



Draft EIA Report for the proposed construction
of Boven PV1 75 MW Solar PV facility
on the remaining extent of the
Farm Boven Rugzeer 169,
Kenhardt, Northern Cape



January 2015

SECTION B

DRAFT

ENVIRONMENTAL MANAGEMENT PROGRAMME

The logo for CSIR (Council for Scientific and Industrial Research). It consists of the letters "CSIR" in a bold, white, sans-serif font.

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1 INTRODUCTION

This draft Environmental Management Programme (draft EMPr) is prepared as part of the requirements of the EIA Regulations promulgated under the National Environmental Management Act (NEMA, Act 107 of 1998) as amended 2010. The EMPr is to be submitted to the national Department of Environmental Affairs (DEA) as part of the application for Environmental Authorisation for the proposed Boven Solar PV1 75 MW AC project proposed by Mulilo Renewable Project Developments (Pty) Ltd (DEA reference no. 14/12/16/3/3/2/712).

This draft EMPr is made available for public comment, as part of the draft EIA Report (EIAR). Following the incorporation of comments from stakeholders, the EMPr is intended as a “living” document and should continue to be updated regularly.

1.1 INTRODUCTION

It is proposed that Boven Solar PV1 project will generate 75 megawatts (MW) Alternating Current (AC) of electricity on the farm Boven Rugzeer (Remaining Extent of Farm No. 169), located 30 km northeast of Kenhardt (Figure 1). The proposed solar facility and associated infrastructure requires a development area of 300 ha. The site will comprise of the following components:

Solar Field

Solar Arrays:

- PV Modules;
- Single Axis Tracking structures aligned North South;
- Solar Module Mounting structures comprised of Galvanised Steel and Aluminium; and
- Solar measuring station.

Building infrastructure:

- Offices;
- Operational and Maintenance control centre;
- Warehouse/workshop;
- Ablution facilities;
- Inverter stations;
- On-site 3 bay 132kV substation and substation building ; and
- Guard House.

Associated infrastructure

- Energy Storage Facility
- 132 kV overhead transmission lines;
- Additional feeder bay and Busbar at the Eskom Nieuwehoop substation;
- 22/33 kV internal transmission lines;
- <8 m wide internal access roads;
- Fencing;
- Temporary work area during the construction phase;
- Storm water channels exceeding 1 km in length; and
- Water pipelines.

This project will connect to the Eskom Nieuwehoop Substation (to be constructed) located on the Boven Rugzeer (Remaining Extent of Farm No. 169) via a 132 kV overhead transmission line. The EA for the construction of the 400/50 kV Eskom Nieuwehoop Substation was granted on 21 February 2011 by the DEA (DEA reference number: 12/12/20/1166) and site preparation for the construction of the substation on site has commenced. An EA (DEA reference number: DEA Reference Number: 12/12/20/2606; NEAS Reference Number: DEA/EIA/0000785/2011), dated 14 February 2014, granted authorisation to Eskom Holdings SOC Limited.

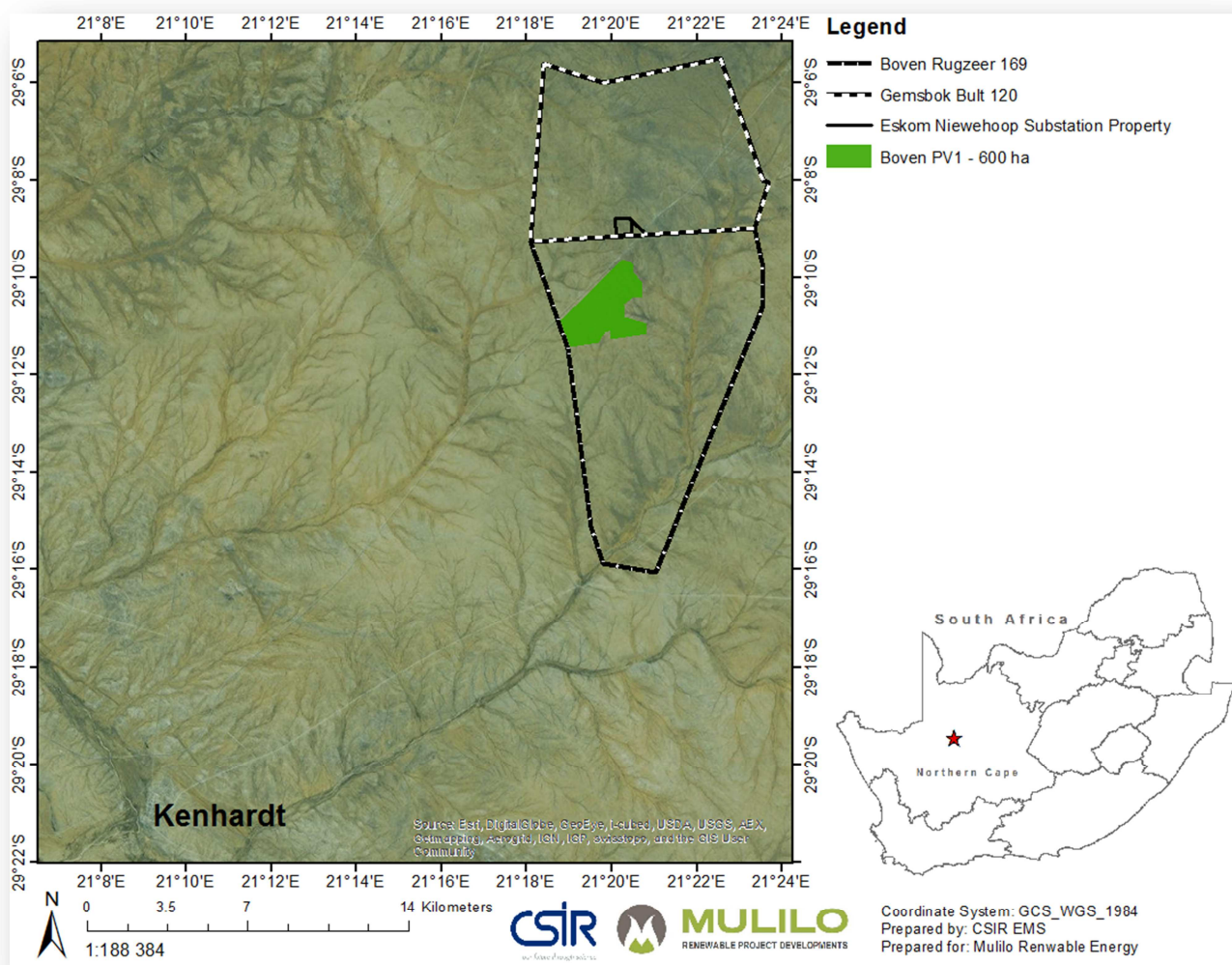


Figure 1: Location of the proposed Boven Solar PV1 project that forms part of the Nieuwehoop Solar Development

1.2 PROJECT PHASES AND ASSOCIATED ACTIVITIES

The project can be divided into three main phases:

- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Activities will be undertaken during each phase which may cause an environmental impact. These activities have therefore been considered by the appointed specialists, considered during the EIA and management and mitigation measures required to address all the impacts included within this draft

EMPr. Construction is planned to start in 2015, and will take up to 6 to 24 months. The solar field will have an operational lifespan of 20 years.

1.2.1 Construction Phase

The main activities that will form part of the construction phase are:

- Vegetation clearing in the areas required for building infrastructure and brush cutting in the solar field area where the panels will be installed;
- Excavations for infrastructure and associated infrastructure;
- Establishment of a laydown area for equipment;
- Construction of internal access roads;
- Stockpiling of soil;
- Traffic generation from construction trucks delivering materials to site and workers coming to site; and
- Construction of the solar field (consisting of the solar arrays and buildings) and additional infrastructure such as transmission lines, water pipelines, stormwater channels and the energy storage facility.

1.2.2 Operational Phase

The two main activities to be undertaken during the operational phase include:

Energy generation

The operational phase of the facility includes the operation of the solar facility whereby power is generated from the sun's radiant light. The electricity generated will either feed directly into the national grid via the Eskom Nieuwehoop substation or be stored on site via the energy storage facility and be fed into the grid system at a later stage.

Panel maintenance and cleaning

The accumulation of dust on the panels affects the productivity of the proposed solar power facility, and as a result, the panels require regular cleaning. It is planned that cleaning will take place quarterly; however this regime will be revised should site conditions prove to make this need more onerous. It is estimated that the washing of the panels will require a total of approximately 700 kilo Litres of water per year.

1.2.3 Decommissioning Phase

Decommissioning involves removing the solar panels and associated infrastructures, and covering the concrete footings with soil to a depth sufficient for natural vegetation re-growth.

Whether all components of the solar facility will be removed still needs to be agreed upon with the landowner (some components may be useful for the landowner and therefore it could be decided that those remain on site). Any other supporting infrastructure no longer in use will be removed from the site

and either disposed of at a registered disposal facility or recycled if possible. Since it is not currently known which disposal facilities will be available at the time of disposal (i.e. in 20 years' time), it is not possible to identify specific landfill facilities at this stage. When the time for decommissioning comes, the nearest facilities, registered to receive waste and recycled material, from the solar facility will be identified and utilised.

1.3 IMPACTS IDENTIFIED DURING THE EIA PROCESS

Based on the specialist studies, the following impacts have been identified and appropriate management and mitigation measures included within the EMP as per the recommendations made in the specialist studies to ensure all impacts are suitably addressed and managed during all phases of the project.

KEY IMPACT	IMPACTS IDENTIFIED
Ecology	<p>Terrestrial Environment</p> <ol style="list-style-type: none"> 1. Loss of vegetation habitat and a reduction or changes to ecological processes and functioning as a result of construction activities 2. Loss of species of special concern and SSC habitat as a result of construction activities 3. Increased risk of alien plant invasion in disturbed areas 4. Increase animal road mortality 5. Permanent barriers to animal movement (habitat fragmentation) <p>Aquatic environment</p> <ol style="list-style-type: none"> 1. Diversion and impedance of surface water flows – changes to the hydrological regime and increased potential for erosion 2. Diversion and increased velocity of surface water flows – reduction in permeable surfaces
Heritage	<p>Archaeology and landscape</p> <ol style="list-style-type: none"> 1. Direct disturbance and/or destruction of archaeological material 2. Direct impacts to the landscape through introduction of industrial type facilities <p>Palaeontology</p> <ol style="list-style-type: none"> 1. Disturbance, damage or destruction of fossils at surface or beneath the ground

KEY IMPACT	IMPACTS IDENTIFIED
Visual	<ol style="list-style-type: none"> 1. Potential visual intrusion of construction activities on existing views of sensitive visual receptors 2. Potential landscape impact of a large solar energy facility on a rural agricultural landscape 3. Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors. 4. Potential impact of night lighting of a large solar energy facility on the nightscape of the region 5. Potential visual intrusion of decommissioning activities on views of sensitive visual receptors
Soil and Agricultural Potential	<ol style="list-style-type: none"> 1. Veld degradation 2. Loss of topsoil 3. Loss of agricultural land use 4. Erosion 5. Additional land use income 6. Regional loss of agricultural land
Socio-Economic	<ol style="list-style-type: none"> 1. Influx of job seekers into the Kenhardt area might disrupt existing social structures 2. Increase in social deviance could occur as more outsiders moves into the Kenhardt area 3. Expectations created regarding possible employment might increase frustration in the local community and could lead to damage of property. 4. Local spending as a result of the development is likely to hold socio-economic benefits as a result of the multiplier effect 5. Local employment created by the development will lead to socio-economic benefits as Human, Social and Financial capital will be increased. 6. The proposed Economic Development Plan will contribute to local employment, local spending and human capacity development. 7. Decommissioning of the proposed development will result in job losses.
Traffic	<ol style="list-style-type: none"> 1. Increase in traffic generation. 2. Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads. 3. Impact on air quality due to noise and release of air pollutants from vehicles and construction equipment. 4. Decrease in quality of surface condition of the roads.

1.4 AUTHORS OF THE DRAFT EMPr

The main authors of this draft EMPr are the CSIR team project leader (Paul Lochner) and project manager (Surina Brink) undertaking the EIA for the proposed Nieuwehoop Solar Development, consisting of the Gemsbok Solar PV1, Gemsbok Solar PV2 and Boven Solar PV1 projects. The EIA Project Team is led by Paul Lochner who has more than 20 years' experience in environmental assessment and management studies, primarily in the leadership and integration functions. This has included Strategic Environmental Assessments (SEA), EIAs and EMPs. He is a certified Environmental Assessment Practitioner for South Africa since July 2002. Paul has extensive experience in conducting environmental assessment and management processes through-out South Africa, but especially in the Western, Northern and Eastern Cape. Paul is supported by CSIR Project Manager, Surina Brink. Surina has a Masters in Environmental Management and 4 years' experience in environmental assessment and management. She has experience in undertaking Basic Assessments and Scoping and EIAs for various sectors, including renewable energy, industry and tourism.

The co-authors of the draft EMPr are the specialists involved in the assessment of potential impacts identified during the EIA process for the proposed solar energy project. The name and role of all authors and co-authors is included in the table below (Table 1.1).

Table 1.1: Draft EMPr authors and co-authors

NAME	ORGANISATION	ROLE
Environmental Assessment Practitioners		
Paul Lochner	CSIR	Project Leader (EAPSA)
Surina Brink	CSIR	Project Manager
Specialists		
Dr. Brian Colloty	Scherman Colloty & Associates cc	Ecological specialist
Dr. Jayson Orton	ASHA Consulting (Pty) Ltd	Heritage specialist
Julian Conrad	GEOSS	Groundwater specialist
Henry Holland	MapThis Trust	Visual impact specialist
Johann Lanz	Private Consultant	Soil scientist
Dr. John Almond	Natura Viva	Palaeontologist
Rudolph du Toit	CSIR	Socio-economic specialist

2 APPROACH TO PREPARING THE DRAFT EMPr

2.1 COMPLIANCE WITH SECTION 33 OF THE EIA REGULATIONS (GOVERNMENT GAZETTE 18 JUNE 2010, AS AMENDED) AND SECTION 24N OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

Requirements of Section 33 of the EIA Regulations (Government Gazette 18 June 2010, as amended) and section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998)	Where it is included in this draft EMPr
(i)the person who prepared the environmental management programme; and (ii)the expertise of that person to prepare an environmental management programme;	Section 1.4
(b)information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of— (i)planning and design; (ii)pre-construction and construction activities; (iii)operational or undertaking of the activity; rehabilitation of the environment; and closure, where relevant.	Mitigation objectives and management actions columns in Sections 5 to 15.
(c)a detailed description of the aspects of the activity that are covered by the draft environmental management programme;	Section 1
(d)an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Section 4 and Monitoring-Responsibility column of the Sections 5 to 15.
(e)proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;	Monitoring-Responsibility column of the Sections 5 to 15.
(f)as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development, including, where appropriate, concurrent or progressive rehabilitation measures	Section 5 .3 Section 6.6 Section 7.10 Section 8.9 Section 9.5

Requirements of Section 33 of the EIA Regulations (Government Gazette 18 June 2010, as amended) and section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998)	Where it is included in this draft EMPr
	<p>Sections 10.6 and 10.7</p> <p>Section 11.5</p> <p>Section 13.9</p> <p>Section 14.3</p>
<p>(g)a description of the manner in which it intends to—</p> <p>(i)modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;</p> <p>(ii)remedy the cause of pollution or degradation and migration of pollutants;</p> <p>comply with any prescribed environmental management standards or practices;</p> <p>(iv)comply with any applicable provisions of the Act regarding closure, where applicable;</p> <p>(v)comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;</p>	<p>Section 5 to Section 15</p>
<p>(h)time periods within which the measures contemplated in the environmental management programme must be implemented;</p>	<p>Monitoring-Frequency column of the Sections 5 to 15.</p>
<p>(i)the process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity;</p>	<p>Management actions column of the Sections 5 to 15.</p>
<p>(j) an environmental awareness plan describing the manner in which</p> <p>the applicant intends to inform his or her employees of any environmental risk which may result from their work; and</p> <p>risks must be dealt with in order to avoid pollution or the degradation of the environment;</p>	<p>Section 14</p>
<p>(k) where appropriate, closure plans, including closure objectives.</p>	<p>n/a (a closure plan will need to be prepared if and when the facility is decommissioned, in accordance with best practice and legislative requirements applicable at the time)</p>

2.2 CONTENTS OF THE DRAFT EMPr

Where applicable, each section of the draft EMPr is divided into four phases of the project cycle: (1) Design phase; (2) Construction phase; (3) Operational phase; and (4) Decommissioning phase.

The draft EMPr includes the findings and recommendations of the EIA process and specialists impact assessments. However, the draft EMPr is considered a “living” document and must be updated with additional information or actions during the design, construction and operational phases.

The draft EMPr follows an approach of identifying an over-arching goal and objectives, accompanied by management actions that are aimed at achieving these objectives. The management actions are presented in a table format in order to show the links between the goal and associated objectives, actions, responsibilities, monitoring requirements and targets. The management plans for the design, construction, operational and decommissioning phases consist of the following components:

- **Impact:** The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated;
- **Mitigation/Management action:** The actions needed to achieve the objectives of enhancing, mitigating or eliminating impacts;
- **Monitoring:** The key monitoring actions required to check whether the objectives are being achieved, taking into consideration methodology, frequency and responsibility.

The requirements listed in the approval letter from the DEA (letter dated 08 October 2014), included in Appendix A of the EIA report, stipulated certain plans that must be included in the EMPr and implemented during the lifetime (construction to decommissioning) of the project. Draft versions of these plans have been included in the EMPr and will be finalised following the comments received on the EMPr and conditions included in the EA. The requirements listed within the approval letter are detailed below:

REQUIREMENT	REFERENCE IN EMPr
An alien invasive management plan to be implemented during the construction and operational of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.	See Draft alien invasive management plan: Section 5.
A plant rescue and protection plan which allows for the maximum transplant of conservation important species from areas to be transformed. This plan must be compiled by a vegetation specialist familiar with the site and be implemented prior to commencement of the construction phase.	See Draft plant rescue and protection plan: Section 6.
A re-vegetation and habitat plan to be implemented during the construction and operational of the facility.	See Draft re-vegetation and habitat plan: Section 6.
An open space management plan to be implemented during the construction and operational of the facility.	See Draft open space management plan: Section 7.

REQUIREMENT	REFERENCE IN EMPR
A traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	See Draft traffic management plan in Section 8.
A transportation plan for the transport of PV components, main assembly cranes and other large pieces of equipment.	See Draft transportation plan in Section 8.
A fire management plan to be implemented during the construction and operational of the facility	See Draft fire management plan in Section 14 (included in the environmental awareness plan).
A storm water management plan to be implemented during the construction and operational of the facility.	See Draft storm water management plan in Section 9.
An erosion management plan for monitoring and rehabilitation erosion events associated with the facility.	See Draft erosion management plan in Section 10.
An effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling use and storage.	See Draft monitoring system to detect any leakage or spillage of all hazardous substances in Section 11.
Measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments, and other environmental sensitive areas from construction impacts including the direct or indirect spillage of pollutants.	See measures to protect hydrological features such as streams, rivers, pans, wetlands, dams and their catchments in Section 9 and 10, and construction impacts including the direct or indirect spillage of pollutants in Section 12.

2.3 GOAL FOR ENVIRONMENTAL MANAGEMENT:

The overall goal for environmental management for the Boven Solar PV1 project is to construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area; and
- Contributes to the environmental baseline and understanding of environmental impacts of solar energy facility in a South African context.

3 Final site layout plan and environmental sensitivity map

A comprehensive environmental sensitivity map based on the findings of the EIA investigation is presented in Figure 1. Figure 2 shows the preferred site layout plan superimposed on the environmental sensitivity map.

This environmental sensitivity map (Figure 2) includes all key mitigation measures from the specialists and therefore represents the preferred environmental option for the proposed development. The preferred layout provided is based on the following key recommendations made within the various specialist studies:

- The facility should be placed in such a way as to be as near as possible to the other existing and proposed infrastructure in the area;
- The overall disturbance footprint of the project should be kept as small as possible;
- It is recommended to avoid placing infrastructure within the identified watercourse and their buffers (i.e. 32 m). This would contribute to minimising the potential impacts on the aquatic environment and avoid the need for a Water Use License, i.e. although the transmission lines would cross watercourses, it is advised that the towers suspending the overhead cables be placed outside the proposed 32 m buffer or the 1:100 year floodline, whichever is greater.

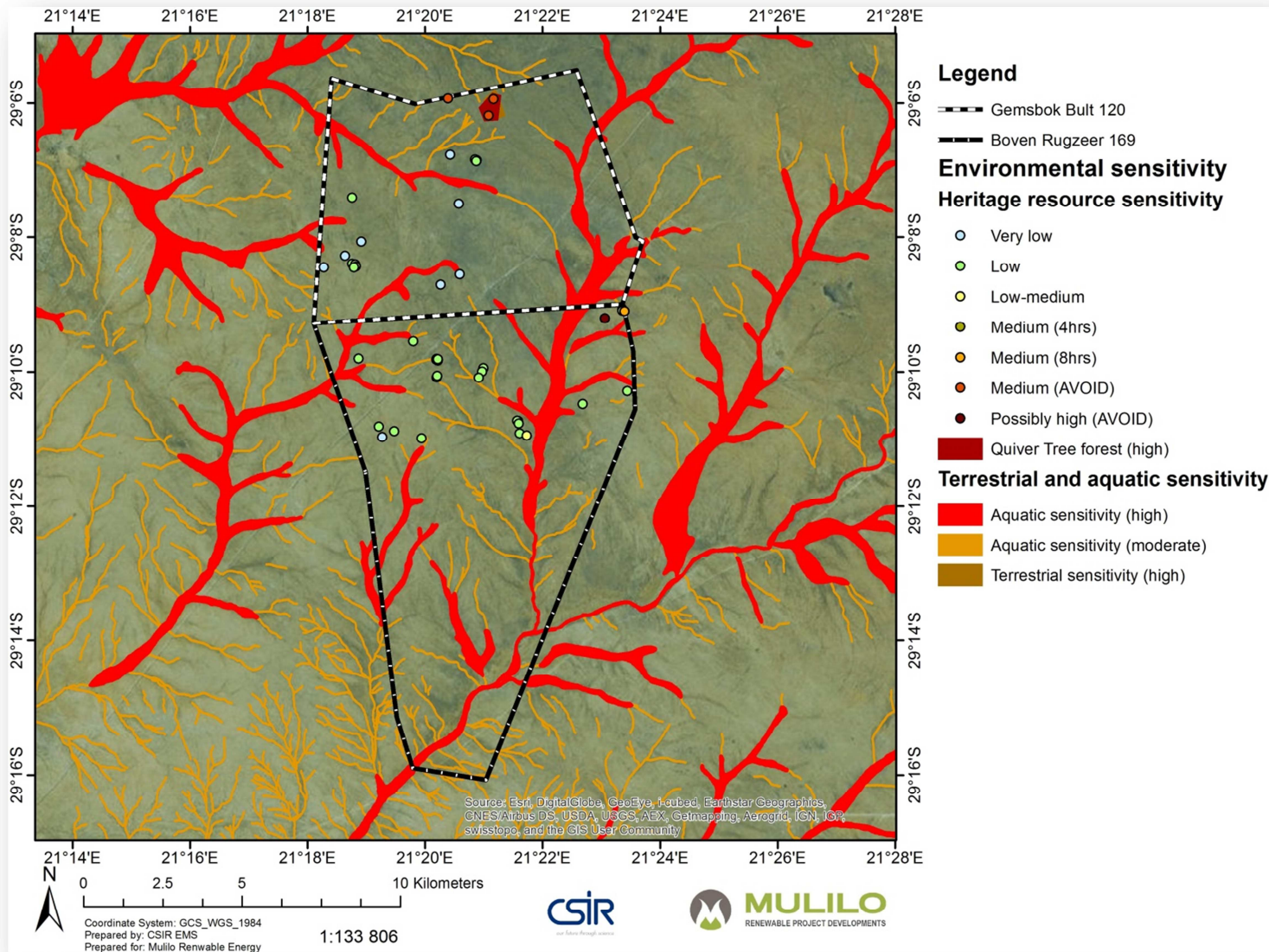


Figure 2: Environmental sensitivity map based on findings of the EIA process

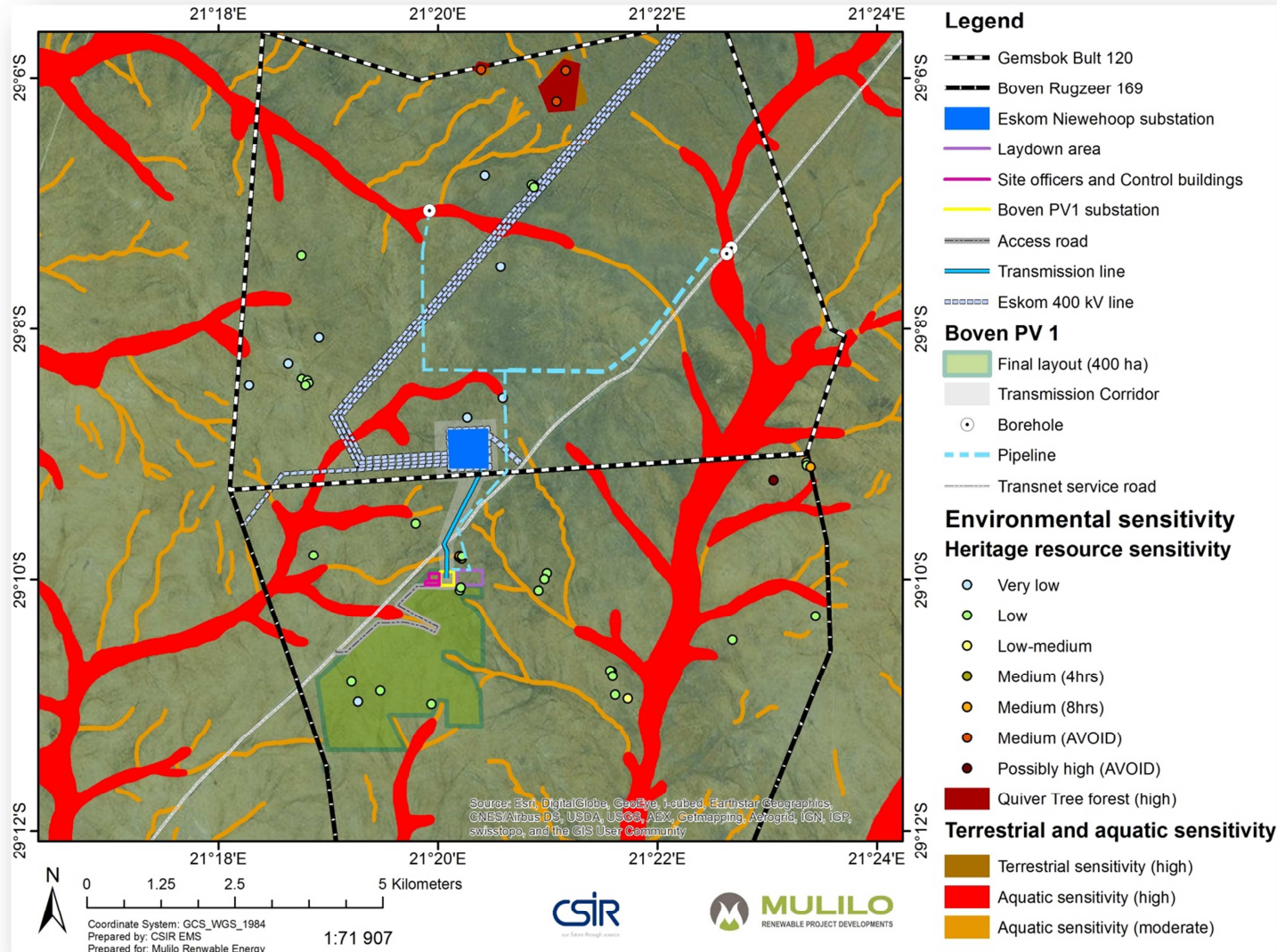


Figure 3: Map combining the preferred site layout plan superimposed on the environmental sensitivity map

4 ROLES AND RESPONSIBILITIES

For the purposes of the EMPr, the generic roles that need to be defined are those of the (1) Project Developer and (2) Environmental Control Officer (ECO) and (3) Contractor.

Note: The specific titles for these functions will vary from project to project. The intent of this section is to give a generic outline of what these roles typically require.

4.1 PROJECT DEVELOPER

The Project Developer (i.e. Mulilo Renewable Project Developments (Pty) Ltd) is the 'owner' of the project and, as such, is responsible for ensuring that the conditions of the Environmental Authorisation issued in terms of NEMA are fully adhered to, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that the Project Developer will appoint the ECO and the Lead Contractor.

It is proposed that Mulilo will implement the Self-Build Option for the associated electrical infrastructure to be constructed. Following the construction phase, the associated electrical infrastructure will either be transferred into the ownership of Eskom or otherwise remain in the ownership of Mulilo. This means that should Eskom take ownership of the electrical infrastructure, the operational, maintenance and decommissioning requirements will be their responsibility. The requirements are included in Section 15 of the draft EMPr.

4.2 ENVIRONMENTAL CONTROL OFFICER

Responsibilities of the ECO include; overseeing the implementation of the EMPr during the construction and operational phases, monitoring environmental impacts, record-keeping, and monitoring compliance with the conditions of the Environmental Authorisation. The ECO also needs to ensure compliance to the plans included in the EMPr following approval of the Final EMPr. These plans are:

- Alien invasive management plan
- Plant rescue and protection plan
- Re-vegetation and habitat plan
- Open space management plan
- Erosion management plan
- Monitoring system to detect any leakage or spillage all hazardous substances
- Environmental awareness plan (fire management plan)

The lead contractor and sub-contractors may have their own ECOs, or designate ECO functions to certain personnel.

During construction, the Project Developer's ECO will be responsible for the following:

- Meeting on site with the Contractor prior to the commencement of construction activities to confirm the construction procedure and designated activity zones;
- Weekly or bi-weekly (i.e. every two weeks) monitoring of site activities during construction to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist that is to be prepared by the ECO at the start of the construction phase;
- Preparation of the monitoring report based on the weekly or bi-weekly site visit;
- Reporting of any non-conformances within 48 hours of identification of such non-conformance to the relevant agents; and
- Conducting an environmental inspection on completion of the construction period and 'signing off' the construction process with the Contractor.

During the operational phase, the Project Developer's ECO will be responsible for:

- Overseeing the implementation of the EMPr for the operational phase;
- Ensure that the necessary environmental monitoring takes place as specified in the EMPr; and
- Update the EMPr and ensure that records are kept of all monitoring activities and results.

During decommissioning, the ECO will be responsible for:

- Overseeing the implementation of the EMPr for the decommissioning phase; and
- Conducting an environmental inspection on completion of decommissioning and 'signing off' the site rehabilitation process.

4.3 LEAD CONTRACTOR

The Lead Contractor will be responsible for the following:

- Traffic management plan;
- Transportation plan;
- Storm water management plan;
- Overall construction programme, project delivery and quality control for the construction for the solar project;
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project management related to project construction;
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment;
- Ensuring that each subcontractor employ an ECO (or have a designated ECO function) to monitor and report on the daily activities on-site during the construction period;

- Ensuring that safe, environmentally acceptable working methods and practices are implemented and that sufficient plant and equipment is made available properly operated and maintained, to facilitate proper access and enable any operational to be carried out safely;
- Meeting on site with the Project Developer's ECO prior to the commencement of construction activities to confirm the construction procedure and designated activity zones;
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the plan; and
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the Project Developer's ECO.

5 ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

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

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

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

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

6 PLANT RESCUE AND PROTECTION PLAN INCLUDING RE-VEGETATION AND HABITAT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
6.1. Loss of Species of Special Concern (SSC) and protected species and their habitats	Minimise fragmentation and loss of SSC and protected species and their habitats through the careful siting and layout planning for the project	Avoid the removal of listed SSC and protected species as far as possible.	Prepare final layout plan and include the plan in the updated EMPr (with submission to DEA if required)	Once-off during design phase	Project Developer
		<p>A buffer zone of 32 m must be implemented from the edge of the drainage lines on site (shown on the sensitivity map (Figure 1 and 2), in which no development or activities should take place.</p> <p>Note: The Environmental Authorisation from DEA may require that the Final Layout be submitted to DEA (and possibly other authorities such as government conservation bodies) prior to the start of construction. In this case, such specifications must be included into this section of the updated EMPr.</p>	Prepare final layout plan and include the plan in the updated EMPr (with submission to DEA if required)	Once-off during design phase	Project Developer
CONSTRUCTION PHASE					
6.2. Excessive loss of natural vegetation in and outside development footprint area	<p>Minimise loss of natural vegetation</p> <p>Prevent impacts on natural</p>	Sensitive habitats and area outside project development should be clearly demarcated as no go areas during the construction phase to avoid accidental impacts. No development or activities should take place in the high sensitivity ecosystems (shown in Figure 1).	Strict control over the behaviour of construction workers, restricting activities to within demarcated areas for construction. ECO must monitor activities and record and report non-compliance	Daily	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
and veld degradation	vegetation in sensitive habitats and SSC		Strict control and proper education of staff to prevent misconduct. If ECO is absent, there should be a designated EO present to deal with any urgent issues.		
		The storm-water management plan must be implemented during the construction phase	Monitor storm water management efficiency	After rainfall events	Contractor
		Unnecessary impacts on surrounding natural vegetation must be avoided during construction. No construction vehicles should be allowed to drive around the veld. All construction vehicles should remain on properly demarcated roads.	Strict control over the behaviour of construction workers, restricting activities to within demarcated areas for construction Include periodical site inspection in environmental performance reporting that specifically records occurrence or not of off-road vehicle tracks in specific areas.	Daily	ECO and Contractor
		Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Undertake following the construction phase.	Daily	ECO and Contractor
		The collection, hunting or harvesting of any plants, fuel wood or animals at the site during construction should be strictly forbidden and the staff educated to prevent this from happening.	Strict control over the behaviour of construction workers, restricting activities to within demarcated areas for construction	Daily	ECO and Contractor
		Fires should only be allowed within fire-safe demarcated areas.	Strict control over the behaviour of construction workers, restricting activities to within demarcated areas	Daily	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
6.3. Impacts on species of special concern and their habitats	Minimise impacts on species of special concern and protected trees.	A plant rescue operation must be initiated to confirm that no other species are located within the development site.	ECO must undertake a final walkthrough of the site prior to commencement of construction to ensure no SCC will be impacted on	Once-off	ECO and Contractor
		Clearing of vegetation should be kept to a minimum, keeping the width and length of the earth works to a minimum.	Monitor activities and record and report non-compliance	Daily	ECO and Contractor
		Avoid the removal of listed SSC or protected species as far as possible. Should any of the listed / protected species need to be removed, the requisite permits must be obtained prior to the removal of the species.	Monitor activities and record and report non-compliance	Daily	ECO and Contractor
6.4 Loss of vegetation, top soil and habitat fragmentation	Minimise the loss of seed bank present within the soil Ensure effective topsoil covering to conserve soil fertility on all disturbed areas, after they have been rehabilitated.	Wind screening must be undertaken to prevent soil loss from the site.	Monitor site for indication of erosion	Daily	ECO and Contractor
		The shallow topsoil layer must be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, the topsoil layers, which contain seed and vegetative material, should be reinstated last to allow plants to rapidly re-colonise the bare soil areas	See measures discussed in Section 5.1.	Daily (stockpiling) and once-off for the reinstatement of the top soil layer	ECO and Contractor
		Dispose of any sub-surface spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.	Stockpile the topsoil layer (0.5m top layer of soil) separately and use on site following the construction phase	Monthly (stockpiling) and once-off for the reinstatement of the top soil layer	ECO and Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
OPERATIONAL PHASE					
6.5 Loss of species of special concern and their habitats	Control loss of natural vegetation during operational. Prevent impacts on natural vegetation in sensitive habitats and species of special concern.	Unnecessary impacts on surrounding natural vegetation must be avoided. All operational and maintenance vehicles to remain on the roads and no off-road driving allowed.	Strict control over the behaviour of operational workers, restricting activities to within demarcated areas for operational Strict control and proper education of staff to prevent misconduct. If ECO is absent, there should be a designated EO present to deal with any urgent issues	Monthly	Operations and Maintenance Contractor
		The collection, hunting or harvesting of any plants, any protected trees, fuel wood or animals at the site should be strictly forbidden and the staff educated to prevent this from happening.	ECO must monitor activities and record and report non-compliance	Monthly	ECO & Operations and Maintenance Contractor
		All hazardous materials should be stored in the appropriate manner to prevent impacts on vegetation. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.	ECO must monitor activities and record and report non-compliance	Monthly	ECO & Operations and Maintenance Contractor
		Fires should only be allowed within fire-safe demarcated areas.	ECO must monitor activities and record and report non-compliance	Monthly	ECO & Operations and Maintenance Contractor
		No unauthorized persons should be allowed onto the site.	ECO must monitor activities and record and report non-compliance	On-going	ECO & Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		The storm-water management plan must be implemented during the operational phase	Monitor storm water management efficiency	Monthly	ECO & Operations and Maintenance Contractor
		Any roads running down a slope must have water diversion structures present.	Monitor storm water management efficiency	Monthly	ECO & Operations and Maintenance Contractor
		Wind screening must be undertaken to prevent soil loss from the site.	ECO must monitor activities and record and report non-compliance	Monthly	ECO & Operations and Maintenance Contractor
DECOMMISSIONING PHASE					
6.6 Rehabilitation of flora on site	Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to operational.	All damaged areas shall be rehabilitated upon completion of the contract.	Final external audit of area to confirm that area is rehabilitated to an acceptable level	Once off	Project Developer with advice from specialist
		All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Final external audit of area to confirm that area is rehabilitated to an acceptable level	Once off	Project Developer with advice from specialist
		Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas.	Final external audit of area to confirm that area is rehabilitated to an acceptable level	Once off	Project Developer with advice from specialist

7 OPEN SPACE MANAGEMENT PLAN

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

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

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>that are not occupied continuously; and</p> <ul style="list-style-type: none"> Lights should be switched off when not in use whenever it is in line with safety and security. 			
7.8 Visual impacts due to the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors	Reduce effects of the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors	Painted features should be maintained and repainted when colour fades or paint flakes.	Ensure a good maintenance of the paint on all painted surface of the solar facility and associated buildings	Twice a year	Operations and Maintenance Contractor
7.9 Permanent barriers to animal movement and habitat fragmentation	Avoid or reduce bird collisions with or due to infrastructure related to the project	The impact on birds must be monitored by environmental staff member during the first six months of the operational phases for each of the projects and in conjunction with any efforts made by Eskom through management measures included in their OEMP in minimising bird collisions.	<ul style="list-style-type: none"> Record any evidence of bird collisions, injury or other bird-related incidents (with GPS coordinates). Where necessary, a bird specialist should oversee the recording and reporting of incidents, help with species identification, assess the significance of any impacts, and if required, suggest mitigation. 	Weekly for the first month, thereafter, monthly	Project Developer
		Annual monitoring by an avifaunal specialist. This should be based on a minimum of 3-5 days	Monitor the flight paths of birds occurring on site, noting which birds	Annually	Project Developer

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

8 TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
8.1 Increase traffic generation	Manage impact that additional traffic generation will have on road network	Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government Northern Cape (PGNC) Department of Public Works, Roads and Transport	Ensure permits are obtained	Once-off during final design phase	Contractor
		Registration details must be supplied for all vehicles that will use the Transnet Service Road to obtain official permit. All permit applications must be submitted to Mrs. M Lourens Tel: 022 703 3233 Fax 022 703 3494.	Ensure permits are obtained	Once-off during final design phase	Contractor
		Provide a Transport Traffic Plan to SANRAL	Prepare and submit plan	Once-off during final design phase	Contractor
8.2 Decrease in quality surface condition of the roads	Limit the deterioration of surface road condition	<p>A Road Maintenance Plan should be developed for the section of the Transnet Service Road that will be used and addresses the following:</p> <ul style="list-style-type: none"> - Grading requirements; - Dust suppressant requirements; - Drainage requirements; - Signage; and - Speed limits. 	Prepare plan	Once-off during final design phase	Contractor
CONSTRUCTION PHASE					

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
8.3 Increase traffic generation	Minimise the impact of the construction activities on the local traffic and avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government Northern Cape (PGNC) Department of Public Works, Roads and Transport	Ensure permits are obtained	During construction	Contractor and ECO
		Registration details must be supplied for all vehicles that will use the Transnet Service Road to obtain official permit. All permit applications must be submitted to Mrs. M Lourens Tel: 022 703 3233 Fax 022 703 3494.	Ensure permits are obtained	Once-off during final design phase	Contractor
		Ensure that roadworthy and safety standards are implemented at all time for all construction vehicles	Monitoring of condition of vehicles coming to site	During construction	Contractor and ECO
		Plan trips so that it occurs during the day but avoid construction vehicles movement on the regional road during peak time (06:00-10:00 and 16:00-20:00).	Monitor and management traffic generated and when trips are made	During construction	Contractor and ECO
8.4. Accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads	Avoidance of accidents	Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established and a product such as Animex fences installed, if needed, to direct animals to safe road crossings.	Appropriate monitoring should be undertaken and Animex fences installed, if needed to direct animals to safe road crossings	Weekly	Contractor and ECO
		Adhere to all speed limits applicable to all roads used. All heavy load vehicles maintain a speed limit of 40 km/hr in proposed section of the Transnet Freight Rail service road.	Ensure that speed limits are adhered to	Daily	Contractor and ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		Implement clear and visible signalisation indicating movement of vehicles and when turning off or onto the Transnet Service Road to ensure safe entry and exit.	Implement clear signalisation	On-going	Contractor and ECO
8.5. Impact on air quality due to dust generation, noise and release of air pollutants from vehicles and construction equipment	Limit the release of noise, pollutants and dust emissions	Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.	Ensure generation of dust to an adequate level	On-going	Contractor and ECO
		Make provision for the repairing of subgrade deterioration (pot holes dust holes) that might result due to loading of heavy construction vehicles on the proposed section. This requirement can be a condition based frequency consensus must be made with the Technical Supervisor Earthworks Mr. Jacob van Dorp 083 269 3416 from Transnet.	Make provision for repairs required to road	Agree to with Transnet	Contractor and ECO
		Construction vehicles must have their lights on at all times. Lights to be properly set to no blind train drivers (SPAD).	Ensure lights are on and properly set	On-going	Contractor and ECO
		Postpone or reduce dust-generating activities during periods with strong wind.	Ensure dust management measures are in place to decrease the dust generated	On-going	Contractor and ECO
		Earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased.	Ensure dust management measures are in place to decrease the dust generated	On-going	Contractor and ECO
		Ensure that all construction vehicles are roadworthy and respect the vehicle safety standards implemented by the	Manage the air pollutants form construction vehicles	On-going	Contractor and ECO

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

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
equipment					
8.10 Decrease in quality of surface condition of the roads	Maintain condition of road	Implement requirements of the Road Maintenance Plan.	Adhere to requirements of the Road Maintenance Plan	On-going	Operations and Maintenance Contractor
DECOMMISSIONING PHASE					
8.11. Ensure that the construction mitigation and management measures are adhered to during this phase.					

9 STORM WATER MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
9.1. Impact of the project if a detailed storm water management plan is not correctly prepared.	Watercourses present on site should retain their existing functioning and character through-out the lifetime of the solar facility	Ensure that the development envelope avoids the watercourses shown in Figure 2.	Check compliance with specified conditions	Once-off during design followed by regular control	Contractor
		<p>Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site, such that they</p> <p>(1) do not result in concentrated flows into natural water courses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural water courses;</p> <p>(2) do not result in any necessity for concrete or other lining of natural water courses to protect them from concentrated flows off the development;</p> <p>(3) do not divert flows out of their natural flow pathways, thus depriving downstream water courses of water.</p>	Check compliance with specified conditions	Once-off during design followed by regular control	Contractor
CONSTRUCTION PHASE					
9.2. Diversion and impedance surface water flows – Changes	Prevent interference with natural run-off patterns,	Stormwater and any run-off generated by the hard surfaces should be discharged into retention swales or areas with rock rip-rap. These could be used to enhance the sense of place, if they are planted with indigenous vegetation.	Check compliance with specified conditions of the stormwater management plan	Weekly or bi-weekly	ECO

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

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		The construction camp and necessary ablution facilities meant for construction workers must be beyond any buffer shown in Figure 2.	Check compliance with specified conditions of the stormwater management plan	Weekly or bi-weekly	ECO
		No ad hoc crossing of channels by vehicles during construction are allowed and access routes across the site should be strictly demarcated	Check compliance with specified conditions of the stormwater management plan	Weekly or bi-weekly	ECO
		No waste materials or sediments are left in the channel after construction.	Check compliance with specified conditions of the stormwater management plan	Weekly or bi-weekly	Contractor and ECO
		Access routes across the site are strictly demarcated and selected with a view to minimising impacts on drainage lines.	Check compliance with specified conditions of the stormwater management plan	Weekly or bi-weekly	Contractor and ECO
OPERATIONAL PHASE					
9.4 Impact due to release of wash water in the environment after use	Prevent runoff into drainage lines onsite	An operational phase stormwater management plan should be designed and implemented, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.	ECO must monitor activities and record and report non-compliance	Continuously during operational phase (i.e. regular interval to be determined by the ECO)	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DECOMMISSIONING PHASE					
<p>9.5 The solar facility would be expected to run for a minimum period of 20 years, after which it would either be decommissioned, alternatively upgraded or an application submitted to obtain a new license. Should the plant be decommissioned, the solar field would be rehabilitated to its original (pre-development) state.</p> <p>In the (unlikely) event that none of the mitigation measures outlined for the Construction and Operational Phases of the project had been implemented, the period of time for recovery to take place would be extended. In the event that decommissioning occurred, and assuming implementation of mitigation measures, the hydrological regime should fully recover over time to present day conditions.</p>					

10 EROSION MANAGEMENT PLAN

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
			occurring at the site. All erosion problems observed should be rectified as soon as possible		
		The shallow topsoil layer must be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, the topsoil layers, which contain seed and vegetative material, should be reinstated last to allow plants to rapidly re-colonise the bare soil areas	Refer to Section 5.1 of the EMPr	Daily (stockpiling) and once-off for the reinstatement of the top soil layer	ECO and Contractor
		Re-seed with locally-sourced seed of indigenous grass species that were recorded on site pre-construction.	Re-seed with seeds of indigenous grass	Once off	ECO with advice from specialist (if required)
OPERATIONAL PHASE					
10.3 Excessive loss of natural vegetation in development footprint area and resulting impacts on species of special concern	Prevent loss of natural vegetation through erosion.	To prevent erosion, indigenous grasses that seed themselves below the solar arrays should be left to form a ground cover and kept short.	ECO to advise on seed to be used	Monthly	Operations and Maintenance Contractor
		The use of silt fences and sand bags must be implemented in areas that are susceptible to erosion. Other erosion control measures that can be implemented are as follows: 1) Brush packing with cleared vegetation, 2) Planting of vegetation, 3) Hydro seeding/hand sowing. All erosion control mechanisms need to be regularly maintained.	Monitor efficiency of erosion control measures	Weekly or monthly	Operations and Maintenance Contractor

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DECOMMISSIONING PHASE					
<p>10.6 No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.</p> <p>10.7 Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. Monitoring: Final external audit of area to confirm that area is rehabilitated to an acceptable level (once off event to be conducted by ECO).</p>					

11 HARZADOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

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

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

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		<p>Secondary containment may need to be constructed and must have a capacity of at least 110% of the largest storage tank's capacity. The secondary containment should include the following:</p> <ul style="list-style-type: none"> ▪ The off-loading point must be located in the bunded area to ensure that any potential spill during the off-loading of the electrolyte solutions is contained; ▪ Divert rainwater away from the bunded area to avoid rainwater mixing with electrolyte spillage potentially present within the secondary containment; ▪ Ensure that the containment area is sloped to a sump; and ▪ All drains should be covered. 	Provide secondary containment according to the specifications	On-going	
		Although highly unlikely, any spill/leakage from the battery storage facility must be attended to immediately and be handled in an environmental friendly manner (i.e. no discharge into the ground or any surface water body) and must be disposed of at an appropriate licenced hazardous waste disposal facility.	Immediately attend to any spillage	On-going	Contractor and ECO
OPERATIONAL PHASE					
11.4 Contamination of soil and risk of	Avoid soil contamination and risk of	Maintenance equipment must be checked to ensure that no fuel spillage takes place from vehicles or machinery.	Implement specifications for maintenance equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
damage to vegetation and/or fauna through spillage of fuels and oils	damage to vegetation and/or fauna through spillage of fuels and oils	Spilled fuel, oil or grease is retrieved during operations where possible and contaminated soil removed, cleaned and replaced.	Implement specifications for removal and disposal of contaminated soil equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor
		Contaminated soil to be collected and disposed of at a waste site designated for this purpose.	Implement specifications for removal and disposal of contaminated soil equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor
		Portable bioremediation kit (to remedy chemical spills) is to be held on site and used as required. In case of a spillage of hazardous chemicals where contamination of soil occurs, depending on the degree of contamination, excavation and removal to a hazardous waste disposal site might be necessary. If the spillage is widespread, a specialist will need to be immediately appointed to deal with the issue, the DEA notified and the notification process stipulated in the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 331, 2 May 2014) should be followed.	Ensure that a well-maintained Portable bioremediation kit (to remedy chemical spills) is available on site and that site workers and contractors know its location and instructions	Monthly	Operations and Maintenance Contractor
		Bunded containment to be provided below and around any fuel storage containers.	Implement specifications for maintenance equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor
DECOMMISSIONING PHASE					

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
11.5 No specific impacts are associated with the decommissioning phase other than those from the operational phase that will still be relevant for the duration of the decommissioning phase due to on-going occupation of the area.					

12 SOCIO-ECONOMIC MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
CONSTRUCTION PHASE					
12.1. Develop a Workforce Recruitment Policy	Reserve employment, where practically possible, for local residents (i.e. Kenhardt) (particularly for vulnerable groups such as women and previously disadvantaged individuals)	The proponent must clearly define who is considered to be local (Kenhardt) residents; known as the Project Affected People (PAP). This should ideally be conducted in collaboration with the local community and local government structures. The purpose of demarcating the PAP is to develop a criterion of characteristics considered to identify a given job seeker as a PAP. Once this criterion is known, all subsequent job seekers can be screened against it in order to determine whether they qualify for employment. The criterion for a PAP should be incorporated into the Workforce Recruitment Policy.	Develop a Workforce Requirement Policy based on the prescribed management actions	Pre-construction	Project Developer & Contractor
		Assemble a database of local residents and their relevant skills and experience (in collaboration with local structures such as the NGO Marcyrox: www.marcyrox.org) during the pre-construction phase of the project.	Develop a Workforce Requirement Policy based on the prescribed management actions	Pre-construction	Project Developer & Contractor
		Ensure the employment of community members. All low skilled positions (i.e. plant cleaning, security and maintenance) are sourced locally if possible	Develop a Workforce Requirement Policy based on the prescribed management actions	Pre-construction	Project Developer & Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
12.2 Develop a Stakeholder Engagement Plan	Assist in a communication strategy for the proposed project to manage expectations.	The plan should be to ensure that all project related information (including those related employment) is communicated: (i) accurately; (ii) timeously; (iii) to the appropriate constituency; (iv) in an appropriate format; and is aimed towards fostering realistic expectations.	Develop a Stakeholder Engagement Plan based on the prescribed management actions	Pre-construction	Project Developer & Contractor
12.3 Local spending	Promotion of socio-economic benefits for Kenhardt area	Procurement of goods and services in the Kenhardt area during the construction phase, where possible	Check that local procurement is undertaken	On-going	Project Developer and Contractor
12.4 Human development via the proposed Economic Development Plan	<p>Create a local community trust which has an equity share in the project life to benefit historically disadvantaged communities.</p> <p>Initiate a training strategy to facilitate employment from the local community.</p> <p>Give preference to local suppliers of components for the</p>	Engage with local NGOs, CBOs and local government structures to identify and agree upon relevant skills and competencies required in the Kenhardt community for inclusion in the Economic Development Plan	Develop an Economic Development Plan based on the prescribed management actions	Pre-construction	Project Developer & Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
	construction of the facility.				
OPERATIONAL PHASE					
12.5 Promotion of local spending	Promotion of socio-economic benefits for Kenhardt area	Procurement of goods and services in the Kenhardt area during the operational phase, were possible	Check that local procurement is undertaken	Weekly	Project Developer and Operations and Maintenance Contractor
		Obtain regularly required goods and services from as large a selection of local service providers as possible	Check that local procurement is undertaken	Weekly	Project Developer and Operations and Maintenance Contractor
12.6 Workforce Recruitment Policy	Reserve employment, where practically possible, for local residents (i.e. Kenhardt) (particularly for vulnerable groups such as women and previously disadvantaged individuals)	Ensure the employment of community members. All low skilled positions (i.e. plant cleaning, security and maintenance) are sourced locally if possible	Implement the Workforce Requirement Policy	As required per the Policy	Project Developer and Operations and Maintenance Contractor
		Actively engage with the local government and other NGOs and CBOs to investigate how skills can be developed to enable short term workers to gain the necessary skills in pursuit of longer-term employment	Implement the Workforce Requirement Policy	As required per the Policy	Project Developer and Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		Reserve employment, where practical, for local residents	Implement the Workforce Requirement Policy	As required per the Policy	Project Developer and Operations and Maintenance Contractor
12.7 Human development via the proposed Economic Development Plan	<p>Create a local community trust which has an equity share in the project life to benefit historically disadvantaged communities.</p> <p>Initiate a training strategy to facilitate employment from the local community.</p> <p>Give preference to local suppliers of components for the construction of the facility.</p>	Implement Economic Development Plan	Adhere to the requirements listed within the Workforce Requirement Policy	As required in the Plan	Project Developer and Operations and Maintenance Contractor
		Where possible, align Economic Development Plan with Local Municipality's IDP	Adhere to the requirements listed within the Workforce Requirement Policy	As required in the Plan	Project Developer and Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DECOMMISSIONING PHASE					
12.8 Job losses	Compliance with relevant South African labour legislation when retrenching employees.	Comply with relevant South African labour legislation when retrenching employees	Ensure compliance to SA labour legislation, proper decommissioning of project infrastructure and implementation of succession training for staff	Once-off	Project Developer
	Appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning.	Consider appropriate succession training of locally employed staff earmarked for retrenchment during decommissioning	Ensure compliance to SA labour legislation, proper decommissioning of project infrastructure and implementation of succession training for staff	Once-off	Project Developer
	Proper decommissioning of project infrastructures and avoidance of misuse of infrastructure following decommissioning.	All project infrastructures should be decommissioned appropriately and thoroughly to avoid misuse	Ensure compliance to SA labour legislation, proper decommissioning of project infrastructure and implementation of succession training for staff	Once-off	Project Developer

13 ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

A number of key elements should be included into the Final environmental awareness plan to be prepared by the ECO of the proposed project, including: explanation of the basic key environmental concepts; importance of the environment, including the management thereof; examples of environmental degradation/pollution and the source of those; role that the employees in protecting the environment; rules to protect the environment and a review of the South African laws which protect the environment.

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
DESIGN PHASE					
13.1. Potential impacts resulting of the lack of overall compliance with the Environmental conditions of approval (issued by DEA)	Ensure compliance with all Environmental conditions of approval (issued by DEA)	Establish clear and transparent reporting of the activities undertaken with regard to all recommendations included in the EMPr.	Audit report on compliance with actions & monitoring requirements	Weekly	Project Developer
13.2. Risk of fire, explosion or release of toxic gas	Reduce fire, explosion or release of toxic gas risk from battery storage facility	The battery storage facility must be located outside (i.e. well-ventilated) and include vents (where necessary and applicable)	Ensure compliance to this requirement	Once-off	Project Developer
CONSTRUCTION PHASE					
13.3.Potential	Prevent fire on site	Designate smoking areas as well as areas for cooking,	Adhoc checks to ensure	Daily	ECO and

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
risk of fire due to construction activities or behavior of staff on site during the construction phase	resulting of workers smoking/ starting fires (i.e. cooking, heating purposes) in undesignated areas Prevent potential loss of habitat due to risk of fire	where the fire hazard could be regarded as insignificant.	workers are smoking/starting fires only in designated areas		Contractors
		Educate workers on the dangers of open and/or unattended fires.	Ensure fire safety requirements are well understood and respected by workers	On-going	ECO and Contractors
		Open fires must be prohibited. Appropriate fire safety training should also be provided to staff that are to be on the site for the duration of the construction phase.	Ensure fire safety requirements are well understood and respected by workers	On-going	ECO and Contractors
		Fire fighting equipment must be made available at various appropriate locations on the construction site.	Ensure fire safety requirements are well understood and respected by workers	On-going	ECO and Contractors
13.4. Inappropriate behaviour of civil contractors and sub-contractors during the construction	Ensure that contractors and sub-contractors are aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment	The terms of this EMPr and the potential conditions in the Environmental authorisation (from DEA) will be included in all tender documentation and contractors and sub-contractors contracts.	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors
		Contractors and sub-contractors will use the ablution facilities situated in a designated area of the site; no bathing/washing will be permitted outside the designated area	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
phase	Ensure that contractors and sub-contractors do not induce side impacts on the surrounding environment as a result of unplanned pollution on site	Cooking will take place in a designated area shown on the site map and no firewood or kindling may be gathered from the site or surrounds	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors
		All litter will be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors
	Ensure that actions by on-site contractors and sub-contractors and workers are properly managed in order to minimise impacts to surrounding environment	No one other than the ECO or personnel authorised by the ECO, will disturb or pick plants inside or outside the demarcated construction area	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors
		No one other than the ECO or personnel authorised by the ECO, will disturb animals on the site (no trapping, shooting etc.)	Check compliance with specified conditions using a report card, and allocate fines when necessary	On-going	ECO and Contractors
13.5. Disturbance to and damage to Heritage Artefacts	Prevent damage to archaeological features	Maintain and enforce awareness of the possibility of uncovering of heritage features during construction phase Inform all employees and contractors of the necessary procedures when discovering heritage objects/sites	An archaeologist or heritage authority (SAHRA, see contact details below) must be informed if any features/sites are found	On-going	ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
13.6. In the event that any unanticipated heritage features is uncovered during construction or operational (including any possible expansion of the facilities).	Mitigate unexpected uncovering, disturbance or destruction of archaeological resources, e.g. burial or feature.	If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted.	Alert heritage authorities and mitigate if deemed necessary	In the event of unexpected uncovering of feature	ECO
		The find would need to be reported to the heritage authorities (SAHRA and Ngwao-Boswa Ya Kapa Bokoni) and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.	Alert heritage authorities and mitigate if deemed necessary	In the event of unexpected uncovering of feature	ECO
13.7. Disturbance or destruction of fossil remains during excavation of sedimentary rocks (e.g. solar panel footings, underground cables, access roads)	Recording and sampling or collection of fossil remains exposed during excavation	Safeguard newly exposed fossil material, preferably in situ.	Monitoring of deep (> 1m) excavations into sedimentary rocks for fossil material (fossil bones, teeth, petrified wood, shells, burrows etc)	During deep (> 1m) excavations	ECO
		Immediately report all fossil finds exposed during construction to SAHRA (Contact details: Mrs Colette Scheermeyer, P.O. Box 4637, Cape Town 8000. Tel: 021 462 4502. Email: cscheermeyer@sahra.org.za) for recording and sampling by a professional palaeontologist (where warranted).	Monitoring of deep (> 1m) excavations into sedimentary rocks for fossil material (fossil bones, teeth, petrified wood, shells, burrows etc)	During deep (> 1m) excavations	ECO

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
13.8. Increased animal road mortality	Reduction in animal mortality	Staff should be made aware of the general speed limits as well the potential animals that may cross and how to react in these situations	Induction of staff should ensure appropriate awareness of speed limits and how to react if an animal crosses the road	Weekly	ECO or EO
		Road kill monitoring programme (inclusive of wildlife collisions record keeping) should be established	Appropriate monitoring should be undertaken and Animex fences installed, if needed to direct animals to safe road crossings	Weekly	ECO or EO
		If it is seen that the number of roadkills / wildlife collisions increase within an area, particularly with regard to smaller species (reptiles), then means such as exclusion fences within these areas only (e.g. Animex fencing or similar) should be installed.	Appropriate monitoring should be undertaken and Animex fences installed, if needed to direct animals to safe road crossings	Weekly	ECO or EO
OPERATIONAL PHASE					
13.9. Ensure that workers are not smoking/ starting fires (i.e. cooking, heating purposes) in undesignated areas during	Ensure an appropriate and efficient fire prevention/ management plan during the operational phase	Designate smoking areas as well as areas for cooking, where the fire hazard could be regarded as insignificant.	Adhoc checks to ensure workers are smoking/starting fires only in designated areas	Monthly	Operations and Maintenance Contractor
		Educate workers on the dangers of open and/or unattended fires.	Adhoc checks to ensure workers are smoking/starting fires only in designated areas	Monthly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
operational phase					
		Ensure that adequate fire fighting equipment is available and easily accessible on site.	Yearly control of fire fighting equipment	Yearly	Operations and Maintenance Contractor
13.10 Non respect of waste management practices	Ensure compliance with waste management legislation Prevent pollution of the environment	Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected	Control of waste management practices throughout operational phase	Monthly	Operations and Maintenance Contractor
13.11 Excessive consumption of water and waste water generation	Maintain reasonable levels of water consumption and waste water generation	Water conservation must be strongly encouraged. Where possible water must be re-used	Water consumption and waste water generation to be monitored throughout operational phase	Quarterly	Operations and Maintenance Contractor
		Waste water must be collected and disposed of at a suitable disposal point off site.	Water consumption and waste water generation to be monitored throughout operational phase	Quarterly	Operations and Maintenance Contractor
13.12 Damage to or destruction of	Prevent damage to archaeological and palaeontological features	If archaeological features are uncovered unexpectedly during operations, the South African Heritage Resources Agency (SAHRA) must be immediately contacted.	An archaeologist must be informed if any features/sites are found	During operations	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
archaeological and palaeontological features (e.g. fossils) that may occur on site		The contact details for SAHRA are: Tel: 021 462 4502 Fax: 021 462 4509 Email: mgalimberti@sahra.org	accidentally)		
13.13. Risk of fire, explosion or release of toxic gas	Reduce fire, explosion or release of toxic gas risk from battery storage facility	Should electrolyte solutions be stored on site, these should be stored away from incompatible materials such as all peroxides, such as hydrogen peroxide; chemicals that react with acid to generate a gaseous product, such as carbonate and bicarbonates, sulfites and bisulfites; strong reducing agents, such as alkaline metals (Li, Na, K) and alkaline earth metals (Be Mg Ca, Sr, Ba); reactive metals such as aluminum and zinc, all hydrides (such as LiAlH ₄ , NaBH ₄), and some carbides (such as CaC ₂).	Adhere to MSDS's of the electrolytes	On-going	Operations and Maintenance Contractor

14 WASTE MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
CONSTRUCTION PHASE					
14.1 Potential impacts resulting of the inadequate control of the generation of waste and waste management on site	Minimise the production of waste	Promote waste reduction, re-use, and recycling opportunities on site during the construction phase	Monitor waste generation and collection throughout construction	Weekly or bi-weekly	ECO and Contractor
		Investigate if any complaints has been expressed from the community regarding waste handling in and out the site			
	Prevent environmental problems (e.g. pollution / change in soil pH) due to solid and liquid wastes disposed of on the site	Ensure an adequate and sustainable use of resources	Monitor waste generation and collection throughout construction	Weekly or bi-weekly	ECO and Contractor
		All construction waste (concrete, steel, rubbles etc.) to be removed from the site.	Waste removal and disposal to be monitored throughout construction	Weekly or bi-weekly	ECO and Contractor
		Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.	Waste removal and disposal to be monitored throughout construction	Weekly or bi-weekly	ECO and Contractor
Ensure compliance with waste management legislation	All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	Waste removal and disposal to be monitored throughout construction	Weekly or bi-weekly	ECO and Contractor	

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
		Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	Waste removal and disposal to be monitored throughout construction	Weekly or bi-weekly	ECO and Contractor
		Waste water from construction and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	Waste removal and disposal to be monitored throughout construction	Weekly or bi-weekly	ECO and Contractor
		Control and implement waste management plans provided by contractors. Ensure that relevant legislative requirements are respected.	Control of waste management practices throughout construction phase	Weekly or bi-weekly	ECO and Contractor
		Determine specific areas on site for temporary management of waste.	Control of waste management practices throughout construction phase	Weekly or bi-weekly	ECO and Contractor
OPERATIONAL PHASE					
14.2 Generation of waste during operational of the solar facility	Minimise the production of waste	Ensure that waste generated during this phase is taken to an appropriate registered landfill.	Control of waste management practices throughout operational phase	Weekly	Operations and Maintenance Contractor
	Ensure compliance with waste management	Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	Control of waste management practices throughout operational phase	Weekly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
	legislation	Determine specific areas on site for temporary management of waste	Investigate if any complaints has been expressed from the community regarding waste handling in and out the site	Monthly	Operations and Maintenance Contractor
14.3 Impacts due to management solid and liquid wastes disposed of on the site during operational phase	Prevent environmental problems (e.g. pollution / change in soil pH)	All operational waste (concrete, steel, rubbles etc.) to be removed from the site and waste hierarchy of prevention, as the preferred option, followed by reuse, recycling, recovery must be implemented, where possible.	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		Other non-hazardous solid waste (e.g. packaging material) to be disposed of at a licensed landfill.	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		All liquid waste (used oil, paints, lubricating compounds and grease) to be packaged and disposed of by appropriate means.	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		Adequate containers for the cleaning of equipment and materials (paint, solvent) must be provided as to avoid spillages.	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		Waste water from operations and painting activities must be collected in a designated container and disposed of at a suitable disposal point off site.	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
14.4 Replacement of materials and waste	Ensure materials originating from battery are appropriately	Any materials that are transported, stored or replaced should be appropriately handled according to the Materials and Safety Data Sheet (MSDS) and sent to a registered hazardous landfill site	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
generation	disposed of	The MSDS's should be kept on site to ensure proper handling of the electrolytes	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		Any used battery that is no longer in use may not be stored on site for a period exceeding 90 days	Waste removal and disposal to be monitored	Monthly	Operations and Maintenance Contractor
		PPE (appropriate gloves, safety glasses/face shield, appropriate clothing) should be worn when handling the electrolyte solutions	Ensure that PPE is worn when handling the materials	On-going	Operations and Maintenance Contractor
DECOMMISSIONING PHASE					
14.5 Generation of waste due to disassembly of the solar facility	Avoid substantial negative impacts at the decommissioning phase due to insufficient planning	Suitable receptacles must be provided for the temporary storage of various waste types such as scrap metal and concrete, until it is removed to the nearest licensed landfill.	Audit the implementation of mitigation measures recommended for the decommissioning Phase	During the decommissioning phase	Project Developer
		Waste separation is encouraged and therefore receptacles should be labelled to reflect the different waste types.	Audit the implementation of mitigation measures recommended for the decommissioning	During the decommissioning phase	Project Developer

15 INDEPENDENT ENVIRONMENTAL MANAGEMENT PLAN FOR THE ASSOCIATED ELECTRICAL INFRASTRUCTURE

In the event that the ownership of the associated electrical infrastructure connecting the Boven Solar PV1 project to the Nieuwehoop Solar Substation is transferred to Eskom SOC Ltd following the construction phase, this section of the EMPr will be transferred to the responsibility of Eskom. Eskom will be responsible for ensuring that the goal and associated objectives, actions, responsibilities, monitoring requirements and targets of the section pertaining to the newly constructed associated electrical infrastructure are implemented. Since the associated electrical infrastructure will be constructed already, this section specifically addresses the operational and decommissioning impacts on the electrical infrastructure.

Nature of the management activity	Mitigation Objectives	Mitigation/Management action	Monitoring		
			Methodology	Frequency	Responsibility
15.1 Risk of bird collisions with electrical infrastructure	Minimise the chance that the associated electrical infrastructure, specifically the transmission line, cause avifaunal collisions	Pigtails and/or flappers should be installed on the overhead cables where known flight paths occur.	During construction, flappers will be installed at known flight paths. The effectivity of this should be monitored, and adjusted, if required.	As needed	Eskom
		The impact on birds must be monitored by environmental staff member during the first six months of the operational phases for each of the projects and in conjunction with any efforts made by Eskom through management measures included in their OEMP in minimising bird collisions.	<ul style="list-style-type: none"> Record any evidence of bird collisions, injury or other bird-related incidents (with GPS coordinates). Where necessary, a bird specialist should oversee the recording and reporting of incidents, 	Weekly for the first month, thereafter, monthly	Eskom

Nature of the management activity	Mitigation Objectives	Mitigation/Management action	Monitoring		
			Methodology	Frequency	Responsibility
			help with species identification, assess the significance of any impacts, and if required, suggest mitigation.		
		Annual monitoring by an avifaunal specialist. This should be based on a minimum of 3-5 days observations.	Monitor the flight paths of birds occurring on site, noting which birds are seen	Annually	Eskom
		Any avian mortality or injury at the facility should be duly recorded and reported.	Record any bird fatalities and undertake the necessary reporting to EWT or relevant authority	When required	Eskom
15.2 Loss of species of special concern and their habitats	Control loss of natural vegetation during operational. Prevent impacts on natural vegetation in sensitive habitats and species of special concern.	Unnecessary impacts on surrounding natural vegetation must be avoided. All operational and maintenance vehicles to remain on the roads and no driving off road allowed.	Strict control over the behaviour of operational workers, restricting activities to within demarcated areas	On-going when maintenance work is being undertaken	Eskom

Nature of the management activity	Mitigation Objectives	Mitigation/Management action	Monitoring		
			Methodology	Frequency	Responsibility
15.3 Impact of traffic causing dust and deterioration in road surface condition	Manage dust generation and reduce the deterioration of the condition of specifically the Transnet Service Road	Vehicle drivers shall drive at moderate speed on site access roads to minimise or eliminate dust generation.	Ensure generation of dust to an adequate level during operational activities	On-going	Eskom
15.4 Visual impacts due to the intrusion of electrical infrastructure in a rural area	Manage the visual impact that the electrical infrastructure may have	Painted features should be maintained and repainted when colour fades or paint flakes.	Ensure that all electrical infrastructure are well maintained	When required	Eskom
15.5 Generation of waste during operational of the solar facility	Minimise the production of waste	Ensure that waste generated during this phase is taken to an appropriate registered landfill.	Control of waste management practices throughout operational phase	Weekly	Eskom
	Ensure compliance with waste management legislation	Burning of waste material such as vegetation and old cleaning materials resulting from operational/maintenance activities at a site is strictly prohibited	Control of waste management practices throughout operational phase	Weekly	Eskom

Nature of the management activity	Mitigation Objectives	Mitigation/Management action	Monitoring		
			Methodology	Frequency	Responsibility
DECOMMISSIONING PHASE					
15.6 Generation of waste during the decommissioning of the electrical infrastructure	Minimise the production of waste	Ensure that waste generated during this phase is taken to an appropriate registered landfill.	Control of waste management practices throughout decommissioning phase	On-going	Eskom
	Ensure compliance with waste management legislation	Burning of waste material such as vegetation and old cleaning materials resulting from decommissioning activities at a site is strictly prohibited	Control of waste management practices throughout decommissioning phase	On-going	Eskom
		No waste materials or sediments from the electrical infrastructure are to be left in the watercourse or on site after decommissioning.	Control of waste management practices throughout decommissioning phase	On-going	Eskom
15.7 Impact of traffic causing dust and deterioration in road surface condition	Manage dust generation and reduce the deterioration of the condition of specifically the Transnet Service Road	Vehicle drivers shall drive at moderate speed on site access roads to minimise or eliminate dust generation.	Ensure generation of dust to an adequate level during operational activities	On-going	Eskom
15.8 Visual impacts due following the decommissioning phase	Minimise the residual impact on structures that were	Disturbed and transformed areas should be contoured to avoid lines and forms that will contrast with the existing landscapes.	Final external audit of area to confirm that area is rehabilitated to an acceptable level	Once off	Eskom

Nature of the management activity	Mitigation Objectives	Mitigation/Management action	Monitoring		
			Methodology	Frequency	Responsibility
	constructed on site	Working at night should be avoided.	Monitoring of adherence to requirement	On-going	Eskom
		Night lighting of reclamation sites should be minimised within requirements of safety and efficiency.	Monitoring of adherence to requirement	On-going	Eskom