed on an impervious surface and provisions should be made to contain spillages or overflows into the soil. 5. Any storage tanks containing hazardous materials	Construction phase	Main Contractor and Environmental Control Officer

	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.		
Mixing of concrete on site	1. The concrete batching plant must be contained within a bunded area. 2. Concrete mixing must only take place within designated areas. 3. Ready mixed concrete must be utilised where possible. 4. No vehicles transporting concrete to the site may be washed on site. 5. If a batching plant is necessary, run-off should 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 storm water system.	Construction phase	Main Contractor and Environmental Control Officer
Earth works	1. Soils compacted during construction should be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil should be re-spread over landscaped areas. 2. It is recommended that a suitably qualified engineering geologist or geotechnical engineer	Construction phase	Main Contractor and Environmental Control Officer

	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.		
Erosion Control			
Erosion control actions that need to be implemented during construction	1. Wind screening and stormwater control should be undertaken to prevent soil loss from the site. 2. The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. 3. Other erosion control measures that can be implemented are as follows: o Brush packing with cleared vegetation o Mulch or chip packing o Planting of vegetation o Hydroseeding/hand sowing 4. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented. 5. All erosion control mechanisms need to be regularly maintained. 6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces.	Construction phase	Environmental Control Officer

	7. Retention of vegetation where possible to avoid soil erosion. 8. Vegetation clearance should be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time. 9. Re-vegetation of disturbed surfaces should occur immediately after construction activities are completed. This should be done through seeding with indigenous grasses. 10. No impediment to the natural water flow other than approved erosion control works is permitted. 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. 12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.		
Water Use and Quality			

Water use	1. Develop a sustainable water supply management plan to minimise the impact to natural systems by managing water use, avoiding depletion of aquifers and minimising impacts to water users. 2. Water must be reused, recycled or treated where possible.	Construction phase	Engineer
	Consultation 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	1. The quality and quantity of effluent streams discharged to the environment including storm water should be managed and treated to meet applicable effluent discharge guidelines. 2. Quality of water being discharged must be tested on a monthly basis. 3. Discharge to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria outside a scientifically established mixing zone. 4. Efficient oil and grease traps or sumps should be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment	Construction phase	Environmental Control officer

	areas and spill kits should be available with emergency response plans.		
Stormwater management	1. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants. 2. Silt fences should be used to prevent any soil entering the storm water drains. 3. Temporary cut off drains and berms may be required to capture storm water and promote infiltration. 4. Promote a water saving mind set with construction workers in order to Contractor ensure less water wastage. 5. New storm water construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 6. Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution. 7. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well	Construction phase	Environmental Control officer

	as the operation phase. 8. Earth, stone and rubble is to be properly disposed of, or utilized on site so as not to obstruct natural water path ways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 9. There should be a periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 10. If a batching plant is necessary, run-off should 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 storm water system or nearby streams, rivers or erosion channels or dongas.		
Protection of groundwater resources	Process solution storage ponds and other impoundments designed to hold non fresh water or non treated process effluents should be lined and be equipped with sufficient wells to enable monitoring of water levels and quality.	Construction phase	Environmental Control officer
Sanitation	1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 2. The facilities must be regularly serviced to reduce	Construction phase	Environmental Control officer

	the risk of surface or groundwater pollution.		
Concrete mixing	1. 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	1. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 2. The Contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 3. No washing or servicing of vehicles on site.	Construction phase	Environmental Control officer
Surface and ground water			
Sanitation on site	1. Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). 2. Water saving devices and technologies such as the use of dual flush toilets should be considered.	Construction phase	Main Contractor and Environmental Control officer

	3. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.		
Use and storage of hazardous materials	1. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled. 2. 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. 3. Any hazardous substances must be stored at least 20m from any of the water bodies on site. 4. The Contractor (monitored by the Environmental Control or Liaison Officer) should 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. 5. 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 shall be collected and removed from the site for appropriate disposal at a licensed commercial	Construction phase	Main Contractor and Environmental Control officer

	facility.		
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	Main Contractor and Environmental Control officer
Public areas	1. Food preparation areas should be provided with adequate washing facilities and food refuse should be stored in sealed refuse bins which should be removed from site on a regular basis. 2. The Contractor should take steps to ensure that littering by construction workers does not occur and persons should be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. 3. No washing or servicing of vehicles on site.	Construction phase	Main Contractor and Environmental Control officer
Water resources	1. Site staff shall 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. 2. Municipal water (or another source approved by the ECO) should instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing,	Construction phase	Main Contractor and Environmental Control officer

	compacting, etc. 3. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments.		
Site specific mitigation measures for surface water	1. Construction vehicles and machinery ideally should not cross drainage channels and should be routed away from these surface water features. This will avoid impacting structurally and functionally on these systems entirely. Moreover, construction should not take place within the buffer zones stipulated. The buffer zone and any surface water features need to be fenced off to prevent access and other related impacts occurring such as uncontrolled interaction between people and the surface water features as well as the entry of leaked hazardous materials into these resources. Where access roads (temporary or permanent) are constructed, stormwater management measures need to be implemented for the duration of the lifecycle of the roads. This specifically relates to the use of any appropriate stormwater structure that will assist in reducing the rate of run-off generated	Construction phase	Main Contractor and Environmental Control officer

	on access roads entering water courses and that will help prevent additional sediment loads entering the water courses. Structures can include silt nets, grass blocks or berms. 2. Stormwater management measures need to be implemented for the duration of the lifecycle of the development and importantly must take into consideration to the larger scale to be applied. This specifically relates to the use of any appropriate stormwater structure that will assist in reducing the rate of run-off generated on the proposed development entering nearby water courses and that will help prevent additional sediment loads entering the water courses. 4. The implementation of a rehabilitation plan designed for the specific impact caused to the natural area. 5. The implementation of an adequate stormwater management plan and associated structures tailored to the design of the proposed development and the underlying topography must be incorporated as part of the proposed development. The storm water management design and plan should consider using structures that area semi-permeable, structures that		

	impede or reduce the rate of run-off and structures that can accommodate the volume of run-off (such as attenuation dams/ponds). 6. Leakage of transformer oils must be prevented by constructing oil bunds to ensure that any oil spills are contained and not released into the environment.		
Site specific mitigation measures for ground water	1. Inventories should 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 should be considered. 2. All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. 3. A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should be securely capped, and must be fitted with a suitable sanitary seal to prevent surface water flowing down the outside of the casing.	Construction phase	Main Contractor and Environmental Control officer

	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 should be done according to recognised standards.		
Waste Management			
Litter management	1. Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. 2. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. 3. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. 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. 5. Littering by the employees of the Contractor shall not be allowed under any circumstances. The	Construction phase	Environmental Liaison Officer

	ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 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. 8. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. 9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site. 11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours.		
Hazardous waste management	1. All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed	Construction phase	Environmental Liaison Officer

	of offsite at a licensed landfill site, where practical. Incineration may be used where relevant. 2. Contaminants to be stored safely to avoid spillage. 3. Machinery must be properly maintained to keep oil leaks in check. 4. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated.		
Sanitation	1. The Contractor shall install mobile chemical toilets on the site. 2. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate sanitary activities on site shall be allowed. 3. Ablution facilities shall be within 50m from workplaces and not closer than 50m from any natural water bodies or boreholes. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated	Construction phase	Environmental Liaison Officer

	separately where possible. 4. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. 5. Toilets should be no closer than 50m or above the 1:100 year flood line from any natural or manmade water bodies or drainage lines or alternatively located in a place approved of by the Engineer. 6. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. 7. The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant. 8. Potable water must be provided for all construction staff.		
Remedial actions	1. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. 2. 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.	Construction phase	Environmental Liaison Officer

	3. 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. 4. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 5. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 6. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 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.		
Flora			
Existing vegetation	1. Vegetation removal must be limited to the PV plants construction site. 2. Vegetation to be removed as it becomes necessary rather than removal of all vegetation throughout the site in one step.	Construction phase	Environmental Liaison Officer

	3. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 4. No vegetation to be used for firewood. 5. Exotic and invasive plant species should not be allowed to establish, if the development is approved. 6. Permits have to be obtained for the removal of protected plant species. 7. Relocation efforts for protected species should be implemented where possible.		
Rehabilitation	1. All damaged areas shall be rehabilitated upon completion of the contract. 2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. 4. Rehabilitation must take place in a phased approach as soon as possible.	Construction phase	Environmental Liaison Officer

	5. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 6. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 7. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged.		
	1. All plants not interfering with the operation of the PV plants construction shall be left undisturbed clearly marked and indicated on the site plan. 2. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 3. Vegetation removal must be phased in order to reduce impact of construction. 4. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 5. Strict and regular auditing of the PV plants construction process to ensure containment of the construction and laydown areas.	Construction phase	Environmental Liaison Officer

	6. 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.		
Utilisation of resources	Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.	Construction phase	Environmental Liaison Officer
Exotic vegetation	1. Alien vegetation on the site will need to be controlled. 2. The Contractor should be 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. 3. The spread of exotic species occurring throughout the site should be controlled.	Construction phase	Environmental Liaison Officer
Herbicides	1. Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be	Construction phase	Environmental Liaison Officer

	used. 2. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation.		
Site specific mitigation measures for flora	1. Demarcation of sensitive areas prior to construction activities starting. 2. Use of appropriate construction methods in the sensitive area. 3. Intensive environmental audits (frequently in sensitive areas) by an independent party during this construction period. 4. A copy of the Environmental Impact Report (EIR) and associated Environmental Management Programme as well as the specialist study must be present at the construction site for easy reference to specialist recommendations in sensitive areas. 5. It is recommended that the construction crew be educated about the sensitivities involved in these areas as well as the potential species they could encounter. 6. Rehabilitation to be undertaken as soon as possible after construction.	Construction phase	Environmental Liaison Officer

	7. Only vegetation within the study area must be removed. 8. Vegetation removal must be phased in order to reduce impact of construction. 9. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 10. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species. 11. A buffer zone should be established in areas where construction will not take place to ensure that construction activities do not extend into these areas. Construction areas must be well demarcated and these areas strictly adhered to.		
Fauna			
Protection of fauna on site	1. Demarcation of sensitive areas must be verified on site by the ECO prior to construction activities starting. 2. Use of appropriate construction techniques. 3. Rehabilitation to be undertaken as soon as possible after construction has been completed.	Construction phase	Environmental Control Officer

	4. No trapping or snaring to fauna on the construction site should be allowed. 5. No faunal species must be disturbed, trapped, hunted or killed by maintenance staff during any routine maintenance at the development.		
Avifauna			
Habitat destruction	1. The footprint of construction related activities should be limited to the site and minimised where possible. 2. Schedule the habitat clearance to occur outside the breeding season of most of the species involved (April to July/August). 3. Trees and scrubs earmarked for removal should be examined for active nests by a knowledgeable person as soon is the project is approved. If none is found, the plants should be removed immediately, even if clearance of the area is scheduled for a later date. 4. If any active nests are found it will allow sufficient time for the birds to complete their breeding cycle after which the plants must be before further breeding activity takes place.	Construction phase	Environmental Liaison Officer
Air Quality			

Dust control measures	1. Wheel washing and damping down of un-surfaced and un-vegetated areas. 2. Retention of vegetation where possible will reduce dust travel. 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. 4. Damping down of all exposed soil surfaces with a water bowser or sprinklers when necessary to reduce dust. 5. The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the neighbouring communities. 6. A speed limit of 30km/h must not be exceeded on site. 7. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. 8. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. 9. Dust suppression measures must be	Construction phase	Environmental Liaison Officer

	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.		
Odour control	1. Regular servicing of vehicles in order to limit gaseous emissions. 2. Regular servicing of onsite toilets to avoid potential odours.	Environmental Liaison Officer	Environmental Liaison Officer
Rehabilitation	The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.	Environmental Liaison Officer	Environmental Liaison Officer
Fire prevention	1. No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. 2. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of fire fighting equipment must be assessed and evaluated through a typical risk assessment process.	Environmental Liaison Officer	Environmental Liaison Officer
Noise and Vibrations			
Mitigation of noise and vibrations	1. The construction phase must aim to adhere to	Environmental Liaison	Environmental

	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. 2. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located well 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 in to the system. 3. Truck traffic should be routed away from noise sensitive areas, where possible. 4. Noise levels must be kept within acceptable limits. 5. Noisy operations should be combined so that they occur where possible at the same time. 6. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 7. Construction workers to wear necessary ear protection gear. 8. Noisy activities to take place during allocated construction hours.	Officer	Liaison Officer

	9. Noise from labourers must be controlled. 10. 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. 11. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 12. Implementation of enclosure and cladding of processing plants. 13. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine		
Site specific mitigation measures for noise	1. During construction care should be taken to	Environmental Liaison	Environmental

and vibration	ensure that noise from 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 should be kept in good operating order and where appropriate have effective exhaust mufflers. 2. Gravel roads used during construction of the plant should be kept in good order. Corrugations and drainage ruts should not be allowed to develop as these can contribute to mechanical rattling and banging noise on vehicles traversing these roads. 3. If a cooling tower is to be utilised then fans should be fitted with sound attenuators.	Officer	Liaison Officer
Energy Use			
The use of energy and actions that need to be implemented during construction	1. Energy saving lighting must be implemented across the board. 2. Water saving measures must be implemented across the plant to ensure little wastage. 3. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations.	Construction phase	Environmental Liaison Officer

	4. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.		
Employment			
Labour	1. The use of labour intensive construction measures should be used where appropriate. 2. Training of labour to benefit individuals beyond completion of the project. 3. DPS79 Solar Energy (RF) (Pty) Ltd. and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;	Construction phase	Main Contractor
Recruitment plan	1. Recruitment must comply with national employment and labour laws. 2. Where reasonable and practical, DPS79 Solar Energy (RF) (Pty) Ltd.'s service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled	Construction phase	Main Contractor

	job categories. 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. 4. Ensure adequate advertising in the project community areas, local papers for skilled labour. 5. Local community leaders must be utilised to source labour. 6. 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. 7. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection. 8. Record of official complaints by employees to authorities i.e. Labour and Social Security. 9. Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria. 10. Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. 11. The recruitment selection process should seek to		

	promote gender equality and the employment of women wherever possible. Establish, maintain a healthy worker-management relationship.		
Occupational health and Safety			
Work safety	1. Implementation of safety measures, work procedures and first aid must be implemented on site. 2. Workers should be thoroughly trained in using potentially dangerous equipment. 3. Contractors must ensure that all equipment is maintained in a safe operating condition. 4. A safety officer must be appointed. 5. A record of health and safety incidents must be kept on site. 6. Any health and safety incidents must be reported to the Project Manager immediately. 7. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 8. Workers have the right to refuse work in unsafe conditions. 9. The Contractor shall take all the necessary	Construction phase	Main Contractor and Environmental Liaison Officer

	precautions against the spreading of disease such as measles, foot and mouth, etc. 10. A record shall 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 DPS79 Solar Energy (RF) (Pty) Ltd. or the Contractor. 11. 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 counseling is offered must be indicated to workers. 12. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers/local residents. 13. The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site 14. Where necessary, the contractors should 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 15. It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Work facilities	1. Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness. 2. Fires are not to be allowed outside controlled areas.	Construction phase	Main Contractor and Environmental Liaison Officer
Hazardous substances	Working areas should be provided with adequate ventilation and dust/fume extraction systems to ensure that inhalation exposure levels for potentially corrosive, oxidizing, reactive or siliceous substances are maintained and managed at safe levels.	Construction phase	Main Contractor and Environmental Liaison Officer
Machine and equipment	1. Use of contrast colouring on equipment/ machinery including the provision of reflective markings to enhance visibility. 2. Use of moving equipment/machinery equipped with improved operator sight lines. 3. Issuing workers with high visibility clothing.	Construction phase	Main Contractor and Environmental Liaison Officer

	4. Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents. 5. Installing safety barriers in high risk locations.		
Fitness for work	Review shift management systems to minimise risk of fatigue. Establish alcohol and other drugs policy for the operation.	Construction phase	Main Contractor and Environmental Liaison Officer
Travel and remote site health	1. Develop programs to prevent both chronic and acute illnesses through appropriate sanitation and vector control systems. 2. Where food is prepared on site, food preparation storage and disposal should be reviewed regularly and monitored to minimise risk of illness.	Construction phase	Main Contractor and Environmental Liaison Officer
Protective gear	1. Personal Protective Equipment (PPE) must be made available to all construction staff and must be compulsory. Hard hats and safety shoes must be worn at all times and other PPE worn were necessary i.e. dust masks, ear plugs etc. 2. No person is to enter the site without the necessary PPE.	Construction phase	Main Contractor and Environmental Liaison Officer
Site safety	1. The construction camp must remain fenced for		

	the entire construction period. 2. Potentially hazardous areas are to be demarcated and clearly marked. 3. Adequate warning signs of hazardous working areas. 4. Emergency numbers for local police and fire department etc. must be placed in a prominent area. 5. Fire fighting equipment must be placed in prominent positions across the site where it is easily accessible. This includes fire extinguishers, a fire blanket as well as a water tank. 6. Suitable conspicuous warning signs in English and all other applicable languages must be placed at all entrances to the site. 7. All speed limits must be adhered to.	Construction phase	Main 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	Main Contractor and Environmental Liaison Officer
Hazardous material storage	1. 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	Construction phase	Main Contractor and Environmental Liaison Officer

	of the stored hazardous material. These areas should be roofed to avoid contamination of stormwater. 2. Material Safety Data Sheets (MSDS) which contain the necessary information pertaining to a specific hazardous substance must be present for all hazardous materials stored on the site.		
Procedure in the event of a petrochemical spill	1. A spill kit needs to be kept on site to address any unforeseen spillages. 2. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO. 3. The problem must be assessed and the necessary actions required will be undertaken. 4. The immediate response must be to contain the spill. 5. The source of the spill must be identified, controlled, treated or removed wherever possible.	Construction phase	Main Contractor and Environmental Liaison Officer
Fire management	1. Firefighting equipment should be present on site at all times. 2. All construction staff must be trained in fire	Construction phase	Main Contractor and Environmental

	hazard control and fire fighting techniques. 3. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. 4. 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. 5. No open fires will be allowed on site. 6. Smoking may only be conducted in demarcated areas.		Liaison Officer
Safety of surrounding residents	All I & AP's should be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are: 1.4 Blasting 1.5 Risk to residence along haulage roads/access routes	Construction phase	Main Contractor and Environmental Liaison Officer
Emergency evacuation plan	1. 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. 2. All permanent staff must undergo safety training.	Construction phase	Main Contractor and Environmental Liaison Officer
Maintenance	The PV plants and surrounding areas are to be regularly		

	maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Construction phase	Main Contractor and Environmental Liaison Officer
Security			
Security actions that need to be implemented during construction	1. A security company should be employed to guard the construction site and monitor access. This company should also be utilised for the operation phase. 2. Labour should be transported to and from the site to discourage loitering in adjacent areas and possible increase in crime or disturbance. 3. Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them. 4. Only pre-approved staff must be permitted to stay within the staff accommodation which will be provided. 5. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase.	Construction phase	Main Contractor and Environmental Liaison Officer

	6. No alcohol/ drugs to be present on site. 7. No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel). 8. No harvesting of firewood from the site or from the business property adjacent to it without prior consent from the ECO. 9. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden). 10. Trespassing on private/ commercial properties adjoining the site is forbidden. 11. Driving under the influence of alcohol is prohibited. 12. All employees must undergo the necessary safety training and wear the necessary protective clothing. 13. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.		
Social Environment			

Social environment actions that need to be implemented during construction	1. All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. 2. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. 3. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. 4. All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect. 5. Care must be taken not to damage irrigation equipment, lines, channels and crops. 6. DPS79 Solar Energy (RF) (Pty) Ltd. should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction	Construction phase	Main Contractor and Environmental Liaison Officer

	workers 7. Contractors appointed by DPS79 Solar Energy (RF) (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		
Influx of people	1. Ensure that employment procedures/polices are communicated to local stakeholders, especially community representative organisations and ward councillors. 2. Have clear rules and regulations for access to the construction site to control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the construction site.	Construction phase	Main Contractor and Environmental Liaison Officer
Change to municipal infrastructure	1. Where possible, construction workers should be housed within the local community to reduce the possible additional strain on local resources. 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	Construction phase	Main Contractor and Environmental Liaison Officer

	toilet facilities) and serviced regularly to prevent contamination. 3. The use of local labour during construction will negate the need for additional housing; therefore, contractors are again urged to make use of as much local labour as possible.		
Integration with local communities	1. An aggressive STI and HIV/AIDS awareness campaign should be launched, which is not only directed at construction workers but also at the community as a whole. 2. Local women should be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability.	Construction phase	Main Contractor and Environmental Liaison Officer
Heritage			
Mitigation of the impact that the new development may have on potential archaeological artifacts on the site	1. Strict implementation of the conditions set in the heritage report. 2. Any finds must be reported to the nearest National Monuments office to comply with the National Heritage Resources Act (Act No 25 of 1999) and to DEA. 3. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be	Construction phase	Main Contractor and Environmental Liaison Officer

	informed if any artefacts are uncovered in the affected area. 4. The Contractor must ensure that his workforce is aware of the necessity of reporting any possible historical or archaeological finds to the ECO so that appropriate action can be taken. 5. Any discovered artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the SAHRA should the proposed site affect any world heritage sites or if any heritage sites are to be destroyed or altered.		
Archaeology on site	1. All three sites identified by the heritage study should be recorded on all development maps to ensure that no accidental damage may occur to them in the future. SAHRA should be informed if any of the sites is proposed to be impacted by future activities related to the PV plant. 2. All stakeholders and key personnel should undergo an archaeological induction course during this phase.	Construction phase	Main Contractor and Environmental Liaison Officer

	3. It is important to recognize any significant material being unearthed, making and to make the correct judgment on which actions should be taken.		
Graves	1. The informal cemetery should be temporarily demarcated during the construction phase to avoid any accidental damage to it. 2. If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find. Where possible, the graves should be relocated.	Construction phase	Main Contractor and Environmental Liaison Officer
Paleontology	1. If during construction any archaeological, paleontological or other heritage resources are found, the operations must be stopped and a professional archaeologist or palaeontologist must be contacted for an assessment of the find. SAHRA (Mrs Colette Scheermeyer, tel. 021 462 4502) must also be alerted immediately. If the newly discovered heritage resource/s is considered significant, a Phase 2 mitigation assessment with a permit from the responsible heritage authority may be required. 2. Should substantial fossil remains (e.g. well-	Construction phase	Main Contractor and Environmental Liaison Officer

	preserved fossil fish, reptiles or petrified wood) be exposed during construction, however, the ECO should carefully safeguard these, preferably in situ, and alert SAHRA as soon as possible so that appropriate action (e.g. recording, sampling or collection) can be taken by a professional palaeontologist.		
Community Engagement			
Community engagement	1. A communication guideline to be drafted and agreed upon with authority representatives and affected communities. 2. Open and transparent community engagement to be followed as culturally appropriate. 3. Records (written) to be kept of all community engagements (e.g. complaints, resolutions, etc)	Construction phase	Environmental Liaison Officer
Visual Impact			
Visual issues and actions that need to be implemented during the construction phase	1. There is good screening opportunity since the land is relatively flat and with scattered trees and bushes. Generation of dust will increase the visibility of the project, and it is therefore important to employ techniques to suppress dust generation during construction. Other measures	Construction phase	Environmental Liaison Officer

	include: 2. Carefully plan to reduce the construction period. 3. Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas. 4. Dust suppression is important as dust will raise the visibility of the development. 5. New road construction should be minimised and existing roads should be used where possible. 6. The contractor should maintain good housekeeping on site to avoid litter and minimise waste. 7. Minimise vegetation clearing and rehabilitate cleared areas as soon as possible. 8. Although there are no readily erodible slopes on the site, erosion risks should be assessed and minimised as erosion scarring can create areas of strong visual contrast with the surrounding vegetation, which can often be seen from long distances since they will be exposed against the hill slopes. 9. 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. 10. Fires and fire hazards need to be managed appropriately. 11. Screening should 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.		

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**
Construction Site Decommissioning			
Removal of equipment	1. All structures comprising the construction camp are to be removed from site. 2. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc, and these shall be cleaned up. 3. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document.	When beneficiaries take occupation	Main Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Temporary services	1. The Contractor must arrange the cancellation of all temporary services. 2. Temporary roads must be closed and access across these, blocked. 3. All areas where temporary services were installed	When beneficiaries take occupation	Main Contractor. Developer, Environmental Control officer and Environmental

	are to be rehabilitated to the satisfaction of the ECO.		Liaison Officer
Associated infrastructure	1. Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. 2. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. 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. 4. The site is to be cleared of all litter. 5. The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials. 6. Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. 7. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 8. All leftover building materials must be returned to the depot or removed from the site.	When beneficiaries take occupation	Main Contractor. Developer, Environmental Control officer and Environmental Liaison Officer

	9. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management.		
Rehabilitation plan	Rehabilitate and re-vegetate cleared areas with indigenous plant species.	When beneficiaries take occupation	Main Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Operation and Maintenance			
Maintenance	1. All applicable standards, legislation, policies and procedures must be adhered to during operation. 2. Regular ground inspection of the power plants must take place to monitor their status.	Operational phase	Developer
Public awereness	The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.	Operational phase	Developer
Soil Erosion and Geology			
Soil erosion	1. To avoid soil erosion, it will be a good practice to design storm water canals into which the water	Operational phase	Developer

	from the panels can be channeled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. 2. Another important measure is to avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads.		
Monitoring and reporting	Specific activities that should be monitored include: o Erosion potential (specifically in and around roads and stormwater discharge points). o Identified problem areas	Operational phase	Developer
Geology	1. Surface drainage should be provided to prevent water ponding. and 2. Bulk infrastructure should be designed by a specialist. 3. The occurrence of a seasonal perched groundwater table/ferricrete at relatively shallow depth, requires the implementation of damp course and an efficient surface drainage system. Mitigation measures proposed by the detailed engineering geological investigation should be implemented.	Operational phase	Developer

Surface and Groundwater			
Surface water	1. Correct drainage of the site should ensure that contaminants do not impact upon surface water. 2. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working.	Operational phase	Developer
Monitoring and reporting	Specific activities that should be monitored include: o Erosion potential (specifically in and around roads and stormwater discharge points). o Stormwater management and design o Identified problem areas	Operational phase	Developer
Site specific mitigation measures for surface water	1. Development and implementation of an adequate storm water management plan to be designed by an appropriate engineer. 2. The storm water management plan must include the construction of appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. 3. Drainage measures must promote the dissipation of storm water run-off.	Operational phase	Developer
Site specific mitigation measures for	1. Inventories should be made of all substances that	Operational phase	Developer

surface water	are potentially hazardous to groundwater, which will be stored, used or transported over the sites. The risk of each substance to the groundwater should be considered. 2. All areas in which substances potentially hazardous to groundwater are stored, loaded, worked with or disposed of should be securely bunded (impermeable floor and sides) to prevent accidental discharge to groundwater. 3. A groundwater monitoring programme (quality and groundwater levels) should be designed and installed for the site. Monitoring boreholes should 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 should be done according to recognised standards.		
Biodiversity (Fauna and Flora)			
Vegetation	1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed off appropriately.	Operational phase	Developer

	2. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. 3. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties within a 20-metre radius of the site. 4. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation.		
Other fauna	No faunal species must be harmed by maintenance staff during any routine maintenance at the development.	Operational phase	Developer
Site specific mitigation measures	1. Six monthly checks of the area should take place for the emergence of invader species. 2. Mitigation measures mentioned for the construction phase above must be implemented for any maintenance of the development that may be undertaken during the operation phase. 3. Correct rehabilitation with locally indigenous species. 4. Monitoring programme to ensure that rehabilitation efforts are successful to ensure	Operational phase	Developer

	that risks such as erosion and the edge effect are avoided. 5. Constant maintenance of the area to ensure re-colonisation of floral species. 6. Regular removal of alien species which may jeopardise the proliferation of indigenous species. Regular maintenance of bird flappers and guards must be undertaken.		
Avifauna			
Bird injury or mortality	1. Implement a bird monitoring program (BMP) for the Waterloo Solar complex. 2. Increase the fragmentation of polarized surfaces on PV panels by non-polarizing white grid. 3. Reduce the trespass of lighting by using luminaires that prevents light from shining beyond the intended area and eliminates light directed upwards or at the horizontal.	Operational phase	Developer
Nesting on site	1. Avoid the use of lattice-type structures in order to minimise perching and nesting opportunities. 2. Minimise standing water. This will make it more difficult for the two swallow species to obtain mud for their nests and will minimise the risk of	Operational phase	Developer

	large congregating birds near the PV arrays. 3. Inspect each PV module at least once a month throughout the year for any nest-building activity. 4. Maintenance staff needs basic training in order to know what to look for and how to fill in the Bird Incident Forms.		
Waste Management			
Recycling and litter management	1. The site should be kept clear of litter at all times. 2. Solid waste separation and recycling should take place for the duration of the operational phase for the development. 3. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 4. In house treatment procedures must be followed strictly. 5. Solid waste should be collected on a regular basis. 6. Package treatment plant must be regularly serviced.	Operational phase	Developer
Health and Safety			

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 plants are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Operational phase	Developer
Fire safety	Fire fighting 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	1. Transformer oil containers must be regularly maintained to ensure that leaks do not occur. 2. A spill kit needs to be kept on site to address any unforeseen spillages. 3. Transport of all hazardous substances must be in accordance with the relevant legislation. 4. The bund wall surrounding the transformer oil containers must be regularly maintained to ensure that any spills are completely contained.	Operational phase	Developer
Visual Impact			

Maintenance and lighting	1. Lighting must be kept to a minimum and restricted to low level, downward facing lights to reduce light spill. 2. Lighting must be inward and downward pointing to reduce glare in surrounding areas. 3. Security lighting should make use of down-lights to minimise light spill, and motion detectors where possible so that lighting at night is minimised. 4. Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility by a lighting engineer. 5. Screening should be implemented by means of vegetation in conjunction with security fencing. 6. The power plants area and surrounds must be kept clean, tidy and well maintained to reduce negative visual impacts. 7. Rehabilitation of surrounding areas must take place with indigenous species. 8. Surrounding roads must be well maintained. 9. Regular maintenance of exteriors and associated infrastructure must be undertaken.	Operational phase	Developer
Employment			

Labour	Training of labour to benefit individuals beyond completion of the project.	Operational phase	Developer
Recruitment plan	1. Recruitment must comply with national employment and labour laws. 2. Where reasonable and practical, DPS79 Solar Energy (RF) (Pty) Ltd.'s service providers should appoint local residents and implement a 'locals first' policy, especially for semi and low-skilled job categories. 3. 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. 4. Ensure adequate advertising in the project community areas, local papers for skilled labour. 5. Local community leaders must be utilised to source labour. 6. 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. 7. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection.	Operational phase	Developer

	8. Record of official complaints by employees to authorities i.e. Labour and Social Security. 9. Where feasible, efforts should be made to employ local contractors that are compliant with Black Economic Empowerment (BEE) criteria. 10. Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the operation phase. 11. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. 12. Establish, maintain a healthy worker-management relationship.		
Grievance mechanism	1. A grievance mechanism as part of the management system should be established. 2. The grievance procedure does not replace normal Manager employee dialogue, but is another open form of communication. 3. The procedure should assist employees to resolve grievance situations quickly and effectively in order to restore harmonious working conditions for all employees. 4. Management is responsible for listening and	Operational phase	Developer

	responding to all employee concerns raised through this procedure. 5. In all cases, matters will be dealt with in as confidential a manner as possible.		
Social Environment			
Corporate social investment	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. 2. DPS79 Solar Energy (RF) (Pty) Ltd. should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project;	Operational phase	Developer
Sense of place	Job opportunities should be afforded to local individuals as far as possible to enhance their sense of place.	Operational phase	Developer

Table 3-6: 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**
Ongoing Stakeholder involvement			
	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. 2. Community to be notified, as culturally appropriate, timeously of the planned decommissioning. 3. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: o What activities will take place during the decommissioning phase. o How these activities will impact upon the communities and/or their properties. o Regarding the timeframes of scheduled activities. 4. Regular interaction between DPS79 Solar Energy (RF) (Pty) Ltd. and community leader(s) during	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	the decommissioning phase. 5. A reporting office/channel to be established should community members experience problems with contractors/sub-contractors during the decommissioning phase. 6. A register to be kept of problems reported by community members and the steps taken to address/ resolve it.		
Community Health and Safety Responsibility			
Community health and safety responsibility	1. Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. 2. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. 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.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Waste Management			
Waste management	1. All decommissioned equipment must be removed from site and disposed of at a registered land fill.		

	Records of disposal must be kept. 2. The panels need to be disposed of appropriately and returned to the manufacturer to be recycled. 3. 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.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Surface and Groundwater Responsibility			
Surface and groundwater responsibility	1. Removal of any historically contaminated soil as hazardous waste. 2. Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. 3. Removal of all substances which can result in groundwater (or surface water) contamination. 4. Re-vegetation of exposed soil surfaces to ensure no erosion in these areas.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Biodiversity Responsibility			
Loss of habitat	1. Maintain footprint strictly during decommissioning. 2. Existing access roads must be used. 3. All infrastructure must be removed from the site. 4. Re-vegetation of affected areas must be made a	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	priority to avoid erosion. 5. Suitable stormwater/wind controls must be put in place until rehabilitation is complete. 6. Constant removal of alien invasive species in and around plant.		
Edge effect	1. The Contractor should be responsible for implementing a programme of weed control. 2. Present exotic and invasive plant species, in particular *Prosopis glandulos*a, should be eradicated at the site. 3. By no means should any declared invaders, such as the mesquite tree (*Prosopis* species) be planted or allowed to establish if the development is approved. 4. All exotic vegetation must be removed from the site (if present).	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Air Pollution Responsibility			
Air pollution responsibility	Regular maintenance of equipment to ensure reduced exhaust emissions.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Noise and Vibrations			
Noise and vibrations	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. 2. Any noisy fixed facilities should be located well away from noise sensitive areas. 3. Truck traffic should be routed away from noise sensitive areas, where possible. 4. Noise levels must be kept within acceptable limits. 5. Noisy operations should be combined so that they occur where possible at the same time. 6. Construction workers to wear necessary ear protection gear. 7. Noisy activities to take place during allocated construction hours. 8. Noise from labourers must be controlled. 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	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	site. 10. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11. Implementation of enclosure and cladding of processing plants. 12. Applying regular and thorough maintenance schedules to equipment and processes.		
Site specific mitigation measures	1. During decommissioning care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. 2. Gravel roads used should be kept in good order. Corrugations and drainage ruts should not be allowed to develop.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Decommissioning Traffic			
Decommissioning traffic	1. Routes and required access roads must be clearly defined. 2. The removal of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	3. Access of all vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. 4. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. 5. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. 6. Servicing must be done in dedicated service areas on site or else off site if no such area exists. 7. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. 8. Soils compacted by construction vehicles shall be deep ripped to loosen compacted layers and re-graded to even running levels.		
Access	1. The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-contractors. 2. Contractor shall clearly mark all access roads. Roads not to be used shall be marked with a “NO ENTRY for construction vehicles" sign.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Noise	Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning	Decommissioning	DPS79 Solar Energy (RF) (Pty) Ltd.

	and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends.	phase	
General	1. The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labeling on the containers and trucks used shall be in place. 2. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. 3. Care for the safety and security of community members crossing access roads should receive priority at all times.	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.
Visual Impact			
Visual impact	Generation of dust will increase the visibility of the project, and it is therefore important to employ techniques to suppress dust generation during decommissioning. Other measures include: 1. Carefully plan to reduce the decommissioning period. 2. Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying	Decommissioning phase	DPS79 Solar Energy (RF) (Pty) Ltd.

	areas. 3. Existing roads should be used where possible. 4. The contractor should maintain good housekeeping on site to avoid litter and minimise waste. 5. Erosion risks should be assessed and minimised as erosion scarring can create areas of strong visual contrast with the surrounding vegetation, which can often be seen from long distances. 6. 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. 7. Fires and fire hazards need to be managed appropriately.		

Table 3-7: Proposed Mitigation Measures during the Post Closure Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING OPERATION (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	**Timeframe**	**Responsibility**
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.			

3 ENVIRONMENTAL AWARENESS PLAN

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 Waterloo Solar Park. 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 should 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 should 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

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 should 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;
- Quarterly independent external audits during the construction and site establishment phase by an independent external auditor;
- One post-construction audit by an independent external auditor;
- Annual audits for the first five years of the operational phase of each of the five phases; 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 Waterloo Solar Energy 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

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 DEA. Copies of the amendments will be issued to all registered I&APs.

Appendices

Appendix A: CV of the EAP

Appendix: 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:		