FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

November 2016

THE BOKAMOSO PHOTOVOLTAIC SOLAR ENERGY FACILITY NEAR LEEUDORINGSTAD, NORTH WEST PROVINCE

ENVIRONAMICS

PROJECT DETAIL

Reference No:	14/12/16/3/3/2/559 14/12/16/3/3/2/559/AM1 14/12/16/3/3/1/1519
Project Title:	The Bokamoso Photovoltaic Solar Energy Facility near Leeudoringstad, North West Province
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BA	Basic Assessment
BAR	Basic Assessment Report
BMP	Bird Monitoring Plan
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
CoMLM	City of Matlosana 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
SPP	Solar Power Plant

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 Environmental Impact Assessment process is effectively managed during the construction and operational phases of the Bokamoso Photovoltaic (PV) Solar Facility. The EMPr specifies the mitigation and management measures to which the Developer is committed in relation to the establishment of the Photovoltaic Solar Energy Facility and its associated infrastructure, and shows how the project will mobilise organizational capacity and resources to implement these measures.

In order to comply with the requirements of GN R 982(19)(4) and (23)(4), an EMPr has been compiled as part of the approved Environmental Impact Report (EIR) and Basic Assessment Report for the Bokamoso PV Facility and expansion thereof. 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 & PROJECT DESCRIPTION

This EMPr has been compiled for the Bokamoso Photovoltaic Solar Energy Facility and expansion located on a portion of the Farm Matjesspruit 145, near Leeudoringstad, North West Province. The total extent of the PV Facility will cover an area of 149.9ha and is authorised under two separate Environmental Authorisations. One EA (DEA Reference: *14/12/16/3/3/2/559*, as amended) has been received for the original PV site of 130ha, and a second EA (DEA Reference: *14/12/16/3/3/1/1519*) has been received for a 19.9ha expansion area. The two authorised areas will be developed as a single PV Facility, and thus a single EMPr (this document) has been developed to govern the development, operation and decommissioning of the facility.

A separate EMPr has been compiled for the 132kV loop-in loop-out overhead powerlines, radio communication mast, switching station and associated infrastructure as part of the Bokamoso Photovoltaic Solar Energy Facility, since it will be handed over (after completion) to Eskom Holdings SOC Ltd. to operate and maintain.

The development of the Bokamoso PV solar energy facility is proposed to involve the following:

- Site clearing and preparation;
- Civil works;
- Construction of the PV panel array with a height up to 3.5 meters,
- Construction of anon site substation within a ~10 000m^2 fenced substation complex area (~ 100m X 100m), with a height of up to 7.5 meters;
- Construction of supporting infrastructure, including operations and maintenance buildings/ facilities, office and ablution facilities with a height of up to 7.5 meters and a total footprint of 400m^2 or less;

- Construction of site access point and access road;
- Construction of internal roads;
- Construction of associated infrastructure, such as inverters, internal cabling between the PV panel arrays and the substation, other sundries etc.;
- Construction of perimeter fencing;
- Construction of a storm water management system; and
- Decommissioning and site rehabilitation (should the facility be decommissioned at some point in the future).

The Layout plan, Sensitivity- and Superimposed Layout map is included as part of the EMPR (refer to Figure 1, 2 & 3) and indicates the site boundary, plant boundary, internal roads and environmental sensitive areas.

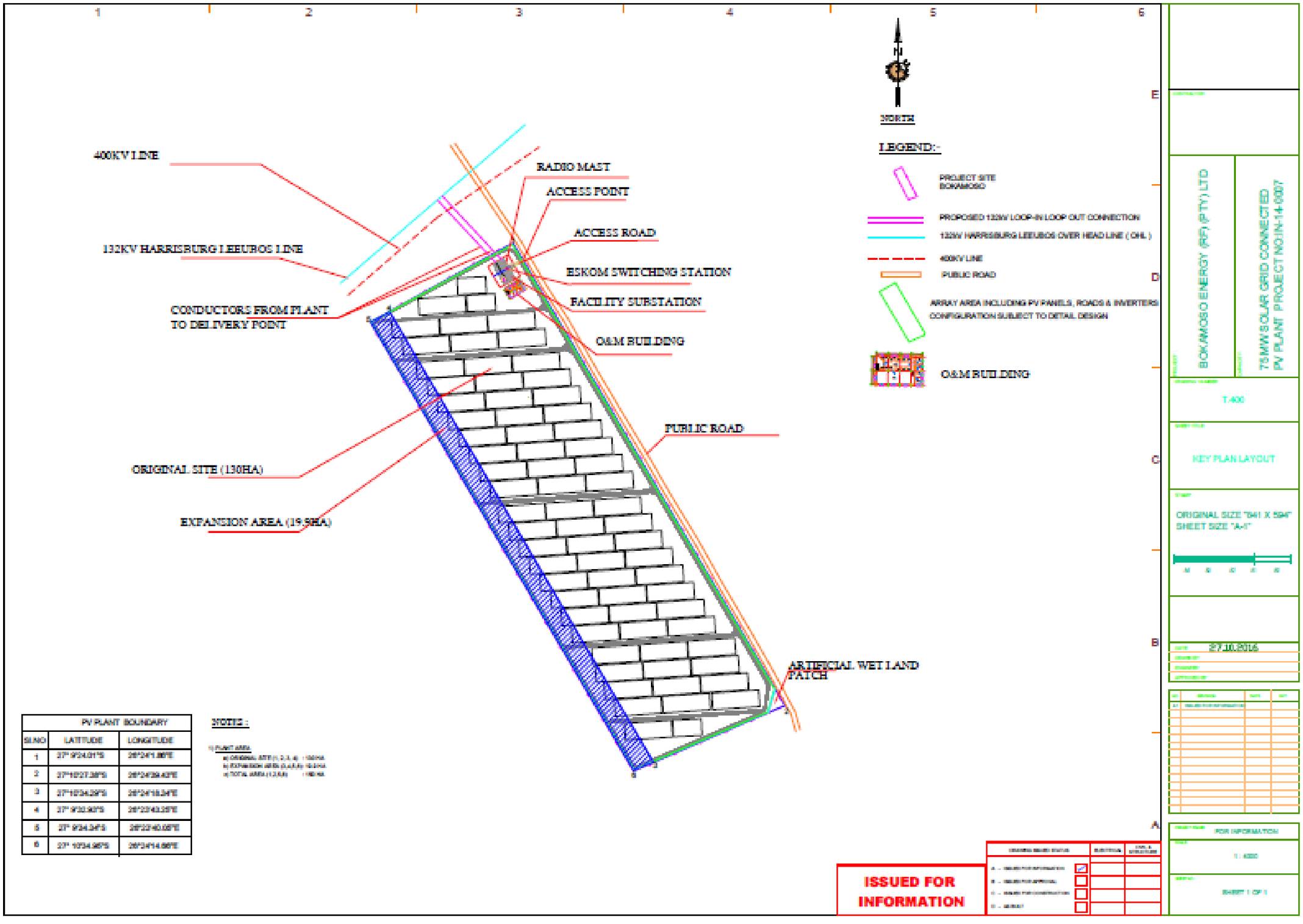

Figure 1: Layout plan indicating site boundary, plant boundary and internal roads

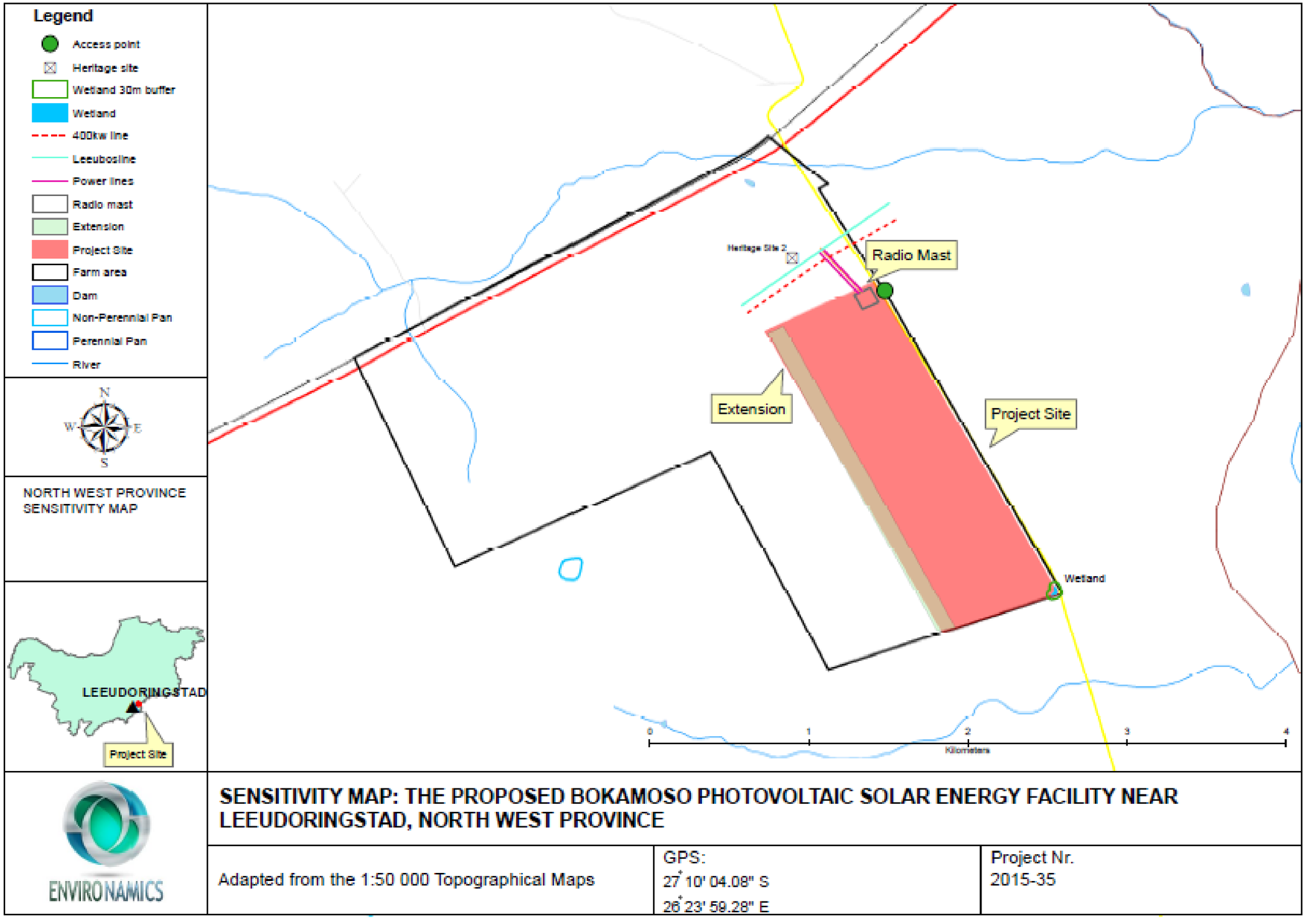

Figure 2: Sensitivity Map, indicating environmental sensitive areas and features

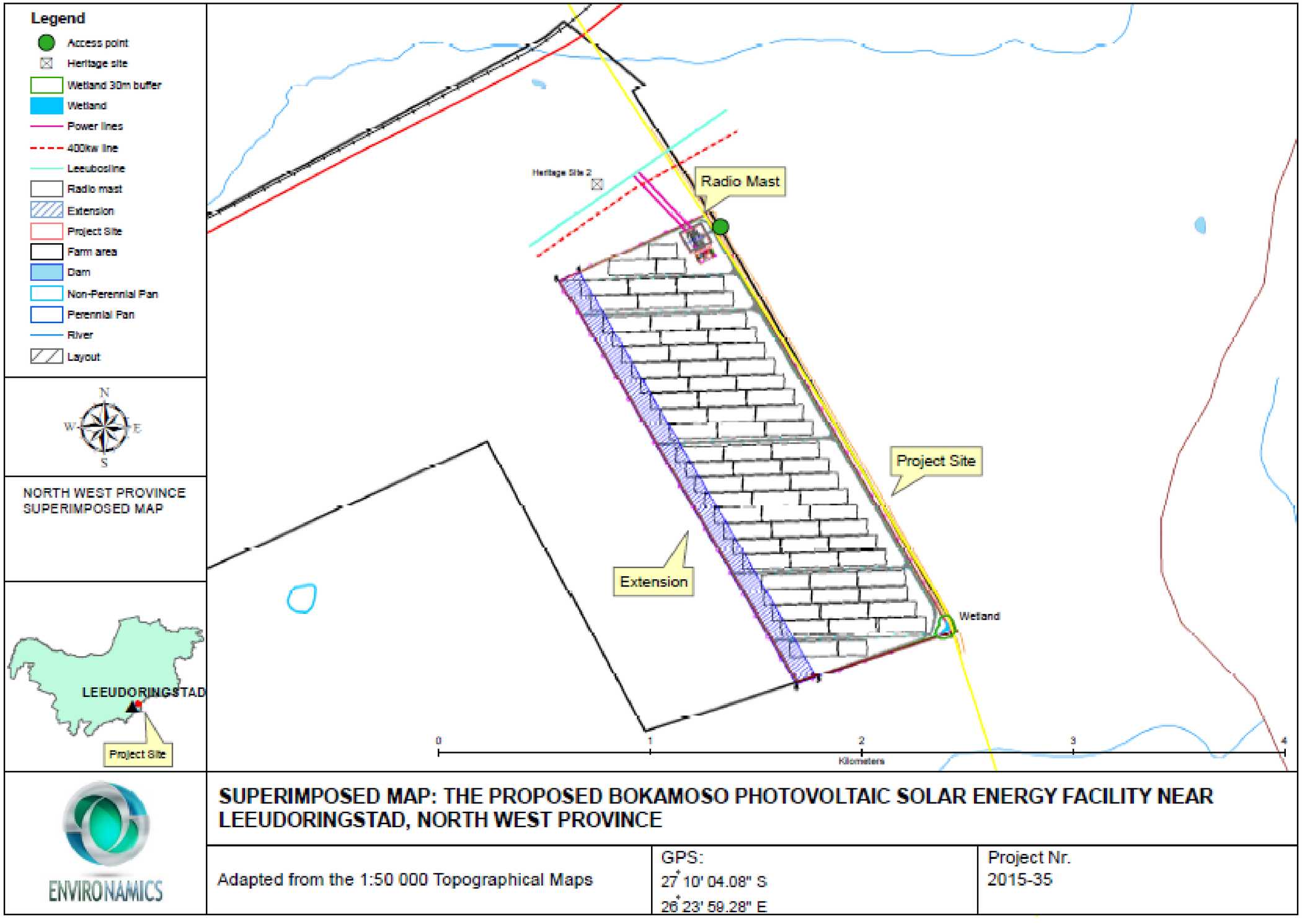

Figure 3: Superimposed Layout Plan on the environmental sensitivity map

1.2 OBJECTIVES OF THE EMPR

The key objectives of the EMPr are to:

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

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

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

- Planning and design;
- Pre-construction and construction;
- Operation;
- 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		
Loss or fragmentation of indigenous natural fauna and flora	Negative Medium	To avoid or reduce the loss of fauna and flora.
Disturbance of soils and existing land use (soil compaction)	Negative Low	To avoid soil compaction on site.
Chemical Soil pollution	Negative low	To avoid the pollution of soil on site.
Temporary employment opportunities	Positive Medium	To enhance the use of local skills and uplift the local community.
Generation of waste	Negative Low	To avoid or minimise the generation of waste.
Operational phase		
Impacts on soil (erosion)	Negative Low	To enhance erosion control and prevent soil loss.
Increase in storm water runoff	Negative Low	To avoid or reduce storm water runoff.
Increase in consumption of water	Negative Medium	To reduce the consumption of water and ensure sustainable supply.
Provision of services	Negative Medium	To ensure the sustainable provision of service infrastructure.
Leakage of hazardous materials	Negative Low	To avoid the leakage of hazardous materials.
Permanent employment opportunities	Positive Medium	To enhance the use of local skills and uplift the local community.
Additional electricity generation	Positive Medium	To enhance the use of renewable energy.
Impact on Local Community	Medium Positive	Provide management measures for the establishment of a community trust.
Decommissioning phase		
Generation of waste (Existing service infrastructure).	Negative Low	To avoid or minimise the generation of waste.
Socio-economic impacts (loss of employment)	Negative Medium	Minimise the impact of the loss of local employment that 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 Process and prepare all required reports such as the EMPr. All correspondence to the EAP can be directed to:

Contact person: Marélie Botha

Postal Address: PO Box 6484, Baillie Park, 2526

Telephone: 018 290 8228 (w) 086 762 8336 (f) 081 756 9945(c)

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 Environmental Impact Assessment. In terms of the independent status of the EAP a declaration was included as part of the Environmental Impact Assessment Report. 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 EMPR

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 is also a condition of the Environmental Authorisations (EAs) for this project. 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 1-2.

Table 1.2: Structure of the EMPr

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.	1.1 & 2.4
(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	1.2 & 1.3

	for all phases of the development including-	
	(i) Planning and design;	
	(ii) Pre-construction activities;	
	(iii) Construction activities;	
	(iv) Rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities	
(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 -	2.9
	(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);	2.7
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	2.7
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	2.3
(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);	2.5
(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 fulfilment 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 EMPr is amendable and must be implemented and strictly enforced during all phases of the project. It shall be seen as a dynamic document and shall be included in all contract documentation for all phases of the development. 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.

1.6 FREQUENCY AND PROCESS OF UPDATING THE EMPR

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. Any changes to, or deviations from, the project description set out in the EA must be approved by the DEA in writing, such changes or deviations may be affected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorization to apply for further environmental authorization in terms of the regulations. Any changes to the EMPr, which are environmentally defendable, shall be submitted to the DEA for acceptance, before such changes could be effected. The DEA reserves the right to amend the EMPr should any impacts that were not anticipated or covered in the BAR be discovered. The holder of an EA must apply for an amendment of the EA with the competent authority for any alienation, transfer or change of ownership rights in the property on which the activity is to take place.

- The EMPr must be updated where the findings of the environmental audit reports indicated insufficient mitigation of environmental impacts associated with the undertaking of the activity, or insufficient levels of compliance with the environmental authorization or EMPr. The updated EMPr must include the following:

- Contain recommendations to rectify the shortcomings identified in the environmental audit report.

- It must be submitted to the DEA for approval together with the environmental audit report, as per Regulation 34 of GN R. 982.

- It must have been subjected to a public participation process, which process has been agreed to by the DEA, prior to submission of the updated EMPr to the DEA for approval.

In assessing whether to grant approval of an EMPr which has been updated as a result of an audit, the DEA will consider the processes prescribed in Regulation 35 of GN R.982. Prior to approving an amended EMPr, the DEA may request such amendments to the EMPr as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

The holder of the authorization may apply for an amendment of an EMPr, if such amendment is required before an audit is required. The holder must notify the DEA of its intention to amend the EMPr at least 60 days prior to submitting such amendments to the DEA for approval. In assessing whether to grant such approval or not, the DEA will consider the processes and requirements prescribed in Regulation 37 of GN R. 982.

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.
Minimisation	Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project.
Mitigation	Measures taken to minimise adverse impacts on the environment.
Enhancement	Magnifying and/or improving the positive effects or benefits of a project.
Rehabilitation	Repairing affected resources, such as natural habitats or water resources.
Restoration	Restoring affected resources to an earlier (possibly more stable and productive) state, typically 'background' or 'pristine' condition. These resources may include soils and biodiversity.
Compensation	Compensating for lost resources, and where possible, the creation, enhancement or protection of the same type of resource at another suitable and acceptable location.

2.1 KEY DEFINITIONS USED IN THIS EMPR

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

Table 2-2: Key definitions used in this EMPr

Term	Definition
Alien species	A species not indigenous to the area or out of its natural distribution range.
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
Assessment	The process of collecting, organising, analysing, interpreting and communicating information which is relevant.
Construction	Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation, and includes site preparation activities.
Decommissioning	To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.
DEA	Department of Environmental Affairs.
Developer	In the context of this EMPr, the Developer (also known as the "Project Company") is the owner of the project and the holder of the Environmental Authorisation/s for the project (i.e. Bokamoso Energy (RF) (Pty) Ltd). The Developer is responsible for appointing and managing contractors and the ECO.
Environment	As per definition in the NEMA.
Environmental Assessment Practitioner	An independent environmental consultant with experience in the management of EA applications in terms of the NEMA.
Environmental Authorisation (EA)	Means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental Control Officer (ECO)	The ECO is appointed by the Developer to ensure compliance to the EMPr and conditions of the EA during construction and provides proof of compliance documentation to the Project Management Team.
Environmental Liaison Officer (ELO)	The ELO is appointed by the Contractor to monitor activities on site on a daily basis and ensure compliance with the EMPr and the conditions of the EA on a daily basis. The ELO acts as the primary point of contact for the ECO, and must report any major incidents immediately to the ECO.
Environmental Impact	A change in the environment, whether adverse or beneficial, wholly or partly, resulting from an organisations' activities, products or services.
Environmental management	All environmental considerations for which the project management team are responsible during the management cycle of the project, i.e. policy, planning and design, implementation (preconstruction, construction and operation), monitoring and corrective action and review.
Interested and affected party (I&AP)	Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, affected land owners, local communities, investors, work force, consumers, environmental interest groups, and the public.
Incident	An undesired event that may result in a significant environmental impact, although can be managed through internal response and procedures.
Method Statement	A written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct a specific activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.
Operator	The Operator is the entity who will be responsible for the operation of the PV solar facility throughout its operational lifespan. This may be the Developer, or an entity/ Contractor appointed by the Developer.
Plan	Sets out the intended method and/or specific measures required to mitigate and/or enhance the negative and positive impacts of the Project. A plan usually focuses on one project phase, i.e. construction, operation or closure.
Pre-construction	The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation such as planning, design, surveys etc.
Project Management	The responsibility of the EMPr implementation resides on this team. This team includes the Developer and/or his appointed Agent as well as

Team	appointed contractors and consultants, including the ECO.
Programme	Identifies a series of interrelated measures (often contained in detailed plans) for managing the environmental effects of the Project. A programme provides broad direction and covers more than one project phase.
Safety, Health and Environmental Representative (SHE representative)	A representative of the Developer or its Agent, appointed as a SHE representative, assisting the construction manager on Health, Safety and Environmental aspects of the project on the construction site. The SHE representative may act as the primary liaison with the ECO. Each Principal Constractor(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 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

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

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Sections 24(5) and 44 of NEMA (GNR 982 – 985 in Government Gazette 38282 of 4 December 2014)
- International Standards – IFC Standards and Equator Principles (2013)

2.3 ROLES AND RESPONSIBILITIES

The roles and responsibilities of the different legal appointments anticipated for the construction of the Bokamoso 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.

2.3.1 Project Management Team

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

- The Developer or its appointed Agent;
- Principal contractors appointed for the development;
- Construction supervisor or Environmental Liaison Officer;
- Subcontractors; and

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

2.3.2 The Developer

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

- The Developer will appoint Principal Contractor(s) for each logical project phase in writing to assume the role of Principal Contractor(s) as intended by the Construction Regulations and as determined by the Bills of Quantities;
- The Developer will appoint an independent Environmental Control Officer (ECO) to monitor and report on compliance with this EMPr;
- Where appropriate, 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 this EMPr is implemented by the Principal Contractor(s) and their Sub-Contractor(s). 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 the conditions of the EA, the provisions of this EMPr or any other environmental permits applicable to the development;

- 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 this EMPr, the approved Method Statements, or their Health and Safety Plan.

- Act in any way which may pose a threat to the environment, or 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;
- The Developer or its appointed Agent will ensure compliance of all contractors and sub-contractors to the conditions set in the approved EMPr and EA;
- The Developer needs to give 14 (fourteen) days written notice to inform the DEA that the activity will commence. Commencement for the purposes of this condition includes site preparation. The notification must include a date when the activity will commence as well as the reference number;
- The Developer must give 14 (fourteen) days written notice to the DEA to inform them of the commencement of the operational phase of the PV site;
- The EMPr must form part of the contract with the Engineering, Procurement & Construction Contractor (EPC – i.e. the Principal contractor) appointed to construct the proposed facility, and must be used to ensure compliance with environmental specifications and management measures; and
- Should the activity ever cease or become redundant, the applicant shall undertake the required decommissioning actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

2.3.3 Principal Contractor(s)

The Principal Contractor(s) appointed for the construction of the different phases of the Bokamoso PV Solar Facility will be responsible for the following:

- Ensure that he/she is fully conversant with the requirements of the specifications of this EMPr and all relevant Environmental, Health and Safety legislation. This EMPr is not intended to supersede the Occupational Health and Safety Act (Act 85 of 1993) (OHSA) nor the Construction Regulations or any part of either. Those sections of the OHSA 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 OHSA, the Construction Regulations or any Regulations proclaimed under the OHSA 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 (as applicable), the OHSA 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 must take responsibility in terms of this contract;
- The Principal Contractor(s) must make provision for the cost of compliance with the EA and this EMPr, as well all other environmental permits, specified occupational health and safety requirements, the OHSA and Construction Regulations;
- 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 EMPr, the EA, other environmental permits, relevant environmental legislation, the OHSA and the Construction Regulations;
- Ensure that a copy of this EMPr, 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 an Environmental, Health and Safety file, which shall include all documentation required in terms of the provisions of this EMPr, the EA, the OHSA and the Construction Regulations, is opened and kept on site and made available to the Developer or Inspector (e.g. the ECO) upon request. Upon completion of the works, the Principal Contractor(s) shall hand over a consolidated Environmental, 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 EMPr, the EA, other environmental permits, relevant environmental legislation, the OHSA 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;
- Comply with the EMPr and EA commitments and any other legislative requirements as applicable to their workings;
- Adhere to any instructions issued by the City of Matlosana 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), or delegated agent overseen by the Construction Supervisor.

2.3.4 Environmental Liaison Officer (Environmental Site Officer)

The Environmental Liaison Officer (ELO) (alternately referred to as the Environmental Site Officer) is appointed by the Contractor, and will be responsible for:

- Ensuring compliance with the EMPr and EA commitments and any other legislative requirements as applicable to their workings, on a day-to-day basis;
- Ensuring adherence to any instructions issued by the City of Matlosana 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;
- Acting as a primary point of contact for the ECO; and
- Reporting major incidents of environmental non-compliance to the ECO.

2.3.5 Sub-contractors

Sub-contractors are responsible for:

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

2.3.6 Environmental Control Officer (ECO)

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

- The ECO is responsible to ensure that the conditions of the EA are implemented, and must monitor and report on the compliance with the conditions of the EA and the provisions of this EMPr;
- The ECO must meet with the contractors to discuss the conditions of the EA and the contents of the EMPr prior to any site clearing occurring;

- The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation;
- The ECO must keep record of all activities on site, problems identified, transgressions noted and a schedule of tasks undertaken by the ECO;
- The ECO must advise the Developer on environmental issues and recommendations for the proposed development;
- The ECO must keep and maintain a detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints;
- The ECO may authorise the removal of personnel and / or equipment should they contravene the requirements of the EA, this EMPr or any other applicable environmental permit or environmental legislative.
- The ECO must keep and maintain a daily site dairy, as appropriate;
- The ECO must keep copies of all reports submitted to the Department;
- Keep and maintain a schedule of current site activities including the monitoring of such activities;
- The ECO must obtain and keep record of all documentation, permits, licenses and authorisations such as waste disposal certificate, hazardous waste landfill site licenses etc. required by this facility; and
- Compile a monthly monitoring report.
- Arrange for liaison with interested and affected parties (I&APs) on environmental issues of concern, should the need arise;
- Ensuring that corrective actions are followed up and closed out in accordance with the conditions set out in the EMPr.

2.4 LIFECYCLE OF THE SOLAR ENERGY FACILITY

2.4.1 Construction

The EMPr has recommended mitigation and management measures to avoid or minimise negative 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 City of Matlosana Local Municipality Landfill Site (or other licensed disposal site);
- Stripping and stockpiling of topsoil and sub soil from the site for later use for rehabilitation and landscaping; and
- Site rehabilitation following the construction phase, of areas that have been disturbed and are not part of the on-going operational phase of the proposed project.

2.4.2 Operation

The operational phase of the Bokamoso PV Solar Facility will involve the following:

- Generation of renewable energy to be fed into the national Eskom grid;
- Maintenance and washing of PV panels;
- Maintenance of the storm water management system; and
- Solid waste removal.

2.4.3 Post-Construction Rehabilitation

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

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

2.4.4 Decommissioning

The operating period will be 20 - 25 years from the commencement date. Thereafter the PV plant may be decommissioned, or may continue to operate (with or without upgrading), subject to the necessary approvals and agreements with the relevant authorities and the land owner concerned.

If, for whatever reason the plant halts operations, the site must be decommissioned and rehabilitated in accordance with the Environmental Authorisation and the lease agreement signed between the Developer and the land owner. During the decommissioning phase the Developer shall undertake all required actions as prescribed by legislation at the time of decommissioning, and must comply with all relevant legal requirements administered by any relevant and competent authority at the time.

<u>The decommissioning process will consist of the following steps:</u>

- The PV facility would be disconnected from the Eskom grid.
- The inverters and PV modules would be disconnected and disassembled.
- Concrete foundations (if used) would be removed and the structures would be dismantled.
- The underground cables would be unearthed and removed and buildings would be demolished and removed.
- The fencing would be dismantled and removed.
- The roads can be retained should the landowner choose to retain them, alternatively the roads will be removed and the compaction will be reversed.
- Most of the wires, steel and PV modules are recyclable and would be recycled to a reasonable extent. The Silicon and Aluminium in PV modules can be removed and reused in the production of new modules.
- Any rubble and non-recyclable materials will be disposed of at a registered landfill facility.
- All materials, equipment, facilities and waste will be removed from the site and re-used, recycled or disposed of as appropriate. No materials, equipment, facilities or waste shall remain on site, unless agreed otherwise with the land owner.

2.5 CONSTRUCTION MONITORING AND CORRECTIVE ACTION

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.

Monitoring ensure that:

- The required EMPr and EA conditions are being implemented on the site; and
- The desired outcomes are being achieved and potential impacts managed.

All programmes and plans forming part of this EMPr will be subject to monitoring. Monitoring during the Construction Phase will have three elements namely:

1. On-going daily and weekly inspections by the Environmental Site Officer, to ensure compliance with the EA and EMPr and identify any corrective actions required.
2. Monthly inspections by the ECO to assess compliance with the EMPr and the EA, and to prescribe and monitor the implementation of corrective actions required,
3. Environmental Audits, according to the frequency specified by the Competent Authority.

2.5.1 Daily/Weekly Monitoring

Monitoring of the implementation of the EMPr, EA and general environmental management measures on a day-to-day basis during construction should be undertaken by the Principal contractor's Environmental Site Officer, or other appointed person. Some aspects (such as dust control) may require daily monitoring, while other aspects (such as soil erosion) may require less frequent or weekly monitoring. Where instances of non-compliance (or potential non-compliance) are identified, the issues/incidents should be recorded and the relevant corrective actions should be identified and implemented.

The contractor is responsible for developing and implementing an ongoing monitoring regime, which will ensure effective implementation of all relevant environmental management and mitigation measures.

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

2.5.2 Monthly ECO Monitoring

The ECO will monitor compliance with the conditions of the EA and the implementation of the EMPr for the proposed development on a monthly basis during the construction phase. This will include, but not be limited to, the monitoring of:

- Land clearing and soil management;
- 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;
- Erosion and storm water management;
- Storage and handling of hazardous substances;
- Dust control;
- Review of the Environmental Complaints register, and resolution of recorded complaints; and
- Post-construction rehabilitation.

The ECO will also be responsible for monitoring and inspecting contractors' written records to illustrate compliance with the EMPr. This compliance monitoring is to verify that the responsible parties are adhering to the procedures, management conditions, and specifications contained in this EMPr.

2.5.3 Environmental Auditing

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 and operational phase of the facility to ensure compliance with the management measures contained in the EMPr.

The holder of the environmental authorisation (EA) must, for the period during which the EA and the EMPR remain valid, ensure that the project compliance with the conditions of the EA and the EMPR are audited, and that the audit reports are submitted to the Director: Compliance Monitoring of the Department. An independent Environmental Auditor (who is not the ECO), must be appointed by the Developer to undertake Environmental Auditing in accordance with the provisions of the EA, and the requirements of Appendix 7 of the Environmental Impact Assessment Regulations (GNR 982 of 4 December 2014).

The frequency of environmental auditing must be in accordance with what is stated in the EA, or as specified by the Competent Authority, taking into account the processes for such auditing as prescribed in Regulation 34 of GNR. 982.

The construction audit schedule is as follows:

- Monthly inspections by the ECO;
- One post-construction audit by an independent external auditor, with the audit report to be submitted to the DEA within 30 days of completion of the construction phase;
- One post-rehabilitation audit by an independent external auditor, with the Audit Report to be submitted to the DEA within 30 days of completion of rehabilitation activities.

Environmental Audits undertaken by external independent auditors must adhere to the audit requirements as specified in the EA and Appendix 7 of the EIA Regulations, 2014. The monthly ECO reports should be incorporated into the audit report.

The Operational audit schedule is as follows:

- Although not a requirement of the EA, it is recommended that the Developer undertake annual audits of the Operational EMPr or Operational Environmental Management System (as applicable), for the operational lifespan of the PV facility. The frequency of the audits may be increased or decreased should the results of the audits warrant it.

The environmental audit report must be compiled in accordance with Appendix 7 of the EIA Regulation, 2014 and must indicate the date of the audit, the name of the auditor and the outcome of the audit in term of compliance with the environmental authorization conditions as well as the requirements of the approved EMPR. Records relating to monitoring, auditing and the approved EMPr must be kept on site and made available for inspection and copying to

anyone on request in respect of the development. Where the holder of the environmental authorization has a website, it must be made available on such publicly accessible website.

The objective of the environmental audit report is to report on the level of compliance with the conditions of the EA and EMPr, the extent to which the avoidance, management and mitigation measures provided for in the EMPr achieve the objectives and outcomes of the EMPr, and to provide for recommendations regarding the need to amend the EMPr.

2.5.4 Mechanisms for Corrective Action

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

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

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

2.6 OPERATIONAL MONITORING & REVIEW

The operational aspects of this EMPr should be integrated into the Developer's Environmental & Social Management System (ESMS) for the site. The Developer or its appointed Agent must monitor compliance with the operational aspects of the EMPr on a monthly basis (or other frequency determined to be appropriate to ensure compliance) and it is recommended that the Developer should review the EMPr at annual intervals during the operational phase. The purpose of the annual Operational EMPr/ ESMS 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. Any amendments to the conditions of this EMPr must first be approved in writing by the Competent Authority before effect is given to those amendments.

2.7 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 Contractor's Environmental Site Officer. 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 development;
- Regular internal audit reports;
- Monthly ECO reports;
- 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 internal and external inspections and 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.

2.8 MITIGATION AND MANAGEMENT MEASURES

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

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

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACT DURING PLANNING AND DESIGN	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.	1. Compliance with the requirements of the EMPr will form part of the construction contract.	Upon appointment of Principal Contractors	Developer and/or appointed Agent
	2. A construction plan and required method statements 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 EMPr will be complied with.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
	3. 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.	1. Carry out a Hazardous Operating Procedures (HAZOP) assessment of the design to ensure that all practical measures to minimise the impact of operations on the environment have been included and to identify what emergency plans need to be developed.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Site demarcation and compliance	1. Before construction begins, all areas to be developed must be clearly demarcated with fencing, orange construction barriers or other appropriate demarcation, where applicable. 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	Prior to commencement of site preparation and construction	Principal Contractor

	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. 6. All "no-go" areas and buffer areas must be clearly demarcated using fencing and appropriate signage before construction commences. 7. The artificial wetland patch in the south-east corner of the site must be demarcated as a no-go area and afforded a 30m buffer. 8. The footprint of the development must be limited to the areas required for actual construction works and the areas outside of the footprint must be clearly demarcated as "no-go" areas.		
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/ impermeable surface 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	Prior to commencement of site preparation and construction	Principal Contractor

	be situated within 30 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. 8. No unsupervised open fires will be allowed and the Contractor must make alternative arrangements for heating or cooking. 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 Bokamoso 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 Bokamoso Energy (RF) (Pty) Ltd. should meet with representatives from the CoMLM 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 procedures that Bokamoso 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.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

Training of site staff	Ensure that all staff have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm, by: 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, litter control, identification of archaeological artefacts and other general environmental management measures. 2. Where feasible training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase. 3. The Contractor must 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 suitably trained and certified as competent. 6. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. 7. Workers must be made aware of the importance of not polluting rivers or wetlands and of not undertaking activities that could result in such pollution, and this awareness must be promoted throughout the construction phase. 8. Contractors and construction workers must be clearly informed of the no-go areas. 9. Staff must be trained in the hazards and required precautionary measures for dealing with these substances. 10. Spillage packs must be available at construction areas, and relevant site workers must be trained in how to utilize the spill kit in the event of a	Prior to commencement of site preparation and construction; and on-going during construction if required	Principal Contractor

	spillage.		
Land Owner & Public consultation	1. Liaison with land owners and/or their farm managers must be done prior to construction in order to provide sufficient time for them to plan agricultural activities. 2. Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. 3. Compile and implement a grievance mechanism procedure for the public. This procedure will include details of the contact person who will be receiving issues raised by I&APs, and the process that will be followed to address issues. The grievance mechanism must be appended to this EMPr. 4. Identify relevant stakeholders and engage them at applicable stages of the development process. 5. Inform the public about the proposed PV development. 6. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. 7. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures. 8. Determine stakeholder satisfaction levels. 9. The CoMLM, 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. 10. Bokamoso Energy (RF) (Pty) Ltd. (the Developer) should 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 Developer and the contractors before the contractors move onto site.	Pre-construction and construction	Principal Contractor (in consultation with Developer)
Site clearing	1. Site clearing must take place in a phased, environmentally acceptable	Site preparation prior to construction	Principal Contractor

	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 to limit vegetation clearing. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species. 4. Before the clearing of the site, the appropriate permits (if applicable) must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) for the removal of plants listed in the National Forest Act and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation. Copies of the permits must be kept by the ECO. 5. A plant rescue and protection plan (see Appendix E) which allows for the maximum transplant of conservation important species from areas to be transformed must be implemented prior to construction phase. 6. Topsoil from all excavations and construction activities must be salvaged, stockpiled and reapplied during post-construction rehabilitation. 7. Soil material that cannot be reused during construction or rehabilitation must be removed from the site to an approved spoil site or a licensed landfill site. 8. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent. 9. Cleared alien vegetation must not be dumped on adjacent intact vegetation during clearing but must be temporarily stored in a demarcated area. 10. A pre-construction survey of the final development footprint must be conducted to ascertain the identity and exact number of individuals of protected species affected by the proposed development. Prior to the commencement of construction, a rescue and rehabilitation operation for these species which could survive translocation must be conducted.		
Establishment of a Social and	1. Performance Standard One of the IFC Standards and Equator Principles	Prior to construction	Principal Contractor

Environmental Management System	(2013) underscores the importance of managing social and environmental performance throughout the life of a project. 2. An effective social and environmental management system is a dynamic, continuous process initiated by management and involving communication between the Developer, its Agents and employees, Contractors and sub-contractors and their employees and the local communities directly affected by the project. The Developer 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.		

Table 2-4: Proposed Mitigation Measures during the Construction Phase

ENVIRONMENTAL ASPECTS RESULTING IN POTENTIAL IMPACTS DURING CONSTRUCTION	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. Construction activities must be restricted to demarcated areas to restrict the impact on sensitive environmental features. 3. 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. 4. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 5. No temporary site camps are permitted outside of the development footprint area, unless authorized by the relevant Competent Authority(ies).	Construction phase	Principal 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, environmental sensitivity, 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. 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	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer

	measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be situated away from drainage lines in a site with the approval of the Project Management Team. 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 storm water events- refer to Appendix J. 6. All fuel storage areas must be roofed to avoid creation of dirty storm water. 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. Hazardous and flammable substances may only be stored within the demarcated signposted storage areas, and the storage and use of hazardous substances must comply with all applicable regulations and standards. 11. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. 12. All hazardous waste, including waste oil, must be disposed of at an appropriate, licensed waste disposal facility and may not be dumped or buried on site. Approved waste disposal contractors may be engaged for this purpose. 13. 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.		

	14. All excess cement and concrete mixes from the batch plant are to be contained on the construction site prior to disposal off site. 15. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately and the cause of the spill investigated. Preventative measures must be identified and submitted to the Principal Contractor and ECO for information. Emergency response procedures to be followed and implemented. The Hazardous Substances Leakage or Spillage Monitoring System is included as Appendix I. 16. Emergency and spillage plans need to be developed by the Contractor and attached to this EMPr. 17.		
Drainage of the construction camp	1. Surface drainage measures must be established in the Construction Camps so as to prevent: • Ponding of water; • Erosion as a result of accelerated runoff; and, • Uncontrolled discharge of polluted runoff.	Construction phase	Principal 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 and carefully planned to limit any intrusion on the neighboring property owners and road users and to limit any accident risks. Where possible, construction vehicles carrying materials to the site should avoid using roads through densely populated areas, so as to minimise impacts to residents, commuters and retail/ commercial operations in those areas. 2. Delivery of equipment must be undertaken with the minimum number 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	Construction phase	Principal Contractor and Environmental Liaison Officer

	dust and nuisance, where required. 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 speed limits. 10. Vehicles carrying material that can be wind-blown should be covered with a suitable material – refer to the Traffic Management Plan attached in Appendix G. 11. Where possible, the movement of construction vehicles on public roads during periods of high traffic (i.e. morning and late afternoon "rush hour") should be limited, to minimise impact to local commuters (Appendix G). 12. All construction vehicles must remain on properly demarcated roads, and may not drive over natural vegetation except where no cleared roads are available and a temporary access road must be created. In such cases a single temporary track should be used and multiple paths should not be formed. Where temporary roads are created, they should be rehabilitated after completion of construction as per the rehabilitation measures contained in this EMPr. 13. Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.		
Access to the site	1. A designated access point to the site must be created and clearly marked to ensure safe entry and exit of vehicles. 2. The main routes on the site must be clearly signposted and printed	Construction phase	Principal Contractor and Environmental Liaison Officer

	delivery maps must be issued to all suppliers and Sub-contractors. 3. 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. 4. The movement of all vehicles within the site must be on designated roadways. 5. Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions and other standard traffic control information. All signage must be in accordance with the prescribed standards and must be appropriately maintained for the duration of the construction period. 6. Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses. 7. Internal access roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity. 8. Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.		
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 storm water 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 any public roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by	Construction phase	Principal Contractor and Environmental Liaison Officer

	the contractor.		
Noise	1. 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	Principal 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. 4. No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor. 5. All relevant permits for abnormal loads must be applied for from the relevant Provincial Government (pre-construction).	Construction phase	Principal Contractor and Environmental Liaison Officer
Environmental Education and Training			
Environmental training	1. The Developer must appoint an ECO prior to construction commencing. 2. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include: • What is meant by "Environment" • Why the environment needs to be protected and conserved • How construction activities can impact on the environment • What can be done to mitigate against such impacts? • Awareness of emergency and spills response provisions • Social responsibility during construction e.g. being considerate to	Construction phase	Bokamoso Energy (RF) (Pty) Ltd. & Contractor

	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 than 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 sensitised to any potential hazards associated with their tasks.		
Monitoring of environmental training	1. 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	Principal Contractor and Environmental Liaison Officer
Soils and Geology			
Mitigation for soil compaction	1. The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.	Construction phase	Principal Contractor and Environmental Liaison Officer
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. 2. Vehicles accessing the site should regularly be checked for fuel and oil	Construction phase	Principal Contractor and Environmental Liaison Officer

	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. 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.	Construction phase	Principal Contractor and Environmental Liaison Officer
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. Topsoil from all excavations and construction activities must be salvaged and reapplied during reclamation. 3. Topsoil must not be stripped or stockpiled during heavy rain or when the soil is saturated as compaction will occur. 4. Subsoil and overburden in all construction and laydown areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. 5. Construction vehicles must only be allowed to utilise existing tracks or pre-planned access routes.	Construction phase	Principal Contractor and Environmental Control Officer

	6. All areas of disturbed soil must be reclaimed using only indigenous grass and shrubs. Reclamation activities shall be undertaken according to the rehabilitation plan included as Appendix E to this EMPR.		
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 and/or ECO. 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 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. Should topsoil be stockpiled for longer than 6 months it must be enriched (under guidance of the ECO) before the topsoil is reapplied to the site during post-construction rehabilitation. 6. 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 Management Team.	Construction phase	Principal Contractor and Environmental Control Officer
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 must 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 must be placed in	Construction phase	Principal Contractor and Environmental Control Officer

	bunded containment areas with sealed surfaces, in accordance with the relevant SABS requirements. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material - refer to Appendix I for the Hazardous Substances Leakage or Spillage Monitoring System.		
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	Principal 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 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. 3. Borrow materials must be obtained only from authorised and permitted sites. Permits must be kept on site by the ECO.	Construction phase	Principal Contractor and Environmental Control Officer
Erosion Control			
Erosion control	1. Wind screening and storm water 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 may be implemented are as follows: o Brush packing with cleared vegetation	Construction phase	Environmental Control Officer

	○ Mulch or chip packing ○ Planting of vegetation ○ Hydro seeding/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, or implementation of other appropriate erosion control measures. 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 storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. 12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion, or suitably protected from erosion via the provision of other suitable covering (e.g. shade cloth). 13. Design storm water canals into which the water from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. The storm water and erosion management plan are included in Appendix H. 14. Avoid the stripping of land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads. 15. Regular monitoring for erosion must take place as part of the on-going monitoring by the ELO and ECO. All erosion problems observed should be rectified as soon as possible by application of the appropriate remediation measures, and appropriate measures should be implemented to prevent –		

	as far as possible – a recurrence of the erosion incident.		
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 used sparingly and reused, recycled or treated where possible.	Construction phase	Principal Contractor
	1. 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, where required. 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 areas and spill kits should be available with emergency response plans.	Construction phase	Principal Contractor; Environmental Liaison Officer; Environmental Control officer
Storm water management	1. A comprehensive storm water management plan for hard surfaces is to make up part of the final project design, which must include appropriate ways of handling storm water within the site. 2. The site must be managed in order to prevent pollution of drains, downstream watercourses or groundwater, due to suspended solids and	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control officer

	silt or chemical pollutants. 3. Silt fences should be used to prevent any soil entering the storm water drains. 4. Temporary cut off drains and berms may be required to capture storm water and promote infiltration. 5. Promote a water saving mind set with construction workers in order to ensure less water wastage. 6. Hazardous substances must be stored at least 30m from any water bodies on site to avoid pollution. 7. The installation of the storm water system must take place as soon as possible to attenuate storm water from the construction phase as well 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 storm water 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	1. No unauthorised groundwater abstraction may occur on the site. 2. Should any water be discharged from site, the water is to comply with national effluent standards. No contaminated water may be discharged from site. 3. No activities shall be allowed to encroach into a water course or feature without a Water Use License being in place from the Department of Water and Sanitation (DWS).	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control officer
Sanitation	1. Adequate sanitary facilities and ablutions must be provided for	Construction phase	Principal Contractor,

	construction workers (1 toilet per every 15 workers) at appropriate locations on site. 2. The facilities must be regularly serviced and appropriately maintained to reduce the risk of surface or groundwater pollution. 3. Ablution or sanitation facilities should not be located within 30m of any water courses or features such as the pan depression.		Environmental Liaison Officer and Environmental Control officer
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	Principal Contractor, Environmental Liaison Officer 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	Principal Contractor, Environmental Liaison Officer and 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. 3. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution.	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control officer
Use and storage of hazardous	1. Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled.	Construction phase	Principal Contractor,

materials	2. Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of the applicable SABS requirements (e.g. 089:1999 Part 1). The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 3. Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately. 4. Hazardous and flammable substances must be stored and used in compliance to the applicable regulations and safety instruction. Furthermore, no chemicals must be stored nor may any vehicle maintenance occur within 350m of the temporal zone of wetlands, a drainage line with or without an extensive floodplain or hillside wetlands. 5. 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. 6. Temporary bunds must be constructed around chemical storage to contain possible spills. 7. No dumping or temporary storage of any materials may take place outside designated and demarcated laydown areas, and these must all be located within areas of low environmental sensitivity. 8. Hazardous substances must not be stored where there could be accidental leakage into surface or subterranean water. 9. 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 facility. 10. Definitions of hazardous substances / materials are those that are potentially: poisonous, flammable, carcinogenic or toxic. Some examples of hazardous substances / materials include: i. diesel, petroleum, oil, bituminous products; ii. cement (raw form); iii. solvent based paints;		Environmental Liaison Officer and Environmental Control officer

	iv. lubricants; v. explosives; vi. drilling fluids; vii. pesticides, herbicides; or viii. Liquefied Petroleum Gas 7. Symbolic safety signs (in accordance with SABS 1186) must be erected at storage facilities and tank capacities must be clearly indicated (in accordance with SABS 0232).		
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, compacting, etc. 3. Relevant departments and other emergency services should be contacted in order to deal with spillages and contamination of aquatic environments.	Construction phase	Principal Contractor and Environmental Control officer
Site specific mitigation measures for surface water	1. The small restricted pan depression (artificial wetland) at the south-east corner of the site should be provided with a 30m buffer and fenced off during the construction phase, with appropriate tape and any activities at this very small depression avoided, except for rehabilitation work. 2. Construction vehicles and machinery ideally should not cross drainage channels and should be routed away from the surface water feature. 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, storm water management measures need to be implemented for the	Construction phase	Principal Contractor and Environmental Control officer

	duration of the lifecycle of the roads. This specifically relates to the use of any appropriate storm water structure that will assist in reducing the rate of run-off generated 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. 4. The implementation of an adequate storm water 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). 5. 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 groundwater	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, if so required by the Department of Water & Sanitation as a condition of any water use authorization granted to the site. The groundwater monitoring programme (if required) must adhere to the requirements of the Department of Water & Sanitation, and all applicable standards. 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	Construction phase	Principal Contractor and Environmental Control officer

	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			
General considerations	1. Construction methods and materials should be carefully considered in view of waste reduction, re-use and recycling opportunities. 1. Construction contractors must provide specific detailed waste management plans to deal with all waste streams. 2. Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control. 3. Adequate weather and vermin proof waste bins and skips (covered at minimum with secured netting or shade cloth) should be placed on site. Separate bins should be provided for general and hazardous waste. 4. Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. 5. Disposal of solid waste (which cannot be reasonably re-used or recycled) shall occur only at appropriately licensed landfills. 6. Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.	Duration of the activity	Principal Contractor
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 a licensed landfill. 3. A housekeeping team should be appointed to regularly maintain the litter	Construction phase	Contractor, Environmental Liaison Officer and Environmental Control Officer

	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 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 of offsite at a licensed landfill site, accepting such waste. 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. 5. Ensure compliance with all national, regional and local legislation with regard to the storage handling and disposal of hydrocarbons, chemicals, solvents, and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable	Construction phase	Contractor and Environmental Liaison Officer

	legislation. 6. SABS approved spill kits to be available and easily accessible.		
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. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated separately where possible. 4. Toilets shall be serviced regularly and the ECO shall inspect toilets regularly. Wastewater from the toilets must be disposed of at a registered disposal site / waste water treatment works. 5. Toilets should be no closer than 30m 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, neighbour's fences or the surrounding bush be used as a toilet facility. 7. The construction of "Long Drop" toilets is forbidden. 8. Potable water must be provided for all construction staff.	Construction phase	Contractor, Environmental Liaison Officer and Environmental Control Officer
Remedial actions	1. An effective monitoring system must be put in place to detect any leakage or spillage during the transportation, handling and storage of hazardous substances. 2. Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance is identified. 3. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible. 4. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site.	Duration of the project	Environmental Liaison Officer, Principal Contractor and Environmental Control Officer

	5. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. 6. If a spill occurs on an impermeable surface such as cement or concrete, the surface spill must be contained using oil absorbent material. 7. If necessary, oil absorbent sheets or pads must be attached to leaky machinery or infrastructure. 8. Materials used for the remediation of petrochemical spills must be used according to product specifications and guidance for use. 9. Contaminated remediation materials must be carefully removed from the area of the spill so as to prevent further release of petrochemicals to the environment, and stored in adequate containers until appropriate disposal. 10. In the event of a major spill or leak of contaminants, the relevant administering authority must be notified immediately as per the notification of emergencies/incidents. 11. Routine serving and maintenance of vehicles should not take place on site (except for emergencies, in which case an appropriate drip tray must be used to contain any fuel or oils). 12. Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste- refer to Appendix I for the Hazardous Substances Leakage or Spillage Monitoring System . 13. Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated as hazardous waste. Clean storm water contained within the bunds may be reused. 14. The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files and applicable regulations and safety instructions. 15. Transport of all hazardous substances must be in accordance with the relevant legislation and regulations. 16. Upon completion of construction, the area must be cleared of potentially polluting materials.		

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. 3. All plants not interfering with the operation of the PV plants construction shall be left undisturbed, clearly marked and indicated on the site plan. 4. Cleared vegetation should not be dumped on adjacent intact vegetation during clearing, but should be temporarily stored in a demarcated area until re-use or disposal. 5. The construction area must be well demarcated and no construction activities must be allowed outside of this demarcated footprint. 6. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 7. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected. 8. No vegetation to be used for firewood. 9. Exotic and invasive plant species should not be allowed to establish, if the development is approved. 10. Areas to be cleared must be clearly fenced off to eliminate the potential for unnecessary clearing. 11. Strict and regular auditing of the PV plants construction process to ensure containment of the construction and laydown areas. 12. 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.	Pre-construction and Construction phase	Contractor, Environmental Liaison Officer and Environmental Control Officer
Rehabilitation	1. All damaged areas shall be rehabilitated as soon as possible after construction. 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.	Construction phase	Contractor, Environmental Liaison Officer & Environmental Control Officer

	4. Rehabilitation must take place in a phased approach as soon as possible (see Appendix E for the Plant Rescue & Protection including Re-Vegetation and Habitat Plan). 5. Rehabilitation process must make use of species indigenous to the area. Seeds from surrounding seed banks can be used for re-seeding. 6. No exotic (non-indigenous) plants may be used for rehabilitation purposes; only indigenous plants of the area may be utilised. 7. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 8. Planting of indigenous tree species in areas not to be cultivated or built on must be encouraged.		
Utilisation of resources	1. 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	Contractor, Environmental Liaison Officer
Exotic vegetation	1. Exotic and invasive plant species should not be allowed to establish, if the development is approved, especially an alien invasive tree species such as Prosopis (see Appendix D for the Alien Invasive Vegetation Management plan). 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. 4. All declared aliens must be identified and managed in accordance with applicable legislation, including the Conservation of Agricultural Resources Act, 1983.	Construction phase	Contractor, Environmental Liaison Officer & Environmental Control 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	Construction phase	Contractor, Environmental Liaison Officer & Environmental

	environmentally friendly herbicides shall be used. 2. The use of pesticides and herbicides on the site must be discouraged as these impact on important pollinator species of indigenous vegetation. Where ever possible, manual clearing methods should be favoured over the use of herbicides.		Control Officer
Site specific mitigation measures for flora	1. Sensitive areas must be demarcated prior to construction activities starting. 2. 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. 3. Rehabilitation to be undertaken as soon as possible after construction. 4. Only vegetation within the study area must be removed. 5. Vegetation removal must be phased in order to reduce impact of construction. 6. Construction site office and laydown areas must be clearly demarcated and no encroachment must occur beyond demarcated areas. 7. All natural areas impacted during construction must be rehabilitated with locally indigenous plant species. 8. 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. 9. Construction areas must be well demarcated and these areas strictly adhered to.	Construction phase	Contractor, Environmental Liaison Officer & Environmental Control Officer
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. 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. 6. All construction vehicles should adhere to site speed limits to avoid collision with susceptible species such as snakes or tortoises. 7. Excavations on site should be inspected regularly to rescue any trapped animal species. Animals should not be harmed during this process, and if necessary, suitably qualified animal handlers should be brought to site to assist in the rescue/ relocation. 8. Kerbs and storm water channels must be designed and built in such a way that will allow small animals and reptiles to move freely across the site without becoming trapped – as far as is reasonably possible. 9. Any fauna directly threatened by the construction activities should be removed to a safe location by a suitably qualified person.	Construction phase	Contractor, Environmental Liaison Officer & Environmental Control Officer
Avifauna			
Habitat destruction	1. The footprint of construction related activities should be limited to the site and minimised where possible. 2. Where possible, 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 nest should be removed.	Construction phase	Contractor, Environmental Liaison Officer

	5. Corridors of natural vegetation should be maintained between developed areas on site (e.g. lay-down areas and PV panel field). 6. Where necessary, consult an ecologist to give input into rehabilitation specifications.		
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 dowser 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. Appropriate dust suppression techniques may include wet suppression, use of wind fences, and providing exposed surfaces with appropriate cover such as vegetation or straw chippings. 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 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.	Construction phase	Contractor, Environmental Liaison Officer & Environmental Control Officer
Odour control	1. Regular servicing of vehicles in order to limit gaseous emissions. 2. Regular servicing of onsite toilets to avoid potential odours.	Pre-construction and construction	Contractor, Environmental Liaison Officer

Rehabilitation	1. The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.	Pre-construction and construction	Contractor, Environmental Liaison Officer
Fire prevention	1. No unsupervised 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. No firewood or kindling may be collected from the site or the surrounds, without explicit approval from the ECO. 3. The Contractor shall have operational fire-fighting equipment available on site at all times. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.	Pre-construction, construction and operation	Contractor, Environmental Liaison Officer
Noise and Vibrations			
Mitigation of noise and vibrations	1. The construction 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. 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.	Pre-construction and construction	Contractor, Environmental 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 and vibration	1. During construction care should be taken to 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.	Pre-construction and construction	Contractor, Environmental Liaison Officer
Energy Use			
The use of energy and actions that need to be implemented	1. Energy saving lighting must be implemented where feasible. 2. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations. 3. Equipment not in use must be switched off and unplugged to save on unnecessary energy costs.	Construction phase	Contractor, Environmental Liaison Officer

Employment			
Labour	1. The use of labour intensive construction measures should be used where appropriate. 2. Training of labourers to benefit individuals beyond completion of the project. 3. No informal vending stations may be allowed on or near the construction site. 4. Bokamoso Energy (RF) (Pty) Ltd. and the contractor(s) should, in consultation with representatives from the Monitoring Forum (if applicable), 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	Principal Contractor
Recruitment plan	1. Recruitment must comply with national employment and labour laws. 2. Where reasonable and practical, Bokamoso Energy (RF) (Pty) Ltd.'s service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. 3. The Project Management Team 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.	Construction phase	Principal Contractor

	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. 12. Establish and maintain a healthy worker-management relationship.		
Occupational Health and Safety			
Work safety	1. All staff should undergo a general health and safety induction and simplified environmental awareness training. 2. Implementation of safety measures, work procedures and first aid must be implemented on site. 3. Workers should be thoroughly trained in using potentially dangerous equipment. 4. Contractors must ensure that all equipment is maintained in a safe operating condition. 5. A safety officer must be appointed. 6. A record of health and safety incidents must be kept on site. 7. Any health and safety incidents must be reported to the Project Management Team immediately. 8. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures. 9. Workers have the right to refuse work in unsafe conditions. 10. The Contractor shall take all the necessary precautions against the spreading of disease such as measles, foot and mouth, etc. 11. 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 Bokamoso Energy (RF) (Pty) Ltd. or the Contractor. 12. The Contractor must ensure that all construction workers are well educated about HIV/AIDS and the risks surrounding this disease. The	Construction phase	Principal Contractor and Environmental Liaison Officer

	location of the local clinic where more information and counselling is offered must be indicated to workers. 13. Material stockpiles or stacks must be stable and well secured to avoid collapse and possible injury to site workers/local residents. 14. 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. 15. 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. 16. 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. Fires for heating/ cooking must be supervised and suitably enclosed.	Construction phase	Principal Contractor and Environmental Liaison Officer
Hazardous substances	1. 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	Principal 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. 4. Use of reflective markings on structures, traffic junctions, and other areas with a potential for accidents.	Construction phase	Principal Contractor and Environmental Liaison Officer

	5. Installing safety barriers in high risk locations.		
Fitness for work	1. Review shift management systems to minimise risk of fatigue. Establish alcohol and other drugs policy for the operation.	Construction phase	Principal 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	Principal 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	Principal 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. Firefighting 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	Principal Contractor and Environmental Liaison Officer

Construction equipment safety	1. All equipment used for construction, including drills, TLB's must be in good working order with up to date maintenance records.	Construction phase	Principal Contractor and Environmental Liaison Officer
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 of the stored hazardous material. These areas should be roofed to avoid contamination of storm water. 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.	Construction phase	Principal Contractor and Environmental Liaison Officer
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 Management Team, 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	Principal 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 hazard control and firefighting 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.	Construction phase	Principal Contractor and Environmental Liaison Officer

	5. No open fires will be allowed on site. Fires for cooking/ heating must be supervised and suitably enclosed (e.g. in a drum). 6. Smoking may only be conducted in demarcated areas. 7. Road borders must be regularly maintained to ensure that vegetation remain short to serve as an effective firebreak.		
Safety of surrounding residents	1. 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: • Blasting • Risk to residence along haulage roads/access routes 2. On-going communication with the affected and surrounding landowners is important to maintain during the construction and operational phases of the solar energy facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.	Construction	Principal 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. The construction process must be compliant with all safety and health measures as prescribed by the relevant act.	Construction phase	Principal Contractor and Environmental Liaison Officer
Maintenance	1. 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	Principal Contractor and Environmental Liaison Officer
Security			
Security actions that need to be implemented	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.	Construction phase	Principal Contractor and Environmental Liaison Officer

	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. Construction workers should be easily identifiable by wearing uniforms and identification tags/induction cards. 6. The site shall be fenced, where necessary to prevent any loss or injury to persons during the construction phase. 7. No alcohol/ drugs to be present on site. 8. No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel). 9. No harvesting of firewood from the site without prior consent from the ECO. 10. 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). 11. Trespassing on private/ commercial properties adjoining the site is forbidden. 12. Driving under the influence of alcohol is prohibited. 13. All employees must undergo the necessary safety training and wear the necessary protective clothing. 14. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.		
Social Environment			
Social actions that need to be implemented	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	Construction phase	Principal Contractor and Environmental Liaison Officer

	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. Bokamoso 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 workers. 7. Contractors appointed by Bokamoso 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. Implement a “locals first” policy, specifically with regard to unskilled and low skilled opportunities. 3. Implement a policy that no employment will be available at the gate. 4. Bokamoso Energy should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences. 5. The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area. 6. Contractors should provide daily transport for low and semi-skilled	Construction phase	Principal Contractor and Environmental Liaison Officer

	workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties. 7. Bokamoso Energy should consider the option of establishing a Monitoring Forum (MF) 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. 8. Contractors appointed by Bokamoso Energy 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. 9. Contractors appointed by Bokamoso Energy must ensure that construction workers who are found guilty of trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation. 10. The housing of construction workers on the site should be strictly limited to security personnel. 11. 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.		
Additional 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 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.	Construction phase	Principal Contractor and Environmental Liaison Officer

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	Principal Contractor and Environmental Liaison Officer
Heritage Resources			
Impacts on potential archaeological artifacts	1. 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. 2. Local museums as well as the South African Heritage Resource Agency (SAHRA) should be informed if any artefacts are uncovered in the affected area. 3. 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. 4. Any discovered artefacts shall not be removed under any circumstances. The position of the find is to be marked (flag). The Principal Contractor and ECO are to be notified. The ECO is to inform the Developer and the Developer contacts the standby archaeologist and/or palaeontologist. 5. 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. 6. Should any archaeological site/feature (such as an unmarked grave or ostrich eggshell cache) be found during the course of construction, SAHRA must be contacted immediately so that the find can be investigated and appropriate mitigation actions proposed.	Construction phase	Principal Contractor and Environmental Liaison Officer
Archaeology on site	1. All stakeholders and key personnel should undergo an archaeological induction course during this phase. 2. It is important to recognize any significant material being unearthed to	Construction phase	Principal Contractor and Environmental Liaison Officer

	make the correct judgment on which actions should be taken.		
Graves	3. An informal burial site is located outside the proposed development area (S 27.15526; E 26.39589). However, is recommended that it is fenced off with danger tape during the construction period in order to prevent accidental damage. 4. If graves are accidentally discovered during construction, activities must cease in the area and a qualified archaeologist be contacted to evaluate the find, and determine the appropriate mitigation or relocation measures.	Construction phase	Principal Contractor and Environmental Liaison Officer
Palaeontology	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) 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-preserved fossil fish, reptiles or petrified wood) be exposed during construction, 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.	Construction phase	Principal Contractor and Environmental Liaison Officer
Community Engagement			
Community engagement	1. Open and transparent community engagement to be followed as culturally appropriate. 2. 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	1. There is good screening opportunity since the land is relatively flat and	Construction phase	Principal Contractor, Environmental

be implemented	with scattered trees and bushes. 2. Generation of dust will increase the visibility of the project, and it is therefore important to employ techniques to suppress dust generation during construction. 3. Carefully plan to reduce the construction period. 4. Locate laydown and storage areas in zones of low visibility i.e. behind tall trees or in lower lying areas. 5. Dust suppression is important as dust will raise the visibility of the development. 6. As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. 7. Any additional external lighting of the facility will be limited. 8. New road construction should be minimised and existing roads should be used where possible. 9. The contractor should maintain good housekeeping on site to avoid litter and minimise waste. 10. Minimise vegetation clearing (surface disturbance) and rehabilitate cleared areas as soon as possible. 11. 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. The storm water and erosion management plan are included as Appendix H. 12. 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. Where feasible, low-pressure sodium lights, preferably yellow, should be utilised to minimise lighting impacts – unless recommended otherwise by the lighting engineer. 13. Fires and fire hazards need to be managed appropriately. 14. Screening should be implemented by erection of the security fence, and		Liaison Officer

	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 ASPECTS RESULTING IN POTENTIAL ENVIRONMENTAL IMPACT DURING OPERATION	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.	Operation of plant	Principal 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 are to be rehabilitated to the satisfaction of the ECO.	Operation of plant	Principal Contractor. Developer, Environmental Control officer and Environmental 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. Fences, barriers and demarcations associated with the construction phase	Operation of plant	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer

	are to be removed from the site unless stipulated otherwise by the Engineer. 6. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. 7. All leftover building materials must be returned to the depot or removed from the site. 8. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor storm water management.		
Rehabilitation plan	1. Rehabilitate and re-vegetate cleared areas with indigenous plant species. Plant Rescue and protection including revegetation and habitat plans are included in Appendix E. 2. Monitoring and follow-up for a period of at least two years it required to ensure the success of the applied rehabilitation measures, unless agreed otherwise with the ECO and the Developer at the conclusion of the post-construction rehabilitation phase.	Operation of plant	Principal Contractor. Developer, ECO and Environmental Liaison Officer
Operation and Maintenance			
General Environmental Management	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. 3. The environmental management measures applicable to the operational phase, as specified in this EMPr, should be incorporated into the Developer's Environment & Social Management System for the site (ESMS).	Operational phase	Developer / Operator
Public awareness	1. The emergency preparedness plan must be ready for implementation at all times should an emergency situation arise.	Operational phase	Developer / Operator

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 from the panels can be channelled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land - refer to Appendix H for the storm water and erosion management plans. 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.	Operational phase	Developer / Operator
Monitoring and reporting	Specific activities that should be monitored include: • Erosion potential (specifically in and around roads and storm water discharge points). • Identified problem areas.	Monthly	Developer / Operator
Geology	1. Surface drainage should be provided to prevent water ponding. 2. Bulk infrastructure should be designed by a specialist. 3. It is expected that some of the material within the study area may be suitable for building construction purposes. It is recommended that the material be tested for this specific use, if required.	Operational phase	Developer / Operator
Surface and Groundwater			
Surface water	1. Correct drainage of the site should ensure that contaminants do not impact upon the pan depression. 2. The storm water system on the proposed site needs to be regularly maintained to ensure effective working.	Operational phase	Developer / Operator
Monitoring and reporting	Specific activities that should be monitored include: • Erosion potential (specifically in and around roads and storm water discharge points).	Monthly	Developer / Operator

	• Storm water management and design. • Identified problem areas.		
Site specific mitigation measures for surface water	1. A buffer zone of 30 m must be enforced around the small wetland patch at the south-eastern corner of the site. 2. Development and implementation of an adequate storm water management plan to be designed by an appropriate engineer. 3. 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. 4. Drainage measures must promote the dissipation of storm water run-off.	Operational phase	Developer / Operator
Site specific mitigation measures for groundwater	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, if so required by the Department of Water & Sanitation. The groundwater monitoring programme (if required) must adhere to the requirements of the Department of Water & Sanitation, and all applicable standards.	Operational phase	Developer / Operator
Biodiversity (Fauna and Flora)			
Vegetation	1. Indigenous vegetation must be maintained and all exotics removed as they appear and disposed of appropriately (see Appendix D for the Alien Invasive Vegetation Management Plan). 2. Re-vegetation of the disturbed site is aimed at approximating as near as	Operational phase	Developer / Operator

	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. 5. Wherever possible, grazing or mechanical methods should be used to keep the vegetation in check instead of chemical alternatives.		
Fauna	1. No faunal species must be harmed by maintenance staff during any routine maintenance at the development. 2. All construction vehicles should adhere to site speed limits to avoid collision with susceptible species such as snakes or tortoises. 3. Electric fencing should not have any strands within 30cm of the ground, in order to allow for the safe passage of smaller animals such as tortoises, other reptiles and small mammals.	Operational phase	Developer / Operator
Site specific mitigation measures	1. The footprint of the development must be limited to the areas required for operational activities. 2. There should be an alien species monitoring and eradication program to prevent encroachment of these problem plants for the duration of the operation. A rehabilitation strategy, with follow-up for at least two years after construction were completed, must also form part of this EMPR. 3. Six monthly checks of the area should take place for the emergence of invader species, and appropriate alien control measures implemented where the emergence of invader species are identified. 4. 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. 5. Correct rehabilitation with locally indigenous species. 6. Monitoring programme to ensure that rehabilitation efforts are successful to ensure that risks such as erosion and the edge effect are avoided – refer	Operational phase	Developer/ Operator

	to Appendix H for the storm water and erosion management plan. 7. Constant maintenance of the area to ensure re-colonisation of floral species. 8. Regular removal of alien species which may jeopardise the proliferation of indigenous species. 9. Any vegetation clearing that needs to take place as part of maintenance activities, should be done in an environmentally friendly manner, including avoiding the use of herbicides and using manual clearing methods wherever possible.		
Avifauna			
Bird injury or mortality	1. If relatively high avifauna mortality rates related to the fencing or other facilities of the PV Site are observed, these cases should be further investigated and appropriate steps taken to minimize or eliminate the threat. 2. Avoid the use of pesticides.	Operational phase	Developer/ Operator
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 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. 5. The only effective counter measure against small birds nesting in equipment is to remove the nesting material when it appears, but only if the nest belongs to one of the six species indicated in the specialist study.	Operational phase	Developer/ Operator
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 and disposed of at the closest municipal landfill site. 6. Package treatment plant must be regularly serviced. 7. No solid waste may be burned or buried on site or disposed of by any other method on site.	Operational phase	Developer/ Operator
Health and Safety			
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.	Operational phase	Developer / Operator
Maintenance	1. The PV plants are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept. 2. If soaps are required to be used for the washing of panels during maintenance biodegradable soaps should be used to avoid soil contamination and poisoning of small animals.	Operational phase	Developer / Operator
Fire safety	1. Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company.	Operational phase	Developer / Operator
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.	Operational phase	Developer/ Operator

	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. The Hazardous Substances Leakage or Spillage Monitoring System is included as Appendix J.		
Visual Impact			
Maintenance and lighting	1. Lighting must be kept to a minimum, installed only where it is absolutely essential 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. Where feasible, low-pressure sodium lights, preferably yellow, should be utilised to minimise lighting impacts – unless recommended otherwise by the lighting engineer. 6. Screening should be implemented by means of vegetation in conjunction with security fencing. 7. The power plants area and surrounds must be kept clean, tidy and well maintained to reduce negative visual impacts. 8. Rehabilitation of surrounding areas must take place with indigenous species. 9. Surrounding roads must be well maintained. 10. Regular maintenance of exteriors and associated infrastructure must be undertaken. 11. Water used for washing solar panels can be channelled to support growth of screening vegetation. 12. Reduce the trespass of lighting by using luminaires that prevents light	Operational phase	Developer / Operator

	from shining beyond the intended area and eliminates light directed upwards or at the horizontal. 13. Decreasing light intensity will reduce energy consumption and limit both sky glow and the area impacted by high-intensity direct light. 14. Lighting technologies emitting a narrow spectrum of light are likely to have less ecological impact compared to broader spectrum light sources.		
Employment			
Labour	1. Training of labourers to benefit individuals beyond completion of the project.	Operational phase	Developer / Operator
Recruitment plan	1. Recruitment must comply with national employment and labour laws. 2. Where reasonable and practical, implement a 'locals first' policy, especially for semi and low-skilled job categories. 3. The Project Management Team 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. 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	Operational phase	Developer/ Operator

	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 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.	operational phase	Developer / Operator
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. Where feasible, Bokamoso 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 / Operator
Sense of place	1. Job opportunities should be afforded to local individuals as far as possible to enhance their sense of place.	Operational phase	Developer / Operator

Table 2-6: Proposed Mitigation Measures during the Decommissioning Phase

POTENTIAL ENVIRONMENTAL IMPACT DURING DECOMMISSIONING (NATURE OF THE IMPACT)	RECOMMENDED MITIGATION MEASURES		
	Management and mitigation measures	**Timeframe**	**Responsibility**
Ongoing Stakeholder involvement			
General	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: • What activities will take place during the decommissioning phase. • How these activities will impact upon the communities and/or their properties. • Regarding the timeframes of scheduled activities. 4. Regular interaction between Bokamoso Energy (RF) (Pty) Ltd. and community leader(s) during 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. 7. Ensure that retrenchment packages are provided for all staff retrenched when the PV facility is decommissioned. 8. All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning. 9. Investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the	Decommissioning phase	Developer

	20-year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.		
Community Health and Safety Responsibility			
Community health and safety responsibility	1. Demarcated routes to be established for vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. 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	Developer / Decommissioning Contractor
General site considerations			
General site decommissioning considerations	1. All temporary fencing and danger tape must be removed once the decommissioning phase has been completed. 2. All hardened surfaces on site should be ripped, all imported materials removed, and the area shall be top soiled and re- vegetated. 3. . 4. The site is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Following completion of construction activities in an area: decommissioning phase	Developer / Decommissioning Contractor
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. 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	Developer / Decommissioning Contractor
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. 5. Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Decommissioning phase	Developer / Decommissioning Contractor
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 priority to avoid erosion. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. 5. Suitable storm water/wind controls must be put in place until rehabilitation is complete. 6. Constant removal of alien invasive species in and around plant. 7. Newly rehabilitated areas must be adequately demarcated and access restricted (specifically vehicular access) until vegetation is established. Appropriate signage must be established and maintained to ensure	Decommissioning phase	Developer / Decommissioning Contractor

	personnel and the public are aware of these areas.		
Edge effect	1. A programme for the monitoring and follow-up clearing of weeds and alien vegetation must be developed and implemented. It is recommended that such monitoring and follow-up clearing take place for at least two-years after the decommissioning and rehabilitation of the site. 2. Present exotic and invasive plant species, should be eradicated at the site. 3. By no means should any declared invaders be planted or allowed to establish. 4. All exotic vegetation must be removed from the site (if present).	Decommissioning phase	Developer / Decommissioning Contractor
Air Pollution Responsibility			
Air pollution responsibility	1. Regular maintenance of equipment to ensure reduced exhaust emissions.	Decommissioning phase	Developer / Decommissioning Contractor
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. 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 equipment, where	Decommissioning phase	Developer / Decommissioning Contractor

	necessary. 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. 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.		
Site specific mitigation measures	1. During decommissioning care should be taken to ensure that noise from 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	Developer / Decommissioning Contractor
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 number of trips to reduce the carbon footprint of these activities. 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 vehicles shall be deep ripped to loosen compacted layers and re-graded to even running levels.	Decommissioning phase	Developer / Decommissioning Contractor

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 heavy vehicles" sign.	Decommissioning phase	Developer / Decommissioning Contractor
Noise	1. Movement of heavy 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.	Decommissioning phase	Developer / Decommissioning Contractor
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 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.	Decommissioning phase	Developer / Decommissioning Contractor
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 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	Decommissioning phase	Developer / Decommissioning Contractor

	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.		

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 Bokamoso Energy (RF) (Pty) Ltd. 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 ELO or ECO 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. An environmental awareness and fire risk plan is included as Appendix C.

Appendices