ENVIRONMENTAL MANAGEMENT PROGRAMME

Draft - 23 June 2023

THE PROPOSED ROOIDRAAI SOLAR
PHOTOVOLTAIC SOLAR ENERGY FACILITY AND
GRID CONNECTION INFRASTRUCTURE NEAR
CARLETONVILLE, NORTH WEST PROVINCE









PROJECT DETAIL

Reference No: 14/12/16/3/3/2/2344

Project Title: Proposed Rooidraai Solar Photovoltaic Solar Energy Facility and

Grid Connection Infrastructure near Carletonville, North West

Province

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Report Status: Draft Environmental Management Programme

Report date: 23 June 2023

When used as a reference this report should be cited as: Environamics (2023) Draft Environmental Management Programme: Proposed Rooidraai Solar Photovoltaic Solar Energy Facility and Grid Connection Infrastructure near Carletonville, North West Province.

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LIST OF ABBREVIATIONS

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

PPP	Public Participation Process
PV	Photovoltaic
REIPPP	Renewable Energy IPP Procurement Process
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
SHE	Safety, Health and Environment

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

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

1.1 BACKGROUND

This EMPr has been compiled for the Rooidraai Solar Photovoltaic Solar Energy Facility near Carletonville, North West Province. This solar energy facility is proposed to involve the following:

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

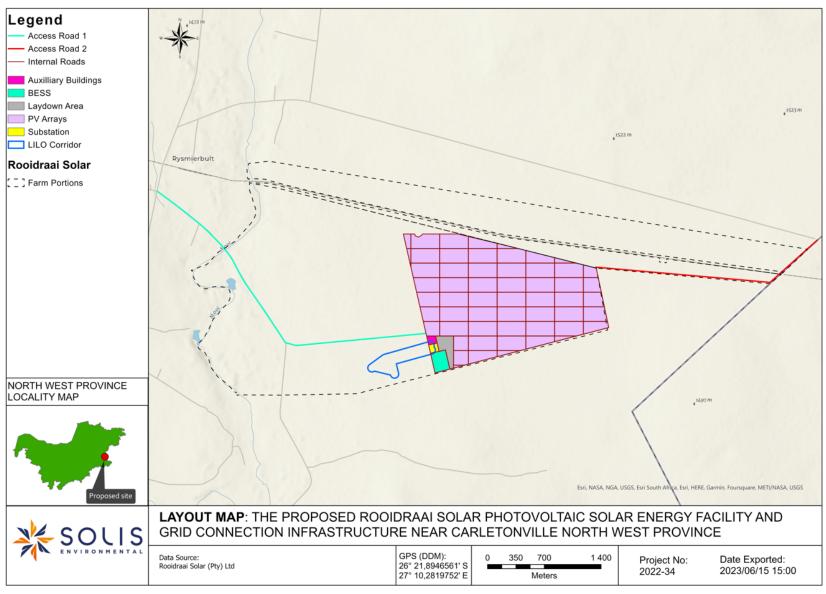


Figure 1: Layout plan indicating the proposed development footprint

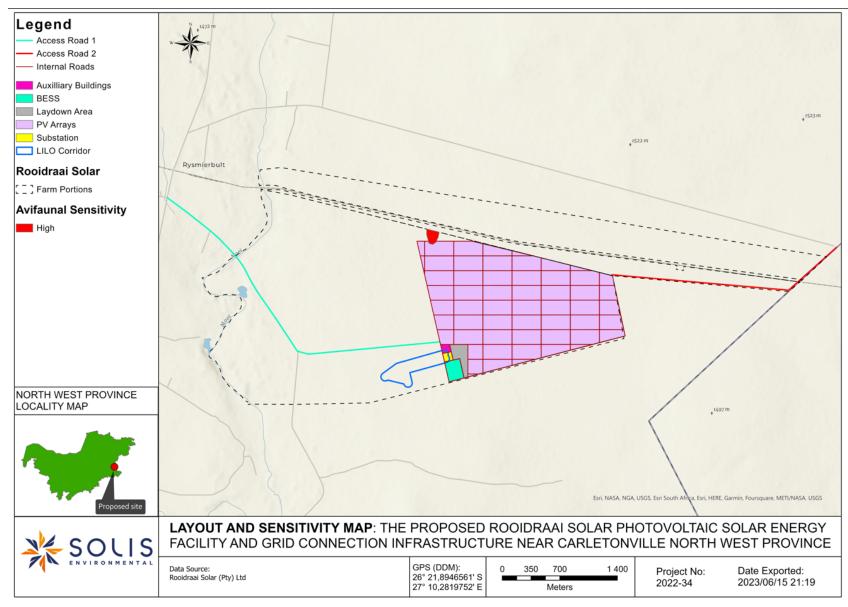


Figure 2: Environmental sensitivity and layout map

1.2 OBJECTIVES OF THE EMPR

The key objectives of the EMPr are to:

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

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

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

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

1.3 ENVIRONMENTAL IMPACTS

The proposed development was assessed to have an overall low impact on the receiving environment. Refer to table 1-1 for aspects requiring specific mitigation within the development footprint as specified in this EMPr.

 Table 1-1:
 Environmental impacts and management outcomes

Impact		Significance	Impact management		
		(with mitigation)	outcomes		
	Construction phase				
Impacts on avifauna	Displacement of priority avian species from important habitats (PV array and associated infrastructure)	Negative Medium	To avoid the displacement of priority avian species from important habitats.		
	Displacement of resident avifauna through increased disturbance (PV array and associated infrastructure) Loss of important avian habitats (PV array and associated infrastructure)	Negative Medium Negative Medium	To avoid the displacement of resident avifauna through increased disturbance. To avoid the loss important avian habitats.		
	Displacement of priority avian species from important habitats (Power Line) Displacement of resident avifauna through increased disturbance (Power Line)	Negative Low Negative Low	To avoid the displacement of priority avian species To avoid the displacement of resident avifauna through increased disturbance		
	Loss of important avian habitats (Power Line)	Negative Low	To avoid the loss of important avian habitats		
Terrestrial Biodiversity	Potential impacts on plant biodiversity and habitats	Negative Low	To avoid impacts on plant biodiversity and habitats		
	Impact on Faunal Diversity.	Negative Low	To minimize impact on Faunal Diversity.		
	Impact on Critical Biodiversity Areas and broad-scale ecological processes.	Negative Medium	To avoid impact on CBAs and broad-scale ecological processes.		
Aquatic ecology	Loss of habitat containing protected species or Species of Special Concern	Negative Low	To reduce the loss of habitat containing protected species or Species of Special Concern.		
	Loss of CBAs or potential areas with conservation potential	Negative Low	To avoid loss of CBAs or potential areas with conservation potential.		
	Potential spread of alien	Negative Low	To reduce the spread of		

	vegetation		alien vegetation.
	Loss of riparian and or wetland habitat	Negative Low	To avoid or reduce the loss of riparian and or wetland habitat
	Changes to the hydrological regime and increase potential for erosion	Negative Low	To avoid or reduce changes to the hydrological regime and increase potential for erosion
	Changes to surface water quality characteristics	Negative Low	To avoid or reduce changes to surface water quality characteristics
Visual	Visual impact of construction activities on sensitive visual receptors in close proximity to the SEF	Negative Low	To minimise visual impacts
	Visual impact of construction activities on sensitive visual receptors in close proximity to the PL.	Negative Low	
Social environment	The creation of direct and indirect employment opportunities during the construction phase of the project.	Medium Positive	To enhance the use of local skills and uplift the local community.
	Significance of the impact from the economic multiplier effects from the use of local goods and services.	Medium Positive	To enhance the use of local goods and services.
	Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure.	Low Positive	To enhance shared infrastructure such as roads and stormwater infrastructure.
	The potential loss in productive farmland during the construction phase, due to factors such as the construction of roads, the preparation of foundations,	Negative Low	To avoid the potential loss in productive farmland.

	power lines, offices etc		
	In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure	Negative Low	To minimise the inmigration of labourers.
	Temporary increase in safety and security concerns associated with the influx of people during the construction phase	Negative Low	To minimise temporary increase in safety and security concerns.
	Temporary increase in traffic disruptions and movement patterns during the construction phase.	Negative Medium	To avoid traffic disruptions and movement patterns.
	Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site.	Negative Low	To minimise nuisance impacts.
	The potential loss of livestock, crops, and farmsteads in the area. This also includes the damage and loss of farm infrastructure and the threatening of human lives that are associated with the increased risk of veld fires.	Negative Low	To avoid the loss of livestock, crops, or damage to local infrastructure in the area.
	Intrusion impacts from construction activities will have an impact on the area's "sense of place".	Negative Low	To minimise the impact on the area's sense of place.
Traffic	Increase in development trips for the duration of the construction Phase. Associated noise, dust and exhaust pollution.	Negative Low	To manage noise, dust and exhaust pollution.
Heritage	Impacts on heritage resources.	Negative Low	To avoid any loss of potential heritage

			resources.
Palaeontology	Impacts on paleontological	Negative Low	To avoid any loss of
	resources.		potential palaeontological
			resources.
	Operationa	l phase	
Avifauna	The creation of novel or new	Negative Low	To avoid the creation of
Impact	avian habitat for commensal bird		novel or new avian
Assessment	species or superior competitive		habitat for commensal
(Appendix E3)	species.		bird species or superior
			competitive species.
	Collisions with PV panels leading	Negative	To avoid habitat loss as
	to injury or loss of avian life.	Medium	well as to avoid increase
			mortality.
	Collision when flying into power	Negative	To avoid the collision
	line infrastructure (mainly	Medium	when flying into power
	applicable to foraging vultures)		line infrastructure.
	Electrocution when perched on	Negative	To avoid the
	power line infrastructure (mainly	Medium	electrocution when
	applicable to foraging vultures)		perched on power line
			infrastructure.
Terrestrial	Soil erosion and associated	Negative Low	To avoid soil erosion and
Biodiversity	degradation of ecosystems.		associated degradation of
,	, , , , , , , , , , , , , , , , , , , ,		ecosystems.
	Alien Plant Invasion.	Negative Low	To avoid Alien Plant
			Invasion.
Aquatic	Potential spread of alien	Negative Low	To minimise the spread of
Ecology	vegetation		alien vegetation.
Visual	Visual impact on sensitive visual	Negative Low	To minimise visual
	receptors within a 1km radius		impacts
	from the SEF and the power line.		
	Visual impact on sensitive visual	Negative Low	
	receptors between a 1km and	o de la companya de l	
	3km radius from the SEF and the		
	power line.		
	Vigual impact on consistive views	Negative	
	Visual impact on sensitive visual	Negative Low	
	receptors within a 3km and 5km radius from the SEF and the		
	power line.		
	power line.		

	Visual impact on sensitive visual receptors within a 5-10km radius from the SEF and the power line Visual impacts of lighting at night on sensitive visual receptors in close proximity to the proposed facility Visual impacts of glint and glare as a visual distraction and possible air travel hazard Visual impacts on sense of place	Negative Low Negative Low Negative Low	
	associated with the operational phase of the SEF and the power line.	Negative Low	
Social Impact Assessment (Appendix E8)	The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy.	Positive Medium	To enhance the creation of employment opportunities and skills development opportunities.
	Development of non-polluting, renewable energy infrastructure	Positive Medium	To enhance the development of non-polluting, renewable energy infrastructure.
	Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property	Negative Low	To reduce the loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property
	Contribution to LED and social upliftment during the operation of the project	Positive High	To enhance the contribution to LED and social upliftment during the operation of the project.
	The potential impact on tourism due to the establishment of the Rooidraai SEF	Positive/Negative Low	To minimise/enhance the potential impact on tourism due to the establishment of the Rooidraai SEF.

	Visual impacts and sense of place impacts associated with the operation phase of Rooidraai SEF The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings	Positive Medium	To minimise visual impacts and sense of place impacts associated with the operation phase of Rooidraai SEF. To enhance the contribution to Local Economic Development (LED) and social upliftment.
Traffic Impact Assessment (Appendix E9)	Slight increase in trips due to permanent staff on site. Increase in trips around twice a year for transport of water to site for the cleaning of solar panels (water source to be clarified – borehole or transported to site/size of water tankers if water is to be delivered on site)	Negative Low	To minimise the increase in trips due to permanent staff on site.
Heritage	Impacts on heritage resources	Negative Low	To avoid any loss of potential heritage resources
	Decon	nmissioning phase	
Avifauna Impact Assessment (Appendix E3)	Displacement of priority avian species from important habitats. Displacement of resident avifauna	Negative Low Negative Low	To avoid the displacement of priority avian species from important habitats.
	through increased disturbance.		To minimise the displacement of resident avifauna through increased disturbance.
Terrestrial Biodiversity	Direct Faunal Impacts.	Negative Low	To avoid the loss of biodiversity as much as possible.
	Soil erosion and associated degradation of ecosystems.	Negative Low	To avoid soil erosion and associated degradation of ecosystems.

	Alien Plant Invasion.	Negative Low	To avoid Alien Plant Invasion.
Aquatic Ecological Assessment (Appendix E1)	Loss of habitat containing protected species or Species of Special Concern.	Negative Low	To avoid loss of habitat containing protected species or Species of Special Concern.
	Loss of CBAs or potential areas with conservation potential.	Negative Low	To avoid loss of CBAs or areas with conservation potential.
	Loss of riparian and or wetland habitat.	Negative Low	To avoid loss of riparian and or wetland habitat.
	Changes to the hydrological regime and increase potential for erosion	Negative Low	Changes to the hydrological regime and increase potential for erosion.
	Changes to surface water quality characteristics.	Negative Low	To avoid or reduce impact on the characteristics of the surface water features.
Traffic Impact Assessment (Appendix E9)	Increase in development trips for the duration of the construction Phase. Associated noise, dust and exhaust pollution.	Negative Low	To manage noise, dust and exhaust pollution.

1.4 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

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

Contact person: Carli van Niekerk

EAPASA Registration: 2019/1742

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

Telephone: 082 220 8651 (Cell)

Electronic Mail: carli@environamics.co.za

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

expertise of the EAP responsible for conducting the EIA is also summarized in the curriculum vitae included as part of Appendix A.

1.5 STRUCTURE OF THE REPORT

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

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

Table 1.2: Structure of the report

Requirements for the contents of an EMPR as specified in the Regulations				
App	endix 4(1) - An EMPr must comply with section 24N of the Act and include-			
(a)	details of -			
	(i) The EAP who prepared the EMPr;	1.4		
	(ii) The expertise of that EAP to prepare an EMPR, including a curriculum vitae.	1.4		
(b)	A detailed description of the aspects of the activity that are covered by the			
	draft environmental management programme as identified by the project description.	2.3		
(c)	a map at an appropriate scale which superimposes the proposed activity, its			
	associated structures, and infrastructure on the environmental sensitivities of	1.1		
	the preferred site, indicating any areas that any areas that should be avoided, including buffers;			
(d)	a description of the impact management objectives, including management			
	statements, identifying the impacts and risks that need to be avoided,			
	managed and mitigated as identified through the Environmental Impact			
	Assessment process for all phases of the development including-			
	(i) Planning and design;			
	(ii) Pre-construction activities;	1.2 & 1.3		
	(iii) Construction activities;			
	(iv) Rehabilitation of the environment after construction and where			
	applicable post closure; and			
	(v) where relevant, operation activities			

for the aspects contemplated in paragraph (d); (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable; (g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f); (h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f); (i) an indication of the persons who will be responsible for the implementation of the impact management actions contemplated in paragraph (f); (i) the time periods within which the impact management actions contemplated in paragraph (f); (i) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f); a program for reporting on compliance, taking into account the requirements as a prescribed by the Regulations; (m) An environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	(e)	a description and identification of impact management outcomes required	
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to - (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable; (g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f); (h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f); (i) an indication of the persons who will be responsible for the implementation of the impact management actions; (j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented; (k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f); (l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations; (m) An environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.	(6)		
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(ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment.			
the environment.			3
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(n) any specific information that may be required by the competent authority.			
	(n)	any specific information that may be required by the competent authority.	N/A

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

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

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

2 APPROACH TO THE EMPR

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

Table 2-1: Approach to Impact Management

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

2.1 KEY DEFINITIONS USED IN THIS EMPR

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

Table 2-2: Key definitions used in this EMPr

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

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

2.2 KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT

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

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 5 of NEMA (GNR 545, GNR 546 as amended in 2017)
- Guidelines published in terms of NEMA EIA Regulations, specifically:
 - Companion to the NEMA EIA Regulations of 2010 (Draft Guideline; DEA, 2010)
 - Public Participation in the EIA process (DEA, 2010)
- International Standards IFC Standards and Equator Principles (2013)

2.3 ROLES AND RESPONSIBILITIES

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

2.3.1 Project Management Team

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

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

The Project Management Team will be responsible for the following:

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

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

2.3.2 THE DEVELOPER

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

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

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

2.3.3 Principal Contractor/s

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

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

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

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

2.3.4 Construction Supervisor

The Construction Supervisor will be responsible for:

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

2.3.5 Sub-contractors

Sub-contractors are responsible for:

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

2.3.6 SHE Representative

The SHE Representative will be responsible for:

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

2.3.7 ECO

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

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

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

2.4 LIFECYCLE OF THE SOLAR ENERGY FACILITY

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

2.4.1 Pre-construction

The primary task of the pre-construction phase will include surveying, pegging and search and rescue of plants and animals.

2.4.2 Construction

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

- Transportation of equipment and machinery to the site location;
- Setting up a construction camp and laydown areas;
- Development of temporary materials and waste storage and control measures;

- Stripping of surface vegetation and removal of vegetation, building rubble and domestic waste from site to the JB Marks Local Municipality's Landfill Site;
- Stripping and stockpiling of topsoil and sub soil from the site for later use for rehabilitation and landscaping; and
- Site rehabilitation following the construction phase, of areas that have been disturbed and are not part of the on-going operational phase of the proposed project.

2.4.3 Operation

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

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

2.4.4 Rehabilitation

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

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

2.4.5 Decommissioning

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

2.5 CHECKING AND CORRECTIVE ACTION

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

- The required EMPr and EA conditions are being implemented on the site;
- The desired outcomes are being achieved and potential impact managed;
- On–going weekly inspections of operational controls and general state of operation; and
- Internal monthly audits to assess the compliance to the EMPr and EA or to focus on a particular performance issue; and

• Quarterly external audits by an independent professional for the duration of the construction phase.

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

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

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

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

2.6 SITE DOCUMENTATION AND REPORTING

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

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

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

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

2.7 MONITORING

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

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

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

2.7.1 Programme Monitoring

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

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

2.8 MANAGEMENT REVIEW

The Developer will review the EMPr at annual intervals during the operational phase. The purpose of the management review is to ensure that the conditions of the EMPr are still

relevant, and to propose measures for improving the performance in the spirit of continuous improvement.

2.9 MITIGATION AND MANAGEMENT MEASURES

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

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

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES		
DURING PLANNING AND DESIGN (NATURE OF THE IMPACT)	Management and mitigation measures	Timeframe	Responsibility
	General Management Measures		
	Compliance with the requirements of the EMPr will form part of the construction contract.	Upon appointment of Principal Contractors	Developer and/or appointed Agent
Contractors and sub-contractors may not have sufficient knowledge and understanding of the potential impacts of construction or the requirements of the EMPr, leading to impacts identified	A construction plan and method statement must be submitted by the Principal contractor and approved by the Developer and/or his appointed Agent prior to the start of activities on site. It should cover all aspects of site establishment, construction and site disestablishment and describe how the EMP will be complied with.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
under each aspect.	Emergency action plans must be devised and approved by the Developer and/or his appointed Agent to deal with any risks identified, such as unplanned disruption of services.	Prior to commencement of site preparation and construction	Developer and/or appointed Agent
Impacts on the environment as a result of inappropriate design and planning.	 Carry out a Hazardous Operating Procedures (HAZOP) assessment of the design to ensure that all practical measures to minimise the impact of operations on the environment have been included and to identify what emergency plans need to be developed. Reduce the construction phase through careful logistical planning. Undertake full geotechnical and Dolomite Stability Investigation. The at least medium dense colluvial sands or pedogenic soils as well as all rock formations would form suitable in-situ subgrades for any pavements and surface beds. In terms of foundations, the pedogenic soils and rock should form a competent founding substrate for the structures. While the colluvial 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	sands could be considered where at least medium dense with only minor precautions to account for any variability in density that is likely to occur.		
Site demarcation and compliance	 Before construction begins, all areas to be developed must be clearly demarcated with fencing or orange construction barriers where applicable. All Construction Camps are to be fenced off in such a manner that unlawful entry is prevented and access is controlled. Signage shall be erected at all access points in compliance with all applicable occupational health and safety requirements. All access points to the Construction Camp should be controlled by a guard or otherwise monitored, to prevent unlawful access. The Contractor and ECO must ensure compliance with conditions described in the EA. Records of compliance/non-compliance with the conditions of the authorisation must be kept and be available on request. Records of all environmental incidents must be maintained and a copy of these records be made available to the department on request throughout the project execution. In terms of on site associated infrastructure and buildings, clear planning must be implemented to minimise vegetation clearing. Consolidating infrastructure as much as possible and making use of areas that already disturbed, where possible, is preferred. All development activities should be restricted to specific recommended areas. The Environment Control Officer (ECO) should control these areas. Storage of equipment, fuel and other materials should be limited to demarcated areas. Layouts should be adapted to fit natural patterns rather than imposing rigid geometries. The entire development footprint should be clearly demarcated prior to initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development. 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	 conforms to the relevant safety requirements and that provides for spillage prevention and containment. 5. All Construction Camps shall be provided with portable fire extinguishing equipment, in accordance with all relevant legislation and must be readily accessible. 6. The Contractor must provide sufficient ablution facilities, in the form of portable/VIP toilets, at the Construction Camps, and must conform to all relevant health and safety standards and codes. No pit latrines, French drain systems or soak away systems shall be allowed and toilets may not be situated within 50 meters of any surface water body or 1:100 year flood line. A sufficient number of toilets must be provided to accommodate the number of personnel working in the area. 7. The Contractor must inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed. 8. No open veld fires will be allowed for cooking or heating unless in designated areas and under supervision. LP Gas may be used, provided that all required safety measures are in place. The Contractor must take specific measures to prevent the spread of veld fires, caused by activities at the campsites. These measures may include appropriate instruction of employees about fire risks and the construction of firebreaks around the site perimeter. 		
Appointment of labour	 Where reasonable and practical Rooidraai Solar (Pty) Ltd should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria. Before the construction phase commences Rooidraai Solar (Pty) Ltd should meet with representatives from the MCLM to establish the existence of a skills database for the area. If such as database exists, it should be made available to the contractors appointed for the 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

	 construction phase. 4. The local authorities, community representatives, and organisations on the interested and affected party database must be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that Rooidraai Solar (Pty) Ltd intends following for the construction phase of the project. 5. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. 		
Training of site staff	 Ensure that all staff have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimization of environmental harm, by: Environmental awareness training for construction staff, concerning the prevention of accidental spillage of hazardous chemicals and oil; pollution of water resources (both surface and groundwater), air pollution and litter control and identification of archaeological artifacts. Where feasible training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase. Project manager shall ensure that the training and capabilities of the Contractor's site staff are adequate to carry out the designated tasks. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks. No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor and certified competent by the Project Manager. Staff should be educated as to the need to refrain from indiscriminate waste disposal and/or pollution of local soil and water resources and receive the necessary safety training. Staff must be trained in the hazards and required precautionary measures for dealing with hazardous substances. Spillage packs must be available at construction areas. 	Prior to commencement of site preparation and construction	Developer and/or appointed Agent

Public consultation of the site	 A meeting must be held with the affected landowner(s). Provide a mechanism through which information could be exchanged between the project proponent and stakeholders. Compile and implement a grievance mechanism procedure for the public. This procedure will include details of the contact person who will be receiving issues raised by I&APs, and the process that will be followed to address issues. Identify relevant stakeholders and engage them at applicable stages of the development. Surrounding communities must be kept informed, through the identified and agreed consultation channels, of the commencement of construction. Solicit views and concerns from the public and allow them to suggest mitigations and enhancement measures. Determine stakeholder satisfaction levels. The MCLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project. Rooidraai Solar (Pty) Ltd should consider the option of establishing a monitoring forum that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site. 	Pre-construction and construction	Principal Contractor
Site clearing	 Site clearing must take place in a phased, environmentally acceptable manner, as and when required. Areas which are not to be constructed on within two months must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained to limit vegetation clearing. Soil that is removed from the site must be removed to an approved spoil 	Site preparation prior to construction	Principal Contractor

	site or a licensed landfill site. 5. The necessary silt fences and erosion control measures must be implemented in areas where these risks are more prevalent.		
Erosion	Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Once-off, during the design of the facility	Developer and/or appointed Agent
Establishment of a Social and Environmental Management System	 Performance Standard One underscores the importance of managing social and environmental performance throughout the life of a project. An effective social and environmental management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers and the local communities directly affected by the project. The client must develop a Social and Environmental Management System, appropriate to the nature and scale of the project and commensurate to the level of social and environmental risks and impacts. 	Prior to construction	Principal Contractor

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

POTENTIAL ENVIRONMENTAL RECOMMENDED MITIGATION MEASURES			
IMPACT DURING CONSTRUCTION (NATURE OF THE IMPACT)	Management and mitigation measures	Timeframe	Responsibility
	Construction Camp		
Site of the construction camp	 The size of the construction camp should be minimised. Adequate parking must be provided for site staff and visitors. The Contractor must attend to drainage of the camp site to avoid standing water and/or sheet erosion. Secure the site, working areas and excavations in an appropriate manner. Restrict construction activities to daylight hours in order to negate or reduce the visual impacts of lighting. Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented. 	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
Storage of materials (including hazardous materials)	 Choice of location for storage areas must consider prevailing winds, distances to water bodies, general onsite topography and water erosion potential of the soil. Impervious surfaces must be provided where necessary. Storage areas must be designated, demarcated and fenced if necessary. Storage areas should be secure to minimise the risk of crime. They should also be safe from access by unauthorised persons i.e. children/animals etc. Fire prevention facilities must be present at all storage facilities. Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage area(s). These pollution prevention measures for storage should include a bund wall high enough to contain at least 110% of any stored volume, and this should be situated away from drainage lines in a site with the approval of the Project Manager. The bund 	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer

- wall must be high enough to contain 110% of the total volume of the stored hazardous material with an additional allocation for potential stormwater events.
- 6. All fuel storage areas must be roofed to avoid creation of dirty stormwater.
- These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of stormwater from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.
- 8. Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs should additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.
- 9. Storage areas containing hazardous substances/materials must be clearly signposted.
- 10. Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures.
- 11. An approved waste disposal contractor must be employed to remove, transport and recycle waste oil, if practical. The Contractor must ensure that its staff is made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing/equipment in case of spillages or accidents and have received the necessary training.
- 12. All excess cement and concrete mixes are to be contained on the construction site prior to disposal off site.
- 13. All major spills as specified in the contractor emergency response procedure of any materials, chemicals, fuels or other potentially hazardous or pollutant substances must be cleaned immediately, and the cause of the spill investigated. Preventative measures must be identified and submitted to the Principal Contractor and ECO for information. Emergency response procedures to be followed and implemented.
- 14. Emergency and spillage plans need to be developed and submitted to the

	relevant authorities for approval.		
Drainage of the construction camp	Surface drainage measures must be established in the Construction Camps so as to prevent: • Ponding of water; • Erosion as a result of accelerated runoff; and, • Uncontrolled discharge of polluted runoff.	Construction phase	Principal Contractor, Environmental Liaison Officer and Environmental Control Officer
	Construction Traffic and Access		
Construction traffic	 Construction routes and required access roads must be clearly defined and carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. Provision of adequate and strategically placed traffic warning signs and control measures along gravel roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night. Delivery of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities. Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work). Access of all construction and material delivery vehicles should be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. Vehicles and equipment shall be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. Servicing must be done in dedicated service areas on site or else off site if no such area exists. Oil changes must take place on a concrete platform and over a drip tray to avoid pollution. Soils compacted by construction shall be deep ripped to loosen compacted layers and re-graded to even running levels. 	Construction phase	Principal Contractor and Environmental Liaison Officer

The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and sub-contractors.	
11. All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. 12. Vehicles carrying material that can be wind-blown should be covered with a suitable material. 13. All drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues. 14. Implement penalties for reckless driving to enforce compliance to traffic rules. 15. All construction vehicles must be roadworthy and drivers must have the relevant licenses for the type of vehicles they are operating; and 16. All vehicle drivers need to strictly adhere to the rules of throad. 17. The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities. 18. The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. 19. The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. 20. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. 21. Gravel roads used will need to be maintained in an appropriate condition. Re-gravelling may be necessary as a maintenance measure (also relevant to the operation phase).	

- not to be used shall be marked with a "NO ENTRY for construction vehicles" sign.
- 3. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.
- 4. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access routes. The development (including the development footprint and contractor's equipment camp) must also be secured and fenced and clearly demarcated.
- 5. Electrical fencing should be constructed in a manner which allows for the passage of small and medium sized mammals and small avifauna. Steel palisade fencing (20 cm gaps min) is a good option in this regard as it allows most medium-sized mammals to pass between the bars, but remains an effective obstacle for humans. Alternatively, the lowest strand or bottom of the fence should be elevated to 30cm above the ground which should be sufficient to allow smaller animals, reptiles and tortoises to pass through (tortoises retreat into their shells when electrocuted and eventually succumb from repeated shocks), but still remain effective as a security barrier.
- 6. Stripping of vegetation for access roads should be restricted and existing roads should be used as far as possible.
- 7. The movement of all vehicles within the site must be on designated roadways.
- 8. Signage must be established at appropriate points warning of turning traffic and the construction site, identifying speed limits, travel restrictions and other standard traffic control information. All signage must be in accordance with the prescribed standards and must be appropriately maintained for the duration of the construction period.
- The access point must be formalised to standard, which will in all probability be a requirement as part of the wayleave approval of the JB Marks Local Municipality and the North West Department of Roads and Transport.

Maintenance of the road	 Where necessary suitable measures shall be taken to rehabilitate damaged areas. Contractors should ensure that access roads are maintained in good condition by attending to potholes, corrugations and stormwater damages as soon as these develop. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt. The contractor must ensure that damage caused by construction related traffic to existing roads is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Noise	 Movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas should not take place over weekends. Ensure all vehicles are road worthy, drivers are qualified and are aware of potential noise issue. A grievance mechanism should be implemented. 	Construction phase	Principal Contractor and Environmental Liaison Officer
General mitigation regarding construction traffic and access	 The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. Care for the safety and security of community members crossing access roads should receive priority at all times. No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor. 	Construction phase	Principal Contractor and Environmental Liaison Officer

- 5. All relevant permits for abnormal loads must be applied for from the relevant authority (pre-construction).
- 6. Stagger component delivery to site.
- 7. Reduce the construction period.
- 8. Stagger the construction Phase.
- 9. The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network.
- 10. Staff and general trips should occur outside of peak traffic periods as much as possible.
- 11. Undertake maintenance of haulage routes.
- 12. Design and maintenance of internal roads must be undertaken and appropriate.
- 13. All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.
- 14. Heavy vehicles should be inspected regularly to ensure their road worthiness.
- 15. Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the N14 road users to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.
- 16. Implement penalties for reckless driving to enforce compliance to traffic rules.
- 17. Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work).
- 18. The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.
- 19. The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.
- 20. The EPC Contractor must ensure that damage / wear and tear caused by

	construction related traffic to the access roads is repaired before the completion of the construction phase. 21. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. Environmental education and Training		
Environmental training	 The project manager must appoint an ECO prior to construction. Ensure that all site personnel have a basic level of environmental awareness training. The Contractor must submit a proposal for this training to the ECO for approval. Topics covered should include: What is meant by "Environment" Why the environment needs to be protected and conserved How construction activities can impact on the environment What can be done to mitigate against such impacts? Awareness of emergency and spills response provisions Social responsibility during construction e.g. being considerate to local residents Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues. It is the Contractor's responsibility to provide the site foreman with no less than 1 hour's environmental training and to ensure that the foreman has sufficient understanding to pass this information onto the construction staff. Training should be provided to the staff members in the use of the appropriate fire-fighting equipment. Translators are to be used where necessary. Use should be made of environmental awareness posters on site. The need for a "clean site" policy also needs to be explained to the workers. Staff operating equipment (such as loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their tasks. 	Construction phase	Rooidraai Solar (Pty) Ltd

Monitoring of environmental training	The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and/or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended.	Construction phase	Rooidraai Solar (Pty) Ltd
	Soils and Geology		
Mitigation for soil compaction	The most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted.	Construction phase	Principal Contractor and Environmental Liaison Officer
Chemical soil pollution	 All waste generated on site during construction should be stored in waste bins and removed from site on a regular basis. Vehicles accessing the site should regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil should be removed and transported to a designated waste site. Broken or old batteries or components of the PV plant should be stored in a demarcated area in quarantine for the shortest period possible until it can be collected and taken to a special chemical waste facility. Refuelling points must be well managed and if any soils are contaminated, it must be stripped and disposed of at a registered hazardous waste dumping site. Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously. Spill kits should be on-hand to deal with spills immediately. All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. 	Construction phase	Principal Contractor and Environmental Liaison Officer

In the second se			
Guidelines for the stripping and storage of topsoil	 The Contractor must, prior to the commencement of earthworks determine the average depth of topsoil and agree on this with the ECO. The full depth of topsoil must be stripped from areas affected by construction and related activities prior to the commencement of major earthworks. This must include the building footprints, working areas and storage areas. Topsoil must be reused where possible to rehabilitate disturbed areas. Care must be taken not to mix topsoil and subsoil during stripping. Should any topsoil become polluted the Contractor must remove the polluted soil to the full depth of pollution and replace it at his own expense with clean topsoil. Removed polluted topsoil must be transported to a licensed landfill site. The topsoil must be conserved on site. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Soil stripping	 No soil stripping must take place on areas within the site that the Contractor does not require for construction works or areas of retained vegetation. Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur. Subsoil and overburden in all construction and laydown areas should be stockpiled separately to be returned for backfilling in the correct soil horizon order. Construction vehicles must only be allowed to utilise existing tracks or preplanned access routes. 	Construction phase	Principal Contractor and Environmental Control Officer
Guidelines for soil stockpiles	 Stockpiles should not be situated such that they obstruct natural water pathways. Stockpiles must not exceed 2m in height unless otherwise permitted by the Engineer. If stockpiles are exposed to windy conditions or heavy rain, they must be covered either by vegetation or geofabric, depending on the duration of 	Construction phase	Principal Contractor and Environmental Control Officer

	the project. Stockpiles may further be protected by the construction of		
	berms or low brick walls around their bases.		
	Stockpiles must be kept clear of weeds and alien vegetation growth by		
4.			
	regular weeding.		
5.	Should topsoil be stockpiled for longer than 6 months it must be		
	vegetated.		
6.	Where contamination of soil is expected, analysis must be done prior to		
	disposal of soil to determine the appropriate disposal route. Proof from an		
	approved waste disposal site where contaminated soils are dumped if and		
	when a spillage/leakage occurs should be attained and given to the project		
	manager.		
7.	Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land.		
8.	Any excavations done during the construction phase, in areas that will be		
	re-vegetated at the end of the construction phase, must separate the		
	upper 30 cm of topsoil from the rest of the excavation spoils and store it in		
	a separate stockpile. When the excavation is back-filled, the topsoil must		
	be back-filled last, so that it is at the surface. Topsoil should only be		
	stripped in areas that are excavated. Across the majority of the site,		
	including construction laydown areas, it will be much more effective for		
	rehabilitation, to retain the topsoil in place. If levelling requires significant		
	cutting, topsoil should be temporarily stockpiled and then re-spread after		
	cutting, so that there is a covering of topsoil over the entire cut surface. It		
	will be advantageous to have topsoil and vegetation cover below the		
	panels during the operational phase to control dust and erosion.		
9.	Topsoil should be retained in the area below the panels. It is not desirable		
	to strip and stockpile this topsoil for the whole of the operational phase. It		
	will be much more effective for rehabilitation, to retain the topsoil in		
	place. If levelling requires significant cutting, topsoil should be temporarily		
	stockpiled and then re-spread after cutting, so that there is a covering of		
	topsoil over the entire surface before the panels are mounted.		
Erosion 1.	Undertake a periodic site inspection to record the occurrence of erosion	Construction phase	Environmental

	and re-vegetation progress of all areas that require re-vegetation. This		Control Officer
	must be undertaken every four months.		
	2. Maintain where possible all vegetation cover and facilitate re-vegetation		
	of denuded areas throughout the site to stabilize disturbed soil against erosion.		
	3. The project must be divided into as many phases as possible, to ensure		
	that the exposed areas prone to erosion are minimal at any specific time.		
	4. Cover disturbed soils as completely as possible, using vegetation or other		
	materials.		
	5. Minimize the amount of land disturbance and develop and implement		
	stringent erosion and dust control practices.		
	6. Protect sloping areas and drainage channel banks that are susceptible to		
	erosion and ensure that there is no undue soil erosion resultant from		
	activities within and adjacent to the construction camp and Work Areas.		
	7. Repair all erosion damage as soon as possible to allow for sufficient		
	rehabilitation growth.		
	8. Gravel roads to the construction sites must be well drained to limit soil		
	erosion.		
	9. Control the flow of runoff to move the water safely off the site without		
	destructive gully formation.		
	10. Protect all areas susceptible to erosion and ensure that there is no undue		
	soil erosion resultant from activities within and adjacent to the		
	construction camp and Work Areas.		
	11. Implement an effective system of storm water run-off control, where it is		
	required - that is at any points where run-off water might accumulate. The		
	system must effectively collect and safely disseminate any run-off water		
	from all accumulation points, and it must prevent any potential down		
	slope erosion.		
	1 Loss than 90 subjectives of final is permitted to be stored as after at any		
Storage of fuel on site 2.	1. Less than 80 cubic meters of fuel is permitted to be stored on site at any one time.		Principal Contractor
	2. Topsoil and subsoil to be protected from contamination. This must be	Construction phase	and Environmental
	·		Control Officer
	monitored on a monthly basis by a visual inspection of diesel/oil spillage		

	 and pollution prevention facilities. Fuel and material storage must be away from stockpiles. Concrete and chemicals must be mixed on an impervious surface and provisions must be made to contain spillages or overflows into the soil. Any storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. 		
Mixing of concrete on site	 The concrete batching plant must be contained within a bunded area. Concrete mixing must only take place within designated areas. Ready mixed concrete must be utilised where possible. No vehicles transporting concrete to the site may be washed on site. If a batching plant is necessary, run-off should be managed effectively to avoid contamination of other areas of the site. Run-off from the batch plant must not be allowed to enter the stormwater system. 	Construction phase	Principal Contractor and Environmental Control Officer
Earth works	 Soils compacted during construction must be deeply ripped to loosen compacted layers and re-graded to even running levels. Topsoil must be re-spread over landscaped areas. Undertake a detailed geotechnical investigation and implement the required mitigation measures. 	Construction phase	Principal Contractor and Environmental Control Officer
	Erosion Control		
Erosion control actions that need to be implemented during construction	 Wind screening and stormwater control must be undertaken to prevent soil loss from the site. 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: Brush packing with cleared vegetation Mulch or chip packing Planting of vegetation 	Construction phase	Environmental Control Officer

- Hydroseeding/hand sowing
- 4. Sensitive areas need to be identified prior to construction so that the necessary precautions can be implemented.
- 5. All erosion control mechanisms need to be regularly maintained.
- 6. Seeding of topsoil and subsoil stockpiles to prevent wind and water erosion of soil surfaces must be undertaken.
- 7. Retention of vegetation where possible to avoid soil erosion.
- 8. Vegetation clearance must be phased to ensure that the minimum area of soil is exposed to potential erosion at any one time.
- 9. Re-vegetation of disturbed surfaces must occur immediately after construction activities are completed. This must be done through seeding with indigenous grasses.
- 10. No impediment to the natural water flow other than approved erosion control works is permitted.
- 11. To prevent stormwater damage, the increase in stormwater run-off resulting from construction activities must be estimated and the drainage system assessed accordingly. A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossings.
- 12. Stockpiles not used in three (3) months after stripping must be seeded to prevent dust and erosion.
- 13. The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time.
- 14. Cover disturbed soils as completely as possible, using vegetation or other materials.
- 15. Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices.
- 16. Protect sloping areas and drainage channel banks that are susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.
- 17. Repair all erosion damage as soon as possible to allow for sufficient rehabilitation growth.
- 18. Gravel roads to the construction sites must be well drained to limit soil

	erosion. 19. Control the flow of runoff to move the water safely off the site without destructive gully formation. 20.		
	Water Use and Quality		
Water use	 Develop a sustainable water supply management plan to minimise the impact to natural systems by managing water use, avoiding depletion of aquifers and minimising impacts to water users. Water must be used sparingly and reused, recycled or treated where possible. 	Construction phase	Engineer
	Consultation must be undertaken with key stakeholders to understand any conflicting water use demands and the community's dependency on water resources and conservation requirements within the area.	Construction phase	Environmental Control officer
Management of water quality	 The quality and quantity of effluent streams discharged to the environment including stormwater must be managed and treated to meet applicable effluent discharge guidelines. Quality of water being discharged must be tested on a monthly basis. Discharge to surface water must not result in contaminant concentrations in excess of local ambient water quality criteria outside a scientifically established mixing zone. Efficient oil and grease traps or sumps must be installed and maintained at refuelling facilities, workshops, fuel storage depots, and containment areas and spill kits must be available with emergency response plans. 	Construction phase	Environmental Control officer
Stormwater management	 A comprehensive stormwater management plan for hard surfaces is to make up part of the final project design, which must include appropriate ways of handling stormwater within the site. The site must be managed in order to prevent pollution of drains, 	Construction phase	Environmental Control officer

	downstream watercourses or groundwater, due to suspended solids and silt or chemical pollutants. 3. Silt fences must be used to prevent any soil entering the stormwater drains. 4. Temporary cut off drains and berms may be required to capture stormwater and promote infiltration. 5. Promote a water saving mind set with construction workers in order to ensure less water wastage. 6. New stormwater construction must be developed strictly according to specifications from engineers in order to ensure efficiency. 7. Hazardous substances must be stored at least 20m from any water bodies on site to avoid pollution. 8. The installation of the stormwater system must take place as soon as possible to attenuate stormwater from the construction phase as well as the operation phase. 9. Earth, stone and rubble is to be properly disposed of, or utilised on site so as not to obstruct natural water pathways over the site. i.e. these materials must not be placed in stormwater channels, drainage lines or rivers. 10. There must be periodic checking of the site's drainage system to ensure that the water flow is unobstructed. 11. If a batching plant is necessary, run-off must be managed effectively to avoid contamination of other areas of the site. Untreated runoff from the batch plant must not be allowed to get into the stormwater system or nearby riparian and wetland areas.		
Protection of groundwater resources	 No unauthorised groundwater abstraction may occur on the site. Should any water be discharged from site, the water is to comply with national effluent standards. No contaminated water must be discharged from site. No activities must be allowed to encroach into a water course or feature without a Water Use License being in place from the Department of Water 	Construction phase	Environmental Control officer

	and Sanitation (DWS).		
Sanitation	 Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers) at appropriate locations on site. The facilities must be regularly serviced and appropriately maintained to reduce the risk of surface or groundwater pollution. Ablution or sanitation facilities must not be located within 100m of any water courses or features. 	Construction phase	Environmental Control officer
Concrete mixing	Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth.	Construction phase	Environmental Control officer
Public areas	 Food preparation areas must be provided with adequate washing facilities and food refuse must be stored in sealed refuse bins which must be removed from site on a regular basis. The Contractor must take steps to ensure that littering by construction workers does not occur and persons must be employed on site to collect litter from the site and immediate surroundings, including litter accumulating at fence lines. No washing or servicing of vehicles on site. 	Construction phase	Environmental Control officer
	Surface and ground water		
Sanitation on site	 Adequate sanitary facilities and ablutions must be provided for construction workers (1 toilet per every 15 workers). Water saving devices and technologies such as the use of dual flush toilets should be considered. The facilities must be regularly serviced to reduce the risk of surface or groundwater pollution. 	Construction phase	Principal Contractor and Environmental Control officer

Use and storage of hazardous materials	 Use and or storage of materials, fuel and chemicals which could potentially leak into the ground must be controlled. All storage tanks containing hazardous materials must be placed in bunded containment areas with sealed surfaces. The bund walls must be high enough to contain 110% of the total volume of the stored hazardous material. Any hazardous substances must be stored at least 20m from any of the riparian and wetland areas on site. The Contractor (monitored by the Environmental Control or Liaison Officer) should be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure, ventilated environment, with concrete or sealed flooring and a means of preventing unauthorised entry. Contaminated wastewater must be managed by the Contractor to ensure existing water resources on the site are not contaminated. All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licensed commercial facility. 	Construction phase	Principal Contractor and Environmental Control officer
Concrete mixing	Concrete contaminated water must not enter soil or any natural drainage system as this disturbs the natural acidity of the soil and affects plant growth.	Construction phase	Principal Contractor and Environmental Control officer
Public areas	No washing or servicing of vehicles on site.	Construction phase	Principal Contractor and Environmental Control officer
Water resources	 Site staff shall not be permitted to use any other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the ECO) must instead be 	Construction phase	Principal Contractor and Environmental Control officer

	1			
		used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.		
	3.	Relevant departments and other emergency services must be contacted in		
		order to deal with spillages and contamination of aquatic environments.		
	1.	All liquid chemicals including fuels and oil, including for the BESS, must be		
		stored in with secondary containment (bunds or containers or berms) that		
		can contain a leak or spill. Such facilities must be inspected routinely and		
		must have the suitable PPE and spill kits needed to contain likely worst-		
		case scenario leak or spill in that facility, safely.		
	2.	Washing and cleaning of equipment must be done in designated wash		
		bays, where rinse water is contained in evaporation/sedimentation ponds		
		(to capture oils, grease cement and sediment).		
	3.	Mechanical plant and bowsers must not be refueled or serviced within		
		100m of a river channel or wetland.		
Site specific mitigation measures for	4.	All construction camps, lay down areas, wash bays, batching plants or		Principal Contractor
surface water		areas and any stores should be more than 50 m from any demarcated	Construction phase	and Environmental
		water courses.		Control officer
	5.	Littering and contamination associated with construction activity must be		
		avoided through effective construction camp management.		
	6.	No stockpiling should take place within or near a water course.		
	7.	All stockpiles must be protected and located in flat areas where run-off		
		will be minimised and sediment recoverable.		
	8.	ESO monitors the site on a daily basis to ensure plant is in working order		
		(minimise leaks), spills are prevented and if they do occur, are quickly		
		rectified.		
	1.	No stormwater discharged may be directed to delineated aquatic zones or		
		the associated buffers.		
	2.	A stormwater management plan must be developed post EA, detailing the		Principal Contractor
Site specific mitigation measures for		structures and actions that must be installed to prevent the increase of	Construction phase	and Environmental
groundwater		surface water flows directly into any natural systems.		Control officer
	3.	Effective stormwater management must include measures to slow, spread		
		and deplete the energy of concentrated flows thorough effective		

stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas

To minimise the impact of the access roads:

- 4. Use existing roads or upgrade existing tracks to cross wetlands rather than constructing entirely new roads wherever possible.
- 5. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- 6. Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- 7. All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- 8. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- 9. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- 10. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- 11. All disturbed areas beyond the construction site that are intentionally or

	accidentally disturbed during the construction phase must be rehabilitated. 12. It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.		
	Waste Management		
General considerations	 Construction methods and materials should be carefully considered in view of waste reduction, re-use and recycling opportunities. Construction contractors must provide specific detailed waste management plans to deal with all waste streams. Specific areas must be designated on-site for the temporary management of various waste streams. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of runoff, seepage and vermin control. Adequate weather and vermin proof waste bins and skips (covered at minimum with secured netting or shade cloth) should be placed on site. Separate bins should be provided for general and hazardous waste. Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any regulated waste. Waste disposal records must be available for review at any time. 	Duration of the activity	Principal Contractor
Litter management	 Refuse bins must be placed at strategic positions to ensure that litter does not accumulate within the construction site. The Contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at registered/licensed landfill. A housekeeping team should be appointed to regularly maintain the litter and rubble situation on the construction site. If possible and feasible, all waste generated on site must be separated into 	Construction phase	Environmental Liaison Officer

	 glass, plastic, paper, metal and wood and recycled. An independent contractor can be appointed to conduct this recycling. 5. Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. 6. Skip waste containers should be maintained on site. These should be kept covered and arrangements made for them to be collected regularly. 7. All waste must be removed from the site and transported to a landfill site promptly to ensure that it does not attract vermin or produce odours. 8. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. 9. A certificate of disposal shall be obtained by the Contractor and kept on file, if relevant. 10. Under no circumstances may solid waste be burnt on site. 11. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. 		
Hazardous waste management	 All waste hazardous materials must be carefully stored as advised by the ECO, and then disposed of offsite at a licensed landfill site, where practical. Incineration may be used where relevant. Contaminants to be stored safely to avoid spillage. Machinery must be properly maintained to keep oil leaks in check. All necessary precaution measures shall be taken to prevent soil or surface water pollution from hazardous materials used during construction and any spills shall immediately be cleaned up and all affected areas rehabilitated. Ensure compliance with all national, regional and local legislation with regard to the storage handling and disposal of hydrocarbons, chemicals, solvents, and any other harmful and hazardous substances and materials. The onus is on the Contractor to identify and interpret the applicable legislation. 	Construction phase	Environmental Liaison Officer

	6. SABS approved spill kits to be available and easily accessible.		
Sanitation	 Staff shall be sensitised to the fact that they should use the available mobile chemical toilets at all times. No indiscriminate sanitary activities on site shall be allowed. Ablution facilities shall be within 50m from workplaces. There should be enough toilets available to accommodate the workforce (minimum requirement 1:15 workers). Male and females must be accommodated separately where possible. Toilets shall be serviced regularly, and the ECO shall inspect toilets regularly. Under no circumstances may open areas, neighbours fences or the surrounding bush be used as a toilet facility. The construction of "Long Drop" toilets is forbidden, but rather toilets connected to the sewage treatment plant. Potable water must be provided for all construction staff. 	Construction phase	Environmental Liaison Officer
Remedial actions	 An effective monitoring system must be put in place to detect any leakage or spillage during their transportation, handling, installation and storage. Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance is identified. Depending on the nature and extent of the spill, contaminated soil must be either excavated or treated on-site. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. The ECO must determine the precise method of treatment for polluted soil. This could involve the application of soil absorbent materials as well as oil-digestive powders to the contaminated soil. If a spill occurs on an impermeable surface such as cement or concrete, 	Duration of the project	Environmental Liaison Officer and Principal Contractor

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	the surface spill must be contained using oil absorbent material.		
	7. If necessary, oil absorbent sheets or pads must be attached to leaky		
	machinery or infrastructure.		
	8. Materials used for the remediation of petrochemical spills must be used		
	according to product specifications and guidance for use.		
	9. Contaminated remediation materials must be carefully removed from the		
	area of the spill so as to prevent further release of petrochemicals to the		
	environment and stored in adequate containers until appropriate disposal.		
	10. In the event of a major spill or leak of contaminants, the relevant		
	administering authority must be notified immediately as per the		
	notification of emergencies/incidents.		
	11. Routine serving and maintenance of vehicles should not take place on site		
	(except for emergencies, in which case an appropriate drip tray must be		
	used to contain any fuel or oils).		
	12. Keep a record of all hazardous substances stored on site. Clearly label all		
	the containers storing hazardous waste.		
	13. Any water that collects in bunds must not be allowed to stand. Should the		
	water be contaminated, it is to be removed and treated as hazardous		
	waste. Clean stormwater contained within the bunds may be reused.		
	14. The storage of flammable and combustible liquids such as oils will be in		
	designated areas which are appropriately bunded and stored in		
	compliance with Material Safety Data Sheets (MSDS) files and applicable		
	regulations and safety instructions.		
	15. Transport of all hazardous substances must be in accordance with the		
	relevant legislation and regulations.		
	16. Upon completion of construction, the area must be cleared of potentially		
	polluting materials.		
	Flora		
	Vegetation removal must be limited to the PV plant construction site.	Duo ao matuu ati - :-	Facility and sent of
Dostruction and fragmentation of	 Vegetation removal must be infinited to the FV plant construction site. Vegetation removal must be phased in order to reduce impact of 	Pre-construction	Environmental
Destruction and fragmentation of habitat	construction.	and Construction	Liaison Officer/
Habitat	3. All flora not interfering with the operation of the PV plants construction	phase	Principal Contractor
	5. All flora flot interfering with the operation of the FV plants construction	L	

- shall be left undisturbed clearly marked and indicated on the site plan.
- 4. Construction site office and laydown areas must be clearly demarcated, and no encroachment must occur beyond demarcated areas.
- 5. Materials should not be delivered to the site prematurely which could result in additional areas being cleared or affected.
- 6. No vegetation to be used for firewood.
- 7. Exotic and invasive plant species should not be allowed to establish, if the development is approved.
- 8. Areas to be cleared must be clearly fenced off to eliminate the potential for unnecessary clearing.
- 9. Strict and regular auditing of the PV plants construction process to ensure containment of the construction and laydown areas.
- 10. Soils must be kept free of petrochemical solutions that may be kept on site during construction. Spillage can result in a loss of soil functionality thus limiting the re-establishment of flora.
- 11. The removal of indigenous plants must be kept to a minimum necessary. Trim, rather than fell species along the edges of the development site where possible.
- 12. During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.
- 13. All development activities should be restricted to specific recommended areas. Storage of equipment, fuel and other materials must be limited to demarcated areas. The facility layout must be adapted to fit natural patterns rather than imposing rigid geometries. The entire development footprint must be clearly demarcated prior to the initial site clearance and prevent construction personnel from leaving the demarcated area. This would only be applicable to the construction phase of the proposed development.
- 14. The ECO must advise the construction team in all relevant matters to ensure minimum destruction and damage to the environment. The ECO

	should enforce any measures that he/she deem necessary. Regular environmental training should be provided to construction workers to ensure the protection of the habitat, fauna and flora and their sensitivity to conservation. 15. Monitoring must be implemented during the construction phase to ensure that minimal impact is caused to the fauna and flora of the area. 16. Use existing facilities (e.g., impacted areas) to the extent possible to minimise the amount of new disturbance. 17. Construction activities must remain within defined construction areas. No construction / disturbance will occur outside these areas.		
Rehabilitation	 All damaged areas shall be rehabilitated upon completion of the contract. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish. Re-vegetation of the disturbed site is aimed at approximating as near as possible the natural vegetative conditions prevailing prior to construction. All natural areas impacted during construction must be rehabilitated with locally indigenous grasses typical of the representative botanical unit. Rehabilitation must take place in a phased approach as soon as possible. Rehabilitation process must make use of species indigenous to the area. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas. 	Construction phase	Environmental Liaison Officer/ Principal Contractor
Utilisation of resources	Gathering of firewood, fruit, muti plants, or any other natural material onsite or in areas adjacent to the site is prohibited unless with prior approval of the ECO.	Construction phase	Environmental Liaison Officer
Exotic/Alien vegetation	 Alien vegetation on the site will need to be controlled, including the spread thereof. The Contractor should be responsible for implementing a programme of 	Construction phase	Environmental Liaison Officer/ Principal Contractor

- weed control (particularly in areas where soil has been disturbed); and grassing of any remaining stockpiles to prevent weed invasion. This must include monitoring and eradication.
- 3. Control involves killing the plants present, killing the seedlings which emerge, and establishing and managing an alternative plant cover to limit re-growth and re-invasion. Weeds and invader plants will be controlled in the manner prescribed for that category by the CARA or in terms of Working for Water guidelines. The control of these species should even begin prior to the construction phase considering that small populations of these species was observed during the field surveys.
- 4. Institute strict control over materials brought onto site, which should be inspected for seeds of noxious plants and steps taken to eradicate these before transport to the site. Routinely fumigate or spray all materials with appropriate low-residual herbicides prior to transport to or in a quarantine area on site. The contractor is responsible for the control of weeds and invader plants within the construction site for the duration of the construction phase. Alien invasive tree species listed by the CARA regulations should be eradicated.
- 5. Rehabilitate disturbed areas as quickly as possible to reduce the area where invasive species would be at a strong advantage and most easily able to establish.
- 6. Institute a monitoring programme to detect alien invasive species early, before they become established and, in the case of weeds, before the release of seeds. Once detected, an eradication/control programme should be implemented to ensure that the species' do not spread to surrounding natural ecosystems.
- 7. Alien vegetation management must be initiated at the beginning of the construction period and must extend into any remaining areas into the operation phase on the facility.
- 8. The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the involvement of a botanist to assist with the revegetation specifications.
- 9. Regeneration of alien vegetation must be monitored once all areas have

	been cleared, forming part of a long-term alien vegetation management plan.		
Herbicides	 Herbicide use shall only be allowed according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. 	Construction phase	Environmental Liaison Officer
Site specific mitigation measures for flora	 Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated. Since a large proportion of the identified protected species at the site are geophytic (e.g. Babiana hypogea, Schizocarphus nervosus), the potential for successful translocation is high. Before construction commences individuals of listed species within the development footprint that would be affected, should be counted and marked and translocated where deemed necessary by the ecologist conducting the pre-construction walk-through survey, and according to the recommended ratios. Permits from the relevant provincial authorities, will be required to relocate and/or disturb listed plant species. Any individuals of protected species affected by and observed within the development footprint during construction should be translocated under the supervision of the ECO and/or Contractor's Environmental Officer (EO). Pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas etc. Demarcate all areas to be cleared with construction tape or similar 	Construction phase	Environmental Liaison Officer

- material where practical. However, caution should be exercised to avoid using material that might entangle fauna.
- 6. ECO and/or Contractor's EO to provide supervision and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place.
- 7. Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.
- 8. All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed.
- 9. Regular dust suppression during construction, if deemed necessary, especially along access roads.
- No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.
- 11. No fires should be allowed on-site.
- 12. The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas.
- 13. An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland.
- 14. Reduce the footprint of the facility within sensitive habitat types as much as possible.
- 15. All disturbed areas that are not used, such as excess road widths, should be rehabilitated with locally occurring plant species after construction to reduce the overall footprint of the development.
- 16. It is difficult to mitigate against the loss of habitat since clearing of vegetation (or habitat) will be required for the infrastructure associated with the project. The grid connection infrastructure occurs predominantly on habitat types of medium sensitivity. The best practicable mitigation will be to consolidate infrastructure (e.g., proposed powerline) to areas where existing impacts occur (e.g., placing the proposed powerline alongside

- existing powerlines and or road infrastructure).
- 17. Avoid livestock watering points, or remove/relocate watering points.
- 18. All access roads must be planned with care to minimise dissection or fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.
- 19. A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout.
- 20. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- 21. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).
- 22.
- 23. To minimise the impact of the access roads:
- 24. Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible.
- 25. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- 26. Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- 27. All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does

- not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- 28. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- 29. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- 30. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- 31. All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated.
- 32. It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
- 33. The aquatic systems have been mapped to a finer scale and have taken cognizance of any potential CBAs. If High / No-Go are avoided by the major infrastructure, then aquatic zones associated with the development can be avoided, noting that at Present the Gauteng Province does not have any spatial data on Aquatic CBAs
- 34. A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring

- plan, coupled to micro-siting of the final layout.
- 35. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation.
- 36. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc).

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- 41. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- 42. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in

	4. No faunal species must be disturbed, trapped, hunted or killed by		
	3. No trapping or snaring to fauna on the construction site should be allowed.		
Protection of fauna on site	2. Use of appropriate construction techniques.	Construction pilase	Liaison Officer
	construction activities starting.	Construction phase	Environmental
	1. Demarcation of sensitive areas must be verified on site by the ECO prior to		
	Fauna		
	plan.		
	been cleared, forming part of a long-term alien vegetation management		
	48. Regeneration of alien vegetation must be monitored once all areas have		
	involvement of a botanist to assist with the revegetation specifications		
	47. The revegetation of any temporary sites as well as any previously degraded areas must begin from the onset of the project, with the		
	operation phase on the facility		
	construction period and must extend into any remaining areas into the		
	46. Alien vegetation management must be initiated at the beginning of the		
	indigenous species and inhibits the re-infestation of the cleaned areas.		
	be undertaken in a way which prevents any damage to the remaining		
	period, which if present must be removed. Removal of these species shall		
	newly established alien species during the contract and establishment		
	45. It is the contractor's responsibility to continuously monitor the area for		
	rehabilitated.		
	accidentally disturbed during the construction phase must be		
	areas to be impacted. 44. All disturbed areas beyond the construction site that are intentionally or		
	must be moved to the closest point of similar habitat type outside of the		
	43. Any fauna (frogs, snakes, etc.) that are found within the construction area		
	divert water away from construction activities.		
	circumstance shall a new channel or drainage canals be excavated to		
	diversions shall be removed to restore natural flow patterns. Under no		
	watercourse. Upon completion of the construction at the site, the		
	good condition, so that they do not burst and empty sediment into the		
	any diversion or for any other activity within a watercourse must be in a		

- maintenance staff during any routine maintenance at the development.
- 5. Where holes for poles pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling during planting of the poles along the lines.
- 6. Poisons for the control of problem animals should rather be avoided since the wrong use thereof can have disastrous consequences for birds of prey. The use of poisons for the control of rats, mice or other vermin should only be used after approval from an ecologist.
- 7. Limit pesticide use to non-persistent, immobile pesticides and apply in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications.
- 8. During construction, sensitive habitats must be avoided by construction vehicles and equipment, wherever possible, to reduce potential impacts. Only necessary damage must be caused and, for example, unnecessary driving around in the veld or bulldozing natural habitat must not take place.
- Any excess or waste material or chemicals should be removed from the site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously.
- 10. Hazardous chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.
- 11. Spill kits should be on-hand to deal with spills immediately.
- 12. All vehicles should be inspected for oil and fuel leaks on a regular basis. Vehicle maintenance yards on site should make provision for drip trays that will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.
- 13. No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site.
- 14. The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals.
- 15. Maintain proper firebreaks around the entire development footprint.
- 16. Educate construction workers regarding risks and correct disposal of

		I	T
	cigarettes. 17. More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 30 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (speed limits will also lessen the probability of road accidents and their negative consequences). 18. Travelling at night should be avoided or limited as much as possible.		
Site specific mitigation measures for fauna	 Site access should be controlled and no unauthorised persons should be allowed onto the site. Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. The collection, hunting, or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. Fires should not be allowed on site. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. 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. All construction vehicles should adhere to a low speed limit (30 km/h) to avoid collisions with susceptible species such as snakes and tortoises. Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint). 	Construction phase	Environmental Liaison Officer
	Avifauna		
Displacement, disturbance, loss of avian habitats	 Trees and scrubs earmarked for removal should be examined for active nests by a knowledgeable person as soon is the project is approved. If none is found, the plants should be removed immediately, even if clearance of the area is scheduled for a later date. If any active nests are found it will allow sufficient time for the birds to complete their breeding cycle after which the plants must be before further breeding activity takes place. Corridors of natural vegetation should be maintained between developed 	Construction phase	Environmental Liaison Officer

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		areas on site (e.g. lay-down areas and PV panel field).		
	4.	Limit the construction footprint and retain indigenous vegetation		
		wherever possible.		
	5.	Consolidate infrastructure as much as possible, specifically to areas where		
		existing impacts occur.		
	6.	Avoid and buffer habitat with high preliminary avian sensitivities. Where		
		necessary, relocate or remove artificial watering points.		
	7.	Avoid and buffer wetland features, dams and artificial livestock watering		
		points, or remove/relocate watering points.		
	8.	All road networks must be planned with care to minimise dissection or		
		fragmentation of important avifaunal habitat type. Where possible, the use of existing roads is encouraged.		
	q	Conduct a "walk-through" of the powerline servitude to identify potential		
]	areas where threatened bird species utilise the area – either re-align the		
		powerline or move pylon footprints.		
		position made pyron rootprinter		
	1.	Consolidate infrastructure to areas where existing impacts occur and to		
Site specific mitigation measures for		relocate (remove) any artificial watering holes.		Environmental
avifauna	2.	All road networks must be planned with care to minimise dissection or	Construction phase	Liaison Officer
		fragmentation of important avifaunal habitat type. Where possible, the		Liaison Officer
		use of existing roads is encouraged.		
		Air Quality		
	1.	Wheel washing and damping down of un-surfaced and un-vegetated		
		areas.		
		Retention of vegetation where possible will reduce dust travel.		
	3.	Clearing activities must only be done during agreed working times and		Environmental
Dust control measures		permitting weather conditions to avoid drifting of sand and dust into	Construction phase	Liaison Officer
		neighbouring areas.		
	4.	Damping down of all exposed soil surfaces with a water dowser or		
	-	sprinklers when necessary to reduce dust.		
	٥.	The Contractor shall be responsible for dust control on site to ensure no		
		nuisance is caused to the neighbouring communities.		

	 Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor. Any dirt roads that are utilised by the workers must be regularly maintained to ensure that dust levels are controlled. Ensure that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. A speed limit should be enforced on dirt roads (preferably 30 km/h). Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. 		
Odour control	1. Regular servicing of vehicles in order to limit gaseous emissions. 2. Regular servicing of onsite toilets to avoid potential odours.	Pre-construction and construction	Environmental Liaison Officer
Rehabilitation	The Contractor should commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks.	Pre-construction and construction	Environmental Liaison Officer
Fire prevention	 No open fires shall be allowed on site under any circumstance. No firewood or kindling may be collected from the site or the surrounds, without explicit approval from the ECO. The Contractor must always have operational fire-fighting equipment available on site. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process. All staff should be trained in firefighting and how to use the fire-fighting equipment. A firebreak should be implemented before the construction phase. The firebreak should be controlled and constructed around the perimeters of the project site. No staff (except security) should be accommodated overnight on site Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is 	Pre-construction, construction and operation	Environmental Liaison Officer

	 also managed properly. 7. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. 8. The fire risks must be managed in terms of a fire management plan and in compliance with the National Veld and Forest fire Act. 		
Mitigation of noise and vibrations	 Noise and Vibrations The construction phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. Construction site yards, workshops, concrete batching plants, and other noisy fixed facilities should be located away from noise sensitive areas. Once the proposed final layouts are made available by the Contractor(s), the sites must be evaluated in detail and specific measures designed into the system. Truck traffic should be routed away from noise sensitive areas, where possible. Noise levels must be kept within acceptable limits. Noisy operations should be combined so that they occur where possible at the same time. Construction activities are to be contained to reasonable hours during the day and early evening. Night-time activities near noise sensitive areas should not be allowed. 	Pre-construction and construction	Environmental Liaison Officer
	 Construction workers to wear necessary ear protection gear. Noise from labourers must be controlled. Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be 		

	transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11. Implementation of enclosure and cladding of processing plants. 12. Applying regular and thorough maintenance schedules to equipment and processes. An increase in noise emission levels very often is a sign of the imminent mechanical failure of a machine. 13. Limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. 14. The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. 15. All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. 16. Communication, complaints, and grievance channels must be implemented, and contact details of the CLO must be provided to the local community in the study area.		
Site specific mitigation measures for noise and vibration	 During construction care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Plant equipment such as generators, compressors, concrete mixers as well as vehicles should be kept in good operating order and where appropriate have effective exhaust mufflers. Gravel roads used during construction of the plant should be kept in good order. Corrugations and drainage ruts should not be allowed to develop as these can contribute to mechanical rattling and banging noise on vehicles traversing these roads. 	Pre-construction and construction	Environmental Liaison Officer
	Energy Use		
The use of energy and actions that need to be implemented during construction	 Energy saving lighting must be implemented across the board. Minimal lighting, while maintaining health and safety regulations, must be kept on during the night operations. Equipment not in use must be switched off and unplugged to save on 	Construction phase	Environmental Liaison Officer

	unnecessary energy costs.		
	Employment		
Labour 5	 The use of labour intensive construction measures should be used where appropriate. Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. No informal vending stations may be allowed on or near the construction site. Rooidraai Solar (Pty) Ltd and the contractor(s) should, in consultation with representatives from the contractor, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation. A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. A local employment policy should be adopted to maximise opportunities made available to the local labour force. Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater JB Marks Local Municipality, West Rand District Municipality, North West Province, South Africa, or elsewhere. Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible. 	Construction phase	Principal Contractor

Effective communication	Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding landowners, should be informed of the details of the contractors, size of the workforce and construction schedules.	Pre-construction phase	Developer
Recruitment plan	 Recruitment must comply with national employment and labour laws. Where reasonable and practical, Rooidraai Solar (Pty) Ltd's service providers should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. The Project Manager must ensure that all staff working on the proposed project is in possession of a South African Identity Card or a relevant work permit. Ensure adequate advertising in the project community areas, local papers for skilled labour. Local community leaders must be utilised to source labour. The recruitment process must be equitable and transparent. A concerted effort must be made to guard against nepotism and/or any form of favouritism during the process. The recruitment of skilled labour must follow standard advertising process in national newspapers and interview based selection. Record of official complaints by employees to authorities i.e. Labour and Social Security. As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. Where feasible, training and skills development programmes for locals should be initiated prior to the initiation of the construction phase. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. Establish and maintain a healthy worker-management relationship. Suppliers should as far as possible be sourced locally. 	Construction phase	Principal Contractor

Enhancement of opportunities for businesses and service providers	 A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project related work where applicable. Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible. The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure. The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved. 	Construction phase	Principal Contractor
Site specific mitigation measures for employment	 A local employment policy should be adopted to maximise opportunities made available to the local labour force. Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater JB Marks LM, Dr Kenneth Kaunda DM, North West Province, South Africa, or elsewhere. Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. As with the labour force, suppliers should also as far as possible be sourced locally. As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. Occupational Health and Safety		

	1. All staff should undergo a general health and safety induction and		
	simplified environmental awareness training.		
	2. Implementation of safety measures, work procedures and first aid must be		
	implemented on site.		
	3. Workers should be thoroughly trained in using potentially dangerous equipment.		
	4. Contractors must ensure that all equipment is maintained in a safe		
	operating condition.		
	5. A safety officer must be appointed.		
	6. A record of health and safety incidents must be kept on site.		
	7. Any health and safety incidents must be reported to the Project Manager immediately.		
	8. First aid facilities must be available on site at all times and a number of employees trained to carry out first aid procedures.		
	9. Workers have the right to refuse work in unsafe conditions.		
	10. The Contractor shall take all the necessary precautions against the		Principal Contractor
Work safety	spreading of disease such as measles, foot and mouth, etc.	Construction phase	and Environmental
	11. A record shall be kept of drugs administered or precautions taken and the		Liaison Officer
	time and dates when this was done. This can then be used as evidence in		
	court should any claims be instituted against Rooidraai Solar (Pty) Ltd or the Contractor.		
	12. The Contractor must ensure that all construction workers are well		
	educated about HIV/AIDS and the risks surrounding this disease. The		
	location of the local clinic where more information and counselling is		
	offered must be indicated to workers.		
	13. Material stockpiles or stacks must be stable and well secured to avoid		
	collapse and possible injury to site workers/local residents.		
	14. The contractor should provide transport to and from the site on a daily $\frac{1}{2}$		
	basis for low and semi-skilled construction workers. This will enable the		
	contactor to effectively manage and monitor the movement of		
	construction workers on and off the site		
	15. Where necessary, the contractors should make the necessary		
	arrangements to enable low and semi-skilled workers from outside the		

	area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks 16. It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.		
Work facilities	Eating areas should be regularly serviced and cleaned to ensure the highest possible standards of hygiene and cleanliness.	Construction phase	Principal Contractor and Environmental Liaison Officer
Management of construction site and construction workers	 All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted. The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified in the EIA Report. The location of this construction equipment camp/s must be approved by the project Environmental Liaison Officer. Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area. Ensure waste storage facilities are maintained and emptied on a regular basis. Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept. Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, 	Construction phase	Principal Contractor and Environmental Liaison Officer

	solvents and any other harmful and hazardous substances and materials.		
	 Ensure ablution facilities are appropriately maintained. Ablutions must be 		
	cleaned regularly and associated waste disposed of at a		
	registered/permitted waste disposal site. Ablutions must be removed		
	from site when construction is completed.		
	10. Cooking and eating of meals must take place in a designated area. No fires		
	are allowed on site. No firewood or kindling may be gathered from the		
	site or surrounds.		
	11. All litter must be deposited in a clearly marked, closed, animal-proof		
	disposal bin in the construction area. Particular attention needs to be paid		
	to food waste.		
	12. A Method Statement should be compiled for the management of pests		
	and vermin within the site, specifically relating to the canteen area if		
	applicable.		
	13. No disturbance of flora or fauna must be undertaken outside of the		
	demarcated construction area/s.		
	14. Workers must be aware of the importance of not polluting rivers or		
	wetlands (especially those located outside of the project site) and the		
	significance of not undertaking activities that could result in such		
	pollution, and this awareness must be promoted throughout the		
	construction phase.		
	15. Contractors must ensure that all workers are informed at the outset of the		
	construction phase of the conditions contained on the Code of Conduct,		
	specifically consequences of stock theft and trespassing on adjacent farms.		
	16. On completion of the construction phase, all construction workers must		
	leave the site within one week of their contract ending.		
	The state of the construction and investment and a second		Dain single Courters
Handrid ava avlasta a	The siting of the construction equipment camp/s must take cognisance of any	Camatan, atticie in le	Principal Contractor
Hazardous substances	sensitive areas identified in the EIA Report. The location of this construction	Construction phase	and Environmental
	equipment camp/s must be approved by the project EO.		Liaison Officer

Machine and equipment	As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Construction phase	Principal Contractor and Environmental Liaison Officer
Fitness for work	Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time.	Construction phase	Principal Contractor and Environmental Liaison Officer
Travel and remote site health	Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan (refer to Appendix I) must be developed with emergency procedures in the event of a fire.	Construction phase	Principal Contractor and Environmental Liaison Officer
Protective gear	Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Construction phase	Principal Contractor and Environmental Liaison Officer
Site safety	Ensure waste storage facilities are maintained and emptied on a regular basis.	Construction phase	Principal Contractor and Environmental Liaison Officer
Construction equipment safety	All equipment used for construction, including drills, TLB's must be in good working order with up-to-date maintenance records.	Construction phase	Principal Contractor and Environmental Liaison Officer
Procedure in the event of a petrochemical spill	 A spill kit needs to be kept on site to address any unforeseen spillages. The individual responsible for or who discovers the petrochemical spill must report the incident to the Project Manager, Contractor or ECO. The problem must be assessed, and the necessary actions required will be 	Construction phase	Principal Contractor and Environmental Liaison Officer

	 undertaken. The immediate response must be to contain the spill. The source of the spill must be identified, controlled, treated or removed wherever possible. 		
Fire management	 All construction staff must be trained in fire hazard control and firefighting techniques. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. No open fires will be allowed on site. Smoking may only be conducted in demarcated areas. Road borders must be regularly maintained to ensure that vegetation remain short to serve as an effective firebreak. A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas. Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction 	Construction phase	Principal Contractor and Environmental Liaison Officer

	phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.		
Safety of surrounding residents	All I&AP's must be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples of these are: • Blasting • Risk to residence along haulage roads/access routes On-going communication with the affected and surrounding landowners is important to maintain during the construction and operational phases of the solar energy facility. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.	Construction and operational phase	Principal Contractor and Environmental Liaison Officer
Emergency evacuation plan	 Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency. All permanent staff must undergo safety training. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Maintenance	The PV plant and surrounding areas are to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Construction phase	Principal Contractor and Environmental Liaison Officer
	Security	ı	
Security actions that need to be implemented during construction	 A security company must be employed to guard the construction site and monitor access. This company must also be utilised for the operation phase. Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them. Only pre-approved staff must be permitted to stay within the staff accommodation which will be provided. 	Construction phase	Principal Contractor and Environmental Liaison Officer

- 4. Construction workers must be easily identifiable by wearing uniforms and identification tags/induction cards.
- 5. The site must be fenced, where necessary to prevent any loss or injury to persons during the construction phase.
- 6. No alcohol/ drugs to be present on site.
- 7. No firearms allowed on site or in vehicles transporting staff to / from site (unless used by security personnel).
- 8. Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden).
- 9. Trespassing on private/ commercial properties adjoining the site is forbidden.
- 10. Driving under the influence of alcohol is prohibited.
- 11. All employees must undergo the necessary safety training and wear the necessary protective clothing.
- 12. The site must be secured in order to reduce the opportunity for criminal activity in the locality of the construction site.
- 13. Working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.
- 14. Provide transportation for workers to prevent loitering within or near the project site outside of working hours.
- 15. The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.
- 16. The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.
- 17. Access in and out of the construction site should be strictly controlled by a security company appointed to the project.
- 18. A community liaison officer (CLO) should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction

	 process. 19. The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. 20. The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. 21. The EPC Contractor must prepare a Method Statement which deals with fire prevention and management. 		
	Social Environment	 	
Social environment actions that need to be implemented during construction	 All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times. A complaints register should be kept on site. Details of complaints should be incorporated into the audits as part of the monitoring process. This should be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the Contractor. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of all damage and remedial actions shall be kept on site. All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect. Care must be taken not to damage irrigation equipment, lines, channels and crops. Rooidraai Solar (Pty) Ltd must hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. Contractors appointed by Rooidraai Solar (Pty) Ltd must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road 	Construction phase	Principal Contractor and Environmental Liaison Officer

	safety issues.		
	 Heavy vehicles should be inspected regularly to ensure their road 		
	worthiness.		
	10. Provision of adequate and strategically placed traffic warning signs, that		
	have to be maintained for the duration of the construction phase, and		
	control measures along the R501 and R500 roads to warn road users of		
	the construction activities taking place for the duration of the construction		
	phase. Warning signs must be always visible, especially at night.		
	11. Implement penalties for reckless driving to enforce compliance to traffic rules.		
	12. Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work).		
	13. The developer and EPC Contractor must ensure that all fencing along		
	access roads is maintained in the present condition or repaired if		
	disturbed due to construction activities.		
	14. The developer and EPC Contractor must ensure that the roads utilised for		
	construction activities are either maintained in the present condition or		
	upgraded if disturbed due to construction activities.		
	15. The EPC Contractor must ensure that damage / wear and tear caused by $$		
	construction related traffic to the access roads is repaired before the		
	completion of the construction phase.		
	16. A method of communication must be implemented whereby procedures		
	to lodge complaints are set out for the local community to express any		
	complaints or grievances with the construction process.		
	1. Ensure that employment procedures/polices are communicated to local		
	stakeholders, especially community representative organisations and ward		
	councillors.		Principal Contractor
Influx of people	2. Have clear rules and regulations for access to the construction site to	Construction phase	and Environmental
	control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the		Liaison Officer
	construction site.		
	3. The appointed EPC Contractor must appoint a security company to ensure		
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- appropriate security procedures and measures are implemented, including such that workers do not remain onsite after working hours.
- 4. A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
- 5. The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security.
- 6. Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work and maximises the benefit to the local economy.
- Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
- 8. Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.
- 9. Provide transportation for workers (from Carletonville and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site.
- 10. Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.
- 11. Compile and implement a grievance mechanism.
- 12. Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.
- 13. Prevent the recruitment of workers at the project site.
- 14. Establish clear rules and regulations for access to the proposed site.
- 15. Inform local community organisations and policing forums of construction times and the duration of the construction phase.
- 16. Establish procedures for the control and removal of loiterers from the construction site.

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Change to municipal infrastructure	 Where possible, construction workers should be housed within the local community to reduce the possible additional strain on local resources. Contractors to supply and install infrastructure needed to access municipal services, e.g. water and sewerage pipelines. On site, sufficient portable services must be available (e.g. portable toilet facilities) and serviced regularly to prevent contamination. The use of local labour during construction will negate the need for additional housing; therefore, contractors are again urged to make use of as much local labour as possible. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Integration with local communities	 An aggressive STI and HIV/AIDS awareness campaign must be launched, which is not only directed at construction workers but also at the community as a whole. Local women must be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability. Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. 	Construction phase	Principal Contractor and Environmental Liaison Officer
Potential loss of productive farmland	 The proposed site for the Rooidraai Solar needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area. Game grazing on the proposed site need to be relocated. All affected areas, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and must be continuously monitored by the Environmental Control Officer (ECO). Implement, manage and monitor a grievance mechanism for the recording 	Construction phase	Principal Contractor

	and management of social issues and complaints.		
Site specific mitigation measures for social environment	It is recommended that a local procurement policy is adopted to maxim the benefit to the local economy. A database of local companies, specifically Historically Disadvantag Individuals (HDIs) which qualify as potential service providers (e. construction companies, security companies, catering companies, was collection companies, transportation companies etc.) should be creat and companies listed thereon should be invited to bid for project-relat work where applicable. Local procurement is encouraged along with engagement with lo authorities and business organisations to investigate the possibility procurement of construction materials, goods and products from lo suppliers where feasible. The project would contribute to an upgrade in the shared infrastructure the LM as well as in the maintenance of this infrastructure. The LM would be encouraged to participate in this maintenance a upgrade where it would be feasible for them to be involved. A database of local companies, specifically Historically Disadvantag Individuals (HDIs) which qualify as potential service providers (e. construction companies, transportation companies etc.) should be creat (or sourced from the local Municipality, where available) and compan listed thereon should be invited to bid for project-related work whe applicable and this would include the maintenance of this shar infrastructure. The proposed site for the Rooidraai SEF needs to be fenced off prior to to construction phase and all construction related activities should confined in this fenced off area. Game farming on the proposed site need to be relocated. All affected areas, which are disturbed during the construction phaneed to be rehabilitated prior to the operational phase and should continuously monitored by the Environmental Control Officer (ECO).	ed g., ste ed ed cal of cal of cal of cal ed g., ste ed ed es ere ed he be	Principal Contractor

- and management of social issues and complaints.
- 11. Mitigation measures from the Agricultural and Soil Report, should also be implemented.
- 12. Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work.
- 13. Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy.
- 14. Provide transportation for workers (from Carletonville and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site.
- 15. Working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.
- 16. Compile and implement a grievance mechanism.
- 17. Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour.
- 18. Prevent the recruitment of workers at the project site.
- 19. Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.
- 20. Establish clear rules and regulations for access to the proposed site.
- 21. Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours.
- 22. Inform local community organisations and policing forums of construction times and the duration of the construction phase.
- 23. Establish procedures for the control and removal of loiterers from the construction site.
- 24. As far as possible, working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities.
- 25. Provide transportation for workers to prevent loitering within or near the project site outside of working hours.

- 26. The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site. The fencing of the site should be maintained throughout the construction period.
- 27. The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented.
- 28. Access in and out of the construction site should be strictly controlled by a security company appointed to the project.
- 29. A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.
- 30. The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security.
- 31. The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners.
- 32. The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.
- 33. A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site.
- 34. Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment.
- 35. No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas.
- 36. Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly.
- 37. Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry.
- 38. Fire risks must be managed in terms of a fire management plan and in

compliance with the National Veld and Forest Fire Act. 39. The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. 40. Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. 41. Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. 42. A CLO should be appointed, and a grievance mechanism implemented. 43. Limit noise generating activities to normal daylight working hours and	
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avoid weekends and public holidays.	
44. The movement of heavy vehicles associated with the construction phase	
should be timed to avoid weekends, public holidays, and holiday periods	
where feasible.	
45. Dust suppression measures must be implemented for heavy vehicles such	
as wetting of gravel roads on a regular basis and ensuring that vehicles	
used to transport sand and building materials are fitted with tarpaulins or	
covers.	
46. All vehicles must be road-worthy, and drivers must be qualified and made	
aware of the potential road safety issues and need for strict speed limits.	
47. Communication, complaints, and grievance channels must be	
implemented, and contact details of the CLO must be provided to the local	
community in the study area.	
Heritage	
1. Known sites (where discovered) must be clearly marked, so that they can	
	Principal Contractor
	and Environmental
archaeological features or finds on the might be exposed during the construction activities.	Liaison Officer
site 3. Should any heritage artefacts be exposed during excavation, work on the	
area where the artefacts were discovered, must cease immediately and	

- the Environmental Control Officer (ECO) shall be notified as soon as possible.
- 4. All discoveries must be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO must advise the necessary actions to be taken.
- 5. Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site.
- 6. Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1).
- 7. A person or entity, e.g. the ECO, must be tasked to take responsibility for the maintenance heritage sites (where present).
- 8. In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it must be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official must be part of the team executing these measures.
- 9. Should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. The appropriate steps to take are indicated in Section 9 of the Heritage Impact Assessment report, as well as in the Management Plan: Burial Grounds and Graves, with reference to general heritage sites, in the Addendum, Section 13.5 of the Heritage Impact Assessment Report.
- 10. If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Sityhilelo Ngcatsha/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule.
- 11. If unmarked human burials are uncovered, the SAHRA Burial Grounds and

	Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA.		
Palaeontology	 If fossil remains are discovered during any phase of construction, either on the surface or uncovered by excavations, the ECO/site manager in charge of these developments must be notified immediately. These discoveries must be secured and the ECO/site manager must alert SAHRA so that appropriate mitigation (documented and collection) can be undertaken by a professional palaeontologist (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports must meet the minimum standards for palaeontological impact studies developed by SAHRA. Implement the Chance Find Procedure as included in the Palaeontological Impact Assessment should fossils be uncovered during construction activities. 	Construction phase	Principal Contractor, Environmental Liaison Officer & Environmental Control Officer
	Community Engagement		
Community engagement	 A communication guideline to be drafted and agreed upon with authority representatives and affected communities. Open and transparent community engagement to be followed as culturally appropriate. Records (written) to be kept of all community engagements (e.g. complaints, resolutions, etc). 	Construction phase	Environmental Liaison Officer
	Visual Impact		
Visual issues and actions that need to be implemented during the construction phase	 Retain and maintain natural vegetation immediately adjacent to the development footprint. Ensure that vegetation is not unnecessarily removed during the construction phase. 	Construction phase	Environmental Liaison Officer

	 Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. Ensure that rubble, litter, etc. are appropriately stored (if it can't be removed daily) and then disposed of regularly at a licenced waste site. Reduce and control dust during construction by utilising dust suppression measures. Limit construction activities between 07:00 and 18:00, where possible, in order to reduce the impacts of construction lighting.
	 8. Rehabilitate all disturbed areas immediately after the completion of construction work and maintain good housekeeping. 9. Rehabilitate cleared areas as soon as possible. 10. Mitigation of lighting impacts includes the pro-active design, planning and
	specification lighting for the facility by a lighting engineer. The correct specification and placement of lighting and light fixtures for the PV plant and the ancillary infrastructure will go far to contain rather than spread the light. Mitigation measures include:
	 Shielding the sources of light by physical barriers (walls, vegetation, or structures.) Limiting mounting heights of lighting fixtures, or alternatively using footlights or bollard level lights.
	 Making use of minimum lumen or wattage lights. Making use of downlighters, or shielded fixtures. Making use of low-pressure sodium lighting or other types of low impact lighting.
	Making use of motion detectors for security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
Site specific mitigation measures for visual impacts	Ensure that vegetation is not unnecessarily removed during the construction phase.

2.	Plan the placement of laydown areas and temporary construction	
	equipment camps in order to minimise vegetation clearing (i.e., in already	
	disturbed areas) where possible.	
3.	Restrict the activities and movement of construction workers and vehicles	
	to the immediate construction site and existing access roads.	
4.	Ensure that rubble, litter, etc. are appropriately stored (if it can't be	
	removed daily) and then disposed of regularly at a licenced waste site.	
5.	Reduce and control dust during construction by utilising dust suppression	
	measures.	
6.	Limit construction activities between 07:00 and 18:00, where possible, in	
	order to reduce the impacts of construction lighting.	
7.	Rehabilitate all disturbed areas immediately after the completion of	
	construction work and maintain good housekeeping.	

Table 2-5: Proposed Mitigation Measures during the Operational Phase

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES		
DURING OPERATION (NATURE OF THE IMPACT)	Management and mitigation measures	Timeframe	Responsibility
	Construction Site Decommissioning		
Removal of equipment	 All structures comprising the construction camp are to be removed from site. The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc, and these shall be cleaned up. All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and regressed using the guidelines set out in the re-vegetation that forms part of this document. 	When beneficiaries take occupation	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Temporary services	 The Contractor must arrange the cancellation of all temporary services. Temporary roads must be closed and access across these, blocked. All areas where temporary services were installed are to be rehabilitated to the satisfaction of the ECO. 	When beneficiaries take occupation	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer
Associated infrastructure	 Surfaces are to be checked for waste products from activities such as concreting or asphalting and cleared in a manner approved by the Engineer. All surfaces hardened due to construction activities are to be ripped and imported material thereon removed. All rubble is to be removed from the site to an approved disposal site as approved by the Engineer. Burying of rubble on site is prohibited. The site is to be cleared of all litter. 	When beneficiaries take occupation	Principal Contractor. Developer, Environmental Control officer and Environmental Liaison Officer

	 Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Engineer. All residual stockpiles must be removed to spoil or spread on site as directed by the Engineer. All leftover building materials must be returned to the depot or removed from the site. The Contractor must repair any damage that the construction works has caused to neighbouring properties, specifically, but not limited to, damage caused by poor stormwater management. 		
Rehabilitation plan	Rehabilitate and re-vegetate cleared areas with indigenous plant species.	When beneficiaries take occupation	Principal Contractor. Developer, ECO and Environmental Liaison Officer
	Operation and Maintenance		
Maintenance	 All applicable standards, legislation, policies and procedures must be adhered to during operation. Regular ground inspection of the power plant must take place to monitor their status. Regular inspection of Battery Management System including the inert fire system. 	Operational phase	Developer
Replacement of solar panels as part of the maintenance process	 Should panels be required to be replaced, the following will apply: Materials and panels are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. Full clean-up of all materials must be undertaken after the removal and replacement of the solar panel arrays and associated infrastructure is complete, and disturbed areas appropriately rehabilitated. 	Operational phase	Developer

	 Most of the materials used for solar panel systems can be recycled. The majority of the glass and semiconductor materials can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site. Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation. 		
Public awareness	The emergency preparedness plan must be ready for implementation always should an emergency situation arise.	Operational phase	Developer
	Soil Erosion and Geology		
Soil erosion	 To avoid soil erosion, it will be a good practice to design stormwater canals into which the water from the panels can be channeled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on existing roads and not create new roads. Facilitate re-vegetation of denuded areas throughout the site. Undertake a periodic (bi-annual) site inspection to record the progress of all areas that require re-vegetation. If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. 	Operational phase	Developer
Monitoring and reporting	Specific activities that should be monitored include: • Erosion potential (specifically in and around roads and stormwater discharge points).	Operational phase	Developer

	Identified problem areas		
Geology	 Surface drainage should be provided to prevent water ponding. Bulk infrastructure should be designed by a specialist. 	Operational phase	Developer
Site specific measures for soil erosion	 Any erosion problems observed along access roads or any hardened/engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. All bare areas (excluding agricultural land and the development footprint), affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible Roads and other disturbed areas should be regularly monitored for erosion problems, and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation. Topsoil must be removed and stored separately from subsoil. Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation on cleared areas. Practical phased development and vegetation clearing must be practiced so that cleared areas are not left un-vegetated and vulnerable to erosion for extended periods of time. 	Operational phase	Developer
	Surface and Groundwater		
Surface water	 Correct drainage of the site should ensure that contaminants do not impact upon the riparian areas and wetlands. The stormwater system on the proposed site needs to be regularly maintained to ensure effective working. 	Operational phase	Developer
Monitoring and reporting	Specific activities that should be monitored include: • Erosion potential (specifically in and around roads and stormwater discharge points).	Operational phase	Developer

	Stormwater management and designIdentified problem areas		
Site specific mitigation measures for surface water	 All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). Mechanical plant and bowsers must not be refueled or serviced within 100m of a river channel or wetland. All construction camps, lay down areas, wash bays, batching plants or areas and any stores should be more than 50 m from any demarcated water courses. Littering and contamination associated with construction activity must be avoided through effective construction camp management. No stockpiling should take place within or near a water course. All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable. ESO monitors the site on a daily basis to ensure plant is in working order (minimise leaks), spills are prevented and if they do occur, are quickly rectified. 	Operational phase	Developer
Site specific mitigation measures for groundwater	 No stormwater discharged may be directed to delineated aquatic zones or the associated buffers. A stormwater management plan must be developed post EA, detailing the structures and actions that must be installed to prevent the increase of surface water flows directly into any natural systems. Effective stormwater management must include measures to slow, spread and deplete the energy of concentrated flows thorough effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed areas To minimise the impact of the access roads: 	Operational phase	Developer

- 5. Use existing roads or upgrade existing tracks to cross wetlands rather than constructing entirely new roads wherever possible.
- 6. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- 7. Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- 8. All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- 9. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- 10. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- 11. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.
- 12. All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be

	rehabilitated. 13. It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas. Biodiversity (Fauna and Flora)		
Vegetation	 Indigenous vegetation must be maintained, and all exotics removed as they appear and disposed of appropriately. Re-vegetation of the disturbed site is aimed at approximating as near as possible to the natural vegetative conditions prevailing prior to construction. Vegetative re-establishment shall, as far as possible, make use of indigenous or locally occurring plant varieties. Continued monitoring and eradication of alien invasive plant species are imperative. Rehabilitation must be executed in such a manner that surface run-off will not cause erosion of disturbed areas during and following rehabilitation. 	Operational phase	Developer
Other fauna	No faunal species must be harmed by maintenance staff during any routine maintenance at the development.	Operational phase	Developer
Site specific mitigation measures	 The successful reduction in the treat (significance) posed by Alien Invasive Plants relies on a detailed; Site-specific eradication and management programme for alien invasive plants; Site-specific Vegetation Rehabilitation Management Plan; and The meticulous implementation of this Management Plan. Such an Alien Invasive and Vegetation Rehabilitation Management Plan must subsequently be included in the Environmental Management Programme (EMPr). Regular monitoring by the operation and maintenance team for alien 	Operational phase	Developer

	plants must occur and could be conducted simultaneously with erosion monitoring. 7. When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. 8. Clearing methods must aim to keep disturbance to a minimum. 9. No planting or importing any listed invasive alien plant species (all Category 1a, 1b, 2, and 3 invasive species) to the site for landscaping,
	rehabilitation or any other purpose must be undertaken.
	Avifauna
Displacement, disturbance, collisions with panels and electrocution	 Apply bird deterrent devices and remove nest structures constructed on infrastructure associated with the PV facility under the guidance of the ECO. Apply bird deterrent devices such as rotating flashers/reflectors to the panels for birds that may mistake the panels for open water and to prevent them from landing on the panels - these should especially be placed at panels nearest to watering points, drainage lines and canals (and agricultural land). Security/CCTV cameras may be installed to quantify mortalities (cameras are also installed along the perimeter fence for security measures and may also prove effective to quantify mortalities). Buffer drainage lines/seeps by at least 350 m. Buffer artificial livestock watering points (by at least 100 m), or remove/relocate watering points. Implement additional pre-construction monitoring to evaluate important bird flyways/dispersal routes. Implement post-construction monitoring. If post-construction monitoring predicts and/or confirms any bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis.

	8.	Apply bird deterrent devices to the power lines and make use of "bird-friendly" pylon structures.		
	9.	Avoid the placement of any watering points in close proximity to any		
		overhead electrical infrastructure. If present, these should be relocated		
		and/or removed.		
	10.	To aid post-construction monitoring and/or monitoring of bird mortality		
		rates, it is advised to conduct direct observations and carcass searches on		
		a regular and systematic basis.		
	11.	Apply bird diverters when wetland features or untransformed/scarp/rocky grassland habitat are to be crossed.		
	12.	Collisions will be reduced if the grid corridor is placed alongside existing powerlines.		
	13.	Make use of bird-friendly pylons and bird guards as recommended by EWT.		
	1.	Minimise standing water.		
	2.	Inspect all PV modules at least once a month throughout the year for any		
Nesting on site		nest-building activity.	Operational phase	Developer
	3.	Maintenance staff require basic training in order to know what to look for		2010.040
		and how to fill in the Bird Incident Forms.		
	1.	Apply bird deterrent devices and remove nest structures constructed on		
		infrastructure associated with the PV facility under the guidance of the		
		ECO.		
	2.	Apply bird deterrent devices such as rotating flashers/reflectors to the		
		panels for birds that may mistake the panels for open water and to		
Site specific mitigation measures for		prevent them from landing on the panels. Security/CCTV cameras may be		
avifauna		installed to quantify mortalities (cameras are also installed along the		
		perimeter fence for security measures and may also prove effective to quantify mortalities).		
	3.	Buffer artificial livestock watering points (by at least 100m), or		
	J.	remove/relocate watering points.		
	4.	Implement additional pre-construction monitoring to evaluate important		
		·		l

- bird flyways/dispersal routes.
- Implement post-construction monitoring. If post-construction monitoring predicts and/or confirms any bird mortalities, an option is to employ video cameras at selected areas to document bird mortalities and to conduct direct observations and carcass searches on a regular and systematic basis.
- 6. Apply bird deterrent devices to the power lines and make use of "bird-friendly" pylon structures.
- All cattle feedlots and watering points within close proximity of power lines should be relocated (at least 100m from the power line servitude) where relevant.
- 8. Grazing of cattle in close proximity to overhead power lines should be avoided (to minimize potential occurrences of livestock carcasses near power line servitudes).
- 9. To aid post-construction monitoring and/or monitoring of bird mortality rates, it is advised to conduct direct observations and carcass searches on a regular and systematic basis. As a priority, the entire length of the powerline should be marked with bird diverters. In addition, the impact significance (after mitigation) could be reduced if the proposed.
- 10. Electrocution will be proportional to the spatial position of livestock carcasses (with reference to scavenging birds of prey), and will probably only occur when a carcass is located underneath or in close proximity to an overhead distribution power line.
- 11. Apply bird deterrent devices to the power line.
- 12. Avoid the placement of cattle feedlots and watering points near electrical infrastructure. All cattle feedlots and watering points within close proximity of power lines should be relocated (at least 100m from the power line servitude) if relevant.
- 13. Grazing of cattle at or in close proximity to distribution lines should be monitored at all times and preferably be avoided (to minimise potential livestock carcasses near power line servitudes).
- 14. Make use of bird-friendly pylons and bird guards as recommended by EWT. Position of electrical infrastructure in close proximity to existing infrastructure will minimize the risk of electrocutions.

	Waste Management		
Recycling and litter management	 The site should be kept clear of litter at all times. Solid waste separation and recycling must take place for the duration of the operational phase for the development. All waste must be removed promptly to ensure that it does not attract vermin or produce odours. In house treatment procedures must be followed strictly. Solid waste must be collected on a regular basis and disposed of at the closest municipal landfill site. Package treatment plant must be regularly serviced. No solid waste may be burned or buried on site or disposed of by any other method on site. Broken or old batteries or components of the PV plant must be stored in a demarcated area in quarantine for the shortest period possible until it can be collected and taken to a special chemical waste facility. Once the batteries become obsolescent, either due to the facility decommissioning or the batteries reaching their useful design life and require replacement, the used batteries will be broken down and recycled as far as possible and unrecoverable wastes disposed of through appropriate channels. 	Operational phase	Developer
	Health and Safety		
Emergency evacuation plan	Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	Operational phase	Developer
Maintenance	The PV plant is to be regularly maintained. A maintenance schedule must be drawn up and records of all maintenance kept.	Operational phase	Developer

Fire safety	Firefighting equipment in the form of fire hydrants or fire extinguishers must be available on the site. These must be regularly maintained by an appropriate company.	Operational phase	Developer
Slight increase in trips due to permanent staff on site.	 Source on-site water supply if possible. Utilise cleaning systems for the panels needing less vehicle trips. Schedule trips for the provision of water for the cleaning of panels outside peak traffic times as much as possible. 	Operational phase	Developer
Storage and handling of hazardous waste, hazardous substances and dangerous goods	 Transformer oil containers must be regularly maintained to ensure that leaks do not occur. A spill kit needs to be kept on site to address any unforeseen spillages. Transport of all hazardous substances must be in accordance with the relevant legislation. The bund wall surrounding the transformer oil containers must be regularly maintained to ensure that any spills are completely contained. Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors. Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately. Develop and adhere to a procedure for the safe handling of battery cells during the undertaking of maintenance activities. Ensure that service providers dispose of used batteries properly by requesting and retaining receipts for disposal/refurbishment. Immediately report significant spillages and initiate an environmental site assessment for risk assessment and remediation if necessary. Emergency response arrangements and systems, such as foam pourers, firefighting systems and cooperation with emergency responders must be implemented. Preventive measures could include maintenance procedures to prevent the occurrence of loss of containment, as well as strict control of ignition sources and other measures which may be 	Operational phase	Developer

	required according to standards such as those prescribed by the South African National Standards System.		
	Risks associated with the BESS		
Gas release with subsequent fire and explosion	 The battery management system (BMS) is essential to the safety and performance of the entire ESS system: it has a controlling and monitoring function, hence its specifications and functions need to be checked, tested and validated. Controlling and monitoring the state of charge (SoC) of the battery cell through its parameters (current, voltage, temperature) during charging and discharging is a critical function based on which functional safety for fault protection is designed. In order to ensure normal operation, optimum power output and service life, the system will require cooling at high temperatures and heating in cold weather. The BESS should be located away from critical buildings or equipment. Where spatial separation is not possible, provide exterior protection such as a passive thermal barrier, or active fire protection such as drenchers. An appropriate distance must be maintained between containers to safeguard against propagation. Install battery and battery management systems/electrical switch gear in separate rooms. Put battery and battery management systems/electrical switch gear in separate rooms, with fire resistive construction (two-hour fire rated) to adequately cut-off the room from surrounding exposures. Provide signage on site specifying how electrical and chemical fires should be dealt with by first responders, and the potential risks to first responders (e.g. toxic fumes). Provide suitable firefighting equipment on site. Provide fire-rated compartmentation and adequate separation between battery units. Provide adequate fire doors that are maintained in the closed position and equipped with automatic closure mechanisms. Where insulated metal 	Operational phase	Developer

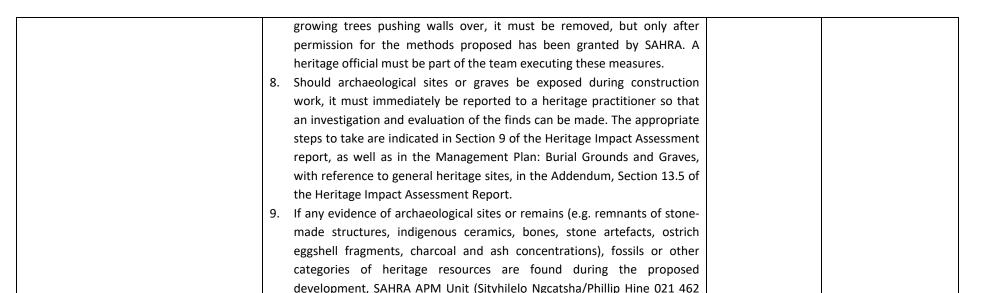
	panels (IMPs) are used, these must contain a mineral wool core and be installed in accordance with the terms of their approval. Only non-combustible IMPs should be installed. 9. Ensure proper management of cable/service penetrations. Cable penetrations must be adequately sealed to meet the fire resistance of the compartment (two-hour fire resistance rating). Heating, ventilation and air conditioning ducts must have fire dampers provided that automatically close on activation of the fire alarm. Establish a permit to access system to manage changes to service or cable penetrations under an audited system. 10. Extensive monitoring of the battery states such as voltage, temperature, current etc. as well as redundant monitoring and control in terms of a fail-safe battery-management-system (BMS) is crucial for a safe operation of BESS. Maintenance and inspection schedules must be set up. The BMS, the inverter control unit and the BESS supervisory control and data acquisition (SCADA) system must closely monitor the BESS. If one of these fails, the BESS needs to be shut down. 11. Automatic fire detection must be in place, with early warning smoke detection or very early warning highly sensitive smoke detection. The system design must include continuous remote monitoring. 12. Consider automatic fire sprinklers and water mist for active fire protection. 13. To ensure that BESS remain at an acceptable risk level, owners and operators of both permanent or portable BESS must follow design standards and best practices, regularly maintain the system's equipment (as well as safety systems and related equipment), train personnel, and communicate with local emergency responders on the storage system's		
	standards and best practices, regularly maintain the system's equipment (as well as safety systems and related equipment), train personnel, and		
Appropriate operation and maintenance of the battery energy storage system (BESS)	 Compile (and adhere to) a procedure for the safe handling of the battery cells. Ensure that battery supplier user guides, safety specifications and Material Safety Data Sheets (MSDS) are filed on site at all times. Operate, maintain and monitor the BESS as per the supplier specifications. 	Operational phase	Developer

	 Compile method statements for approval by the Technical/SHEQ Manager for battery cell, electrolyte and battery call / container replacement. Maintain the method statements on site. Ensure that all maintenance contractors / staff are familiar with the supplier's specifications. Provide signage on site specifying the types of batteries in use and the risk of exposure to hazardous material and electric shock. Maintain strict access control to the battery storage area. Undertake regular visual checks of the BESS equipment to identify signs of damage or leaks. Provide environmental awareness training to all personnel on site. Training should include a discussion of: Potential impact of electrolyte spills on groundwater; Suitable disposal of waste and effluent; and How incidents and suggestions for improvement can be reported.
	Visual Impact
Maintenance and lighting	 Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint. Where insufficient natural vegetation exists next to the property, a 'screen' can be planted if the landowner requests additional mitigation. This can be done using endemic, fast growers that are water efficient. The subjectivity towards the project in its entirety can be influenced by creating a "Green Energy" awareness campaign, educating the local community and potentially tourists on the benefits of renewable energy. This can be achieved by also hosting an 'open day' where the local community can have the opportunity to view the completed project which may enlist a sense of pride in the renewable energy project in their area. Maintain general appearance of the facility as a whole. Implement good housekeeping measures. As far as practically possible: Shield the source of light by physical barriers (walls, vegetation etc.)

	 Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level lights. Make use of minimum lumen or wattage in fixtures. Make use of down-lighters, or shield fixtures. Make use of low-pressure sodium lighting or other types of low impact lighting. Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. The use of night vision or thermal security cameras are very effective and can replace security lighting entirely. 		
	Employment		
Labour	Training of labourers to benefit individuals beyond completion of the project.	Operational phase	Developer
Recruitment plan	 Recruitment must comply with national employment and labour laws. It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. The Project Manager must ensure that all staff working on the proposed project are in possession of a South African Identity Card or a relevant work permit. Ensure adequate advertising in the project community areas, local papers for skilled labour. Local community leaders must be utilised to source labour. The recruitment process must be equitable and transparent. A concerted effort will be made to guard against nepotism and/or any form of favouritism during the process. The recruitment of skilled labour will follow standard advertising process in national newspapers and interview based selection. Record of official complaints by employees to authorities i.e. Labour and Social Security. Where feasible, efforts should be made to employ local contractors that 	Operational phase	Developer

	 are compliant with Black Economic Empowerment (BEE) criteria. 10. The recruitment selection process must seek to promote gender equality and the employment of women wherever possible. 11. Establish, maintain a healthy worker-management relationship. 12. It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. 13. Vocational training programs should be established to promote the development of skills. 		
Grievance mechanism	 A grievance mechanism as part of the management system should be established. The grievance procedure does not replace normal manager-employee dialogue, but is another open form of communication. The procedure should assist employees to resolve grievance situations quickly and effectively in order to restore harmonious working conditions for all employees. Management is responsible for listening and responding to all employee concerns raised through this procedure. In all cases, matters will be dealt with in as confidential a manner as possible. 	Construction and operational phase	Developer
	Social Environment		
Corporate social investment	 Consult with the community to determine their needs. Following a top-down approach without community consultation can result in irrelevant interventions that are disregarded by the community. Rooidraai Solar (Pty) Ltd should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project; A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. 	Operational phase	Developer

	 Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time). 		
Sense of place and tourism	 Job opportunities should be afforded to local individuals as far as possible to enhance their sense of place. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be open to school fieldtrips, the local community, and tourists. 	Operational phase	Developer
	Heritage Resources		
Mitigation of the impact that the new development may have on potential archaeological artifacts and palaeontology on the site	 The contractors and workers must be notified that archaeological sites might be exposed during the maintenance activities. Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, must cease immediately and the operations manager shall be notified as soon as possible. All discoveries must be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO must advise the necessary actions to be taken. Under no circumstances must any artefacts be removed, destroyed or interfered with by anyone on the site. Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA, Section 51(1). A person or entity, e.g. the ECO, must be tasked to take responsibility for the maintenance heritage sites (where present). In areas where the vegetation is threatening the heritage sites, e.g. 	Construction and operational phase	Developer



5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the

10. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490),

must be alerted immediately as per section 36(6) of the NHRA.

NHRA and item 5 of the Schedule.

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

POTENTIAL ENVIRONMENTAL	RECOMMENDED MITIGATION MEASURES		
IMPACT DURING DECOMMISSIONING (NATURE OF THE IMPACT)	Management and mitigation measures	Timeframe	Responsibility
	Ongoing Stakeholder involvement		
General	 Closure must be planned from inception through adequate social planning and infrastructure development that can be maintained by the communities after closure and opportunities to redirect skills must be sought. Community to be notified, as culturally appropriate, timeously of the planned decommissioning. Recommend that a meeting with community leader(s) be held before decommissioning commence to inform them: What activities will take place during the decommissioning phase. How these activities will impact upon the communities and/or their properties. Regarding the timeframes of scheduled activities. Regular interaction between Rooidraai Solar (Pty) Ltd and community leader(s) during the decommissioning phase. A reporting office/channel to be established should community members experience problems with contractors/sub-contractors during the decommissioning phase. A register to be kept of problems reported by community members and the steps taken to address/ resolve it. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
	Community Health and Safety Responsibility		
Community health and safety responsibility	 Demarcated routes to be established for construction vehicles to ensure the safety of communities, especially in terms of road safety and communities to be informed of these demarcated routes. Where dust is generated by trucks passing on gravel roads, dust mitigation to be enforced. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	3. Any infrastructure that would not be decommissioned must be appropriately locked and/or fenced off to ensure that it does not pose any danger to the community.		
	General site considerations		
General site decommissioning considerations	 All temporary fencing and danger tape must be removed once the construction phase has been completed. All hardened surfaces within the construction camp area must be diced, all imported materials removed, and the area shall be top soiled and revegetated. Temporary roads (if any) must be closed and access across these blocked. The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up. A method statement must be developed to guide the safe decommissioning of Battery storage which will consider appointment of accredited battery recyclers. 	Following completion of construction activities in an area: decommissioning phase	Principal Contractor and Rooidraai Solar (Pty) Ltd
	Waste Management		
Waste management	 All decommissioned equipment must be removed from site and disposed of at a registered land fill. Records of disposal must be kept. The panels need to be disposed of appropriately and returned to the manufacturer to be recycled. Rubble or waste that could accompany the construction effort, if the development is approved, should be removed during and after construction. Measures must be taken to avoid any spills and infiltration of petroleum fuels or any chemical pollutants into the soil during construction phase. The applicant must ensure that the final disposal site can accept the waste and the anticipated volumes thereof. Any hazardous waste must be disposed of at a hazardous waste disposal site. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

Surface and Groundwater Responsibility				
Surface and groundwater responsibility	 Removal of any historically contaminated soil as hazardous waste. Removal of hydrocarbons and other hazardous substances by a suitable contractor to reduce contamination risks. Removal of all substances which can result in groundwater (or surface water) contamination. Re-vegetation of exposed soil surfaces must be undertaken to ensure no erosion in these areas. Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion. Compaction of soils should be limited and / or avoided as far as possible. Compaction will reduce water infiltration and will result in increased runoff and erosion. Where any disturbance of the soil takes place (have taken place in the past), these areas must be stabilised and any alien plants which establish should be cleared and follow-up undertaken for at least 2 years thereafter and preferably longer. Where compaction becomes apparent, remedial measures must be taken (e.g., "ripping" the affected area). Reseed any areas where earthworks have taken place with indigenous grasses to prevent further erosion. Erosion control mechanisms must be established as soon as possible. If compaction occurs, rectification can be done by application and mixing of manure, vegetation mulch or any other organic material into the area. Use of well cured manure is preferable as it will not be associated with the nitrogen negative period associated with organic material that is not composted. Vehicle traffic should not be allowed on the rehabilitated areas, except on allocated roads. It will have a negative impact due to the dispersive/compaction characteristics of soils and its implications on the long term. Appropriate design and mitigation measures must be developed and implemented to minimise impacts on the natural flow regime of the 	Decommissioning phase	Rooidraai Solar (Pty) Ltd	

	 watercourse i.e., through placement of structures/supports and to minimise turbulent flow in the watercourse. 12. The indiscriminate use of machinery within the riparian and wetland will lead to compaction of soils and destruction of vegetation and must therefore be strictly controlled. 13. Perform scheduled maintenance to be prepared for storm events. Ensure that culverts have their maximum capacity, ditches are cleaned, and that channels are free of debris and brush than can plug structures. 14. After decommissioning all materials have to be disposed of in a responsible manner. 15. After decommissioning, the site has to be rehabilitated by sowing indigenous grass species. The control and monitoring of declared invaders must continue for five years after decommissioning. 		
Site specific measures for soil erosion	 Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. There should be regular monitoring for erosion for at least 2 years after decommissioning by the applicant to ensure that no erosion problems develop as a result of the disturbance, and if they do, to immediately implement erosion control measures. All bare areas, affected by the development, should be re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
Site specific mitigation measures for surface water	 All liquid chemicals including fuels and oil, including for the BESS, must be stored in with secondary containment (bunds or containers or berms) that can contain a leak or spill. Such facilities must be inspected routinely and must have the suitable PPE and spill kits needed to contain likely worst-case scenario leak or spill in that facility, safely. Washing and cleaning of equipment must be done in designated wash bays, where rinse water is contained in evaporation/sedimentation ponds (to capture oils, grease cement and sediment). 	Construction phase	Principal Contractor and Environmental Control officer

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	3. Mechanical plant and bowsers must not be refueled or serviced within		
	100m of a river channel or wetland.		
	4. All construction camps, lay down areas, wash bays, batching plants or		
	areas and any stores should be more than 50 m from any demarcated		
	water courses.		
	5. Littering and contamination associated with construction activity must be		
	avoided through effective construction camp management.		
	6. No stockpiling should take place within or near a water course.		
	7. All stockpiles must be protected and located in flat areas where run-off		
	will be minimised and sediment recoverable.		
	8. ESO monitors the site on a daily basis to ensure plant is in working order		
	(minimise leaks), spills are prevented and if they do occur, are quickly		
	rectified.		
	1. No stormwater discharged may be directed to delineated aquatic zones or		
	the associated buffers.		
	2. A stormwater management plan must be developed post EA, detailing the		
	structures and actions that must be installed to prevent the increase of		
	surface water flows directly into any natural systems.		
	3. Effective stormwater management must include measures to slow, spread		
	and deplete the energy of concentrated flows thorough effective		
	stabilisation (gabions and Reno mattresses) and the re-vegetation of any		
	disturbed areas		Duin sin al Cambus at an
Site specific mitigation measures for	- · · · · · · · · · · · · · · · · · · ·	Construction	Principal Contractor
Site specific mitigation measures for	To minimise the impact of the access roads:	phase	and Environmental
groundwater	4. Use existing roads or upgrade existing tracks to cross wetlands rather than		Control officer
	constructing entirely new roads wherever possible.		
	5. Use the smallest possible working corridor. Outside the working corridor,		
	all watercourses are to be considered no go areas. Any unnecessary		
	intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly,		
	before any construction commences.		
	6. Removal of vegetation must only be when essential for the continuation of		
	the project. Do not allow any disturbance to the adjoining natural		
	vegetation cover or soils.		
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Site specific mitigation measures for avifauna	 Avoid the temporary storage (laydown) of removed infrastructure on habitat with a high avian sensitivity. Rehabilitation should make use of indigenous floristic species that are native to the study area. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
	Avoid the temperature charge (laydown) of removed infrastructure on		
	 All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted. All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas. 		

	3. Avoid the temporary storage (laydown) of removed infrastructure on habitat with a high avian sensitivity.4. Rehabilitation should make use of indigenous floristic species that are native to the study area.		
	Fauna		
Site specific mitigation measures for fauna	 Site access should be controlled and no unauthorised persons should be allowed onto the site. Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. Fires should not be allowed on site. All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. 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. All vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. Vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint). 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
	Fauna		
Site specific mitigation measures for fauna	 A pre-construction walkthrough with an aquatic specialist is recommended and they can assist with the development of the stormwater management plan and Aquatic Rehabilitation and Monitoring plan, coupled to micro-siting of the final layout. Where large cut and fill areas are required these must be stabilised and rehabilitated during the construction process, to minimise erosion and sedimentation. Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

spreaders, etc).

- 4. To minimise the impact of the access roads:
- 5. Use existing roads or upgrade existing tracks rather than constructing entirely new roads wherever possible.
- 6. Use the smallest possible working corridor. Outside the working corridor, all watercourses are to be considered no go areas. Any unnecessary intrusion into these areas is prohibited. Where intrusion is required, the working corridor must be kept to a minimum and demarcated clearly, before any construction commences.
- 7. Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- 8. All pipe culverts must be removed and replaced with suitable sized box culverts, where road levels are raised. Crossings that are installed below the natural ground level are to be constructed with an appropriate drop inlet structure on the upstream side to ensure that head cut erosion does not develop as a result of the gradient change from the natural ground level to the invert level of the culvert.
- 9. The channel profile, regardless of the current state of the river / water course, will be reinstated thus preventing any impoundments from being formed. The related designs must be assessed by an aquatic specialist during a pre-construction walkdown.
- 10. Water diversions must be temporary in nature and no permanent walls, berms or dams may be installed within a watercourse. Sandbags used in any diversion or for any other activity within a watercourse must be in a good condition, so that they do not burst and empty sediment into the watercourse. Upon completion of the construction at the site, the diversions shall be removed to restore natural flow patterns. Under no circumstance shall a new channel or drainage canals be excavated to divert water away from construction activities.
- 11. Any fauna (frogs, snakes, etc.) that are found within the construction area must be moved to the closest point of similar habitat type outside of the areas to be impacted.

	 12. All disturbed areas beyond the construction site that are intentionally or accidentally disturbed during the construction phase must be rehabilitated. 13. It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas. The development footprint should be kept to a minimum and natural vegetation should be encouraged to return to disturbed areas. 14. An open space management plan should be developed for the site, which should include management of biodiversity within the fenced area, as well as that in the adjacent rangeland. 15. Reduce the footprint of the facility within sensitive habitat types as much as possible. 16. All disturbed areas that are not used, such as excess road widths, should be rehabilitated with locally occurring plant species after construction to 		
	reduce the overall footprint of the development.		
	Biodiversity Responsibility		
Loss of habitat	 Maintain footprint strictly during decommissioning. Existing access roads must be used. All infrastructure must be removed from the site. Plant vegetation species for rehabilitation that will effectively bind the loose material, and which can absorb run-off from the mining areas. Rehabilitate all the land where infrastructure has been demolished. Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. Protect rehabilitation areas until the area is self-sustaining. Water management facilities must stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. All the monitoring and reporting on the management and rehabilitation issues to the authorities must continue till closure of the mine is approved. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	 Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. Refer to mitigation measures for the construction phase needed during the closure phase that are relevant. Re-vegetation of affected areas must be made a priority to avoid erosion. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. Suitable stormwater/wind controls must be put in place until rehabilitation is complete. Constant removal of alien invasive species in and around plant. Newly rehabilitated areas must be adequately demarcated and access restricted (specifically vehicular access) until vegetation is established. Appropriate signage must be established and maintained to ensure personnel are aware of these areas. Monitoring should be implemented during the decommissioning phase to ensure that minimal impact is caused to the fauna and flora of the area. Avoid the temporary storage (laydown) of removed infrastructure on habitat with a high avian sensitivity. Rehabilitation should make use of indigenous floristic species that are native to the study area. After decommissioning, infrastructure has to be removed and disposed of in a responsible manner. After decommissioning, the site has to be rehabilitated by sowing indigenous grass species. The control and monitoring of declared invaders have to continue for five years after decommissioning. 		
Site specific measures for alien invasive species	 The successful reduction in the threat (significance) posed by Alien Invasive Plants relies on a detailed; Site-specific eradication and management programme for alien invasive plants; Site-specific Vegetation Rehabilitation Management Plan; and The meticulous implementation of this Management Plan. Such an Alien Invasive and Vegetation Rehabilitation Management Plans 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	 must subsequently be included in the Environmental Management Programme (EMPr). 6. Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control must be implemented until a cover of indigenous species (ideally climax species) has returned. 7. When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. 8. Clearing methods must aim to keep disturbance to a minimum. 9. No planting or importing of any listed invasive alien plant species (al Category 1a, 1b, 2, and 3 invasive species) to the site for landscaping rehabilitation or any other purpose must be undertaken. 		
Surface Water features	 Plant vegetation species for rehabilitation that will effectively bind the loose material, and which can absorb run-off from the development areas. Rehabilitate all the land where infrastructure has been demolished. Monitor the establishment of the vegetation cover on the rehabilitated sites to the point where it is self-sustaining. Protect rehabilitation areas until the area is self-sustaining. Diversion trenches and storm water measures must be maintained. Water management facilities must stay operational and maintained and monitored until such a stage is reached where it is no longer necessary. The development areas must be shaped to make it safe. All the monitoring and reporting on the management and rehabilitation issues to the authorities must continue till closure of the site is approved. Monitor and manage invader species and alien species on the rehabilitated land until the natural vegetation can outperform the invaders or aliens. Refer to mitigation measures for the construction phase needed during the closure phase that are relevant. 	Decommissioning phase	Carrmel Solar 1 (Pty) Ltd

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Negative effect of human activities on fauna and road mortalities	 No staff should be accommodated on the site. If practical, construction workers should stay in one of the nearby villages and transported daily to the site. The ECO should regularly inspect the site, including storage facilities and compounds and eradicate any invasive or exotic plants and animals. Maintain proper firebreaks around the entire development footprint. Educate construction workers regarding risks and correct disposal of cigarettes. More fauna is normally killed the faster vehicles travel. A speed limit should be enforced (preferably 30 km/hour). It can be considered to install speed bumps in sections where the speed limit tends to be disobeyed. (Speed limits will also lessen the probability of road accidents and their negative consequences). Travelling at night should be avoided or limited as much as possible. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
Edge effect	 The Contractor should be responsible for implementing a programme of weed control. Present exotic and invasive plant species should be eradicated at the site. By no means should any declared invaders, be planted or allowed to establish if the development is approved. All exotic vegetation must be removed from the site (if present). 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
Erosion and loss of topsoil	 Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion. Undertake a periodic site inspection to record the occurrence of and revegetation progress of all areas that require re-vegetation. This must be undertaken every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved. If an activity will mechanically disturb the soil below surface in any way, 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. 4. Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.		
	Air Pollution Responsibility		_
Air pollution responsibility	 Regular maintenance of equipment to ensure reduced exhaust emissions. A speed limit should be enforced on dirt roads (preferably 30 km/h). Implement standard dust control measures, including periodic spraying (frequency will depend on many factors including weather conditions, soil composition and traffic intensity and must thus be adapted on an on-going basis) of construction areas and access roads, and ensure that these are continuously monitored to ensure effective implementation. 	phase	Rooidraai Solar (Pty) Ltd
	Noise and Vibrations	¥	
Noise and vibrations	 The decommissioning phase must aim to adhere to the relevant noise regulations and limit noise to within standard working hours in order to reduce disturbance of dwellings in close proximity to the development. Any noisy fixed facilities should be located away from noise sensitive areas. Truck traffic should be routed away from noise sensitive areas, where possible. Noise levels must be kept within acceptable limits. Noisy operations should be combined so that they occur where possible at the same time. Construction workers to wear necessary ear protection gear. Noisy activities to take place during allocated construction hours. Noise from labourers must be controlled. Noise suppression measures must be applied to all construction 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	equipment. Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site. 10. The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub-Contractors by the Contractors own transport. 11. Implementation of enclosure and cladding of processing plants. 12. Applying regular and thorough maintenance schedules to equipment and processes.		
Site specific mitigation measures	 During decommissioning care should be taken to ensure that noise from construction vehicles and plant equipment does not intrude on the surrounding residential areas. Gravel roads used should be kept in good order. Corrugations and drainage ruts should not be allowed to develop. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
	Decommissioning Traffic		
Decommissioning traffic	 Routes and required access roads must be clearly defined. The removal of equipment must be undertaken with the minimum amount of trips to reduce the carbon footprint of these activities. Access of all vehicles must be strictly controlled, especially during wet weather to avoid compaction and damage to the topsoil structure. Damping down of the un-surfaced roads must be implemented to reduce dust and nuisance. Vehicles and equipment must be serviced regularly to avoid the contamination of soil from oil and hydraulic fluid leaks etc. Servicing must be done in dedicated service areas on site or else off site if no such area exists. Oil changes must take place on a concrete platform and over a drip tray to 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

	avoid pollution. 8. Soils compacted by construction vehicles shall be deep ripped to loosen compacted layers and re-graded to even running levels.		
Access	 The main routes on the site must be clearly signposted and printed delivery maps must be issued to all suppliers and Sub-contractors. Contractor must clearly mark all access roads. Roads not to be used must be marked with a "NO ENTRY for construction vehicles" sign. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
Noise	Movement of heavy construction vehicles through residential areas must be timed to avoid peak morning and evening traffic periods. In addition, movement of heavy construction vehicles through residential areas must not take place over weekends.	Decommissioning phase	Rooidraai Solar (Pty) Ltd
General	 The Contractor must meet safety requirements under all circumstances. All equipment transported must be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used must be in place. The Contractor must ensure that all the necessary precautions against damage to the environment and injury to persons are taken. Care for the safety and security of community members crossing access roads must receive priority at all times. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd
Site specific recommendations for decommissioning traffic	 The Contractor shall meet safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place. The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken. Care for the safety and security of community members crossing access roads should receive priority at all times. 	Decommissioning phase	Rooidraai Solar (Pty) Ltd

- 4. No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the Contractor.
- 5. All relevant permits for abnormal loads must be applied for from the relevant authority (pre-construction).
- 6. Stagger component delivery to site.
- 7. Reduce the construction period.
- 8. Stagger the construction Phase.
- 9. The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network.
- 10. Staff and general trips should occur outside of peak traffic periods as much as possible.
- 11. Undertake maintenance of haulage routes.
- 12. Design and maintenance of internal roads must be undertaken and appropriate.
- 13. All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.
- 14. Heavy vehicles should be inspected regularly to ensure their road worthiness.
- 15. Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the N14 road users to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.
- 16. Implement penalties for reckless driving to enforce compliance to traffic rules.
- 17. Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work).
- 18. The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.
- 19. The developer and EPC Contractor must ensure that the roads utilised for

	construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities. 20. The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase. 21. A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. 22. It is noted that it is unlikely that all developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects.		
	Visual Impact		
Visual impact	 Ensure that vegetation is not unnecessarily cleared or removed during the decommissioning. Reduce the decommissioning period through careful logistical planning and productive implementation of resources. Plan the placement of laydown areas and potential temporary construction camps in order to minimise vegetation clearing (i.e., in already disturbed areas) where possible. Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads. Implement good housekeeping through the removal of rubble, litter and construction material, if it is not removed daily to a registered landfill site, then it should be stored appropriately until removal can take place. Dust suppression should be implemented especially near roads where dust may cause reduced visibility. Due to a scarcity of water in the region, contractors should source alternative ways to implement dust suppression. One such way could be the use of fine gravel stone on roads with heavy traffic. Restrict activities to daylight hours in order to negate or reduce the visual impact associated with lighting. 		Rooidraai Solar (Pty) Ltd

8.	Rehabilitate all disturbed areas, construction areas, roads, slopes etc.	
	immediately after the completion of decommissioning activities.	
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Table 2-7: Proposed Mitigation Measures during the Post Closure Phase

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

3 ENVIRONMENTAL AWARENESS PLAN

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

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

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

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

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

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

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

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

5 EMPR AMENDMENT

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

Appendices

Appendix A: CV of the EAP

Appendix B: Bird incident form

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

APPENDIX C: ENVIRONMENTAL AWARENESS AND FIRE MANAGEMENT PLAN

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

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

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

In	Impact Mitigation/Management		Mitigation/Management	Monitoring			
		Objectives	Actions	Methodology	Frequency	Responsibility	
6.	Increased energy consumption during the construction phase.	Reduce energy consumption where possible.	6.1. Encourage the use of energy saving equipment at the site camp site (such as low voltage lights and low-pressure taps) and promote recycling. Construction personnel must be made aware of energy conservation practices as part of the Environmental Awareness Training programme.	Contractor to monitor energy usage via audits. Carry out Environmental Awareness Training. Conduct audits of the signed attendance registers.	Monthly Once-off training and ensure that all new staff are inducted. Monthly	Contractor/ ECO ECO	
7.	Impact on the regional water balance as a result of increased water usage.	Reduce water usage during the construction phase.	 7.1. Water conservation should be practiced as follows: Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g., sweep before wash-down). Ensure that regular audits of water systems are conducted to identify possible water leakages. 7.2. Avoid the use of potable water for dust suppression during the construction phase and consider the use of alternative approved sources, where possible. 	Monitor via site audits and record non-compliance and incidents.	Monthly	ECO	
			7.3. Make construction personnel aware of the importance of limiting water wastage, as well as reducing water use.	Carry out Environmental Awareness Training with a discussion on water usage and conservation. Conduct audits of the signed attendance registers.	Once-off training and ensure that all new staff are inducted. Monthly	Contractor/ ECO ECO	

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

10. Impact on the regional water balance as a result of increased water usage.	Reduce water usage during operations.	 10.1 Water conservation to be practiced in line with Energy Saving Policies as follows: 10.2 Cleaning methods utilised for cleaning vehicles, floors, the offices etc. should aim to minimise water use (e.g., sweep before wash-down). Where possible, encourage the re-use of water. Ensure that regular audits of water systems are conducted to identify possible water leakages. 10.3 Consider installing water saving devices (e.g. dual flush toilets, automatic shut-off taps, etc.). 	Record water usage during the operational phase, conduct audits and record non-compliance and incidents.	Monthly	Facility Manager
		10.4 Carry out environmental awareness training with a discussion on water usage and conservation and make operational personnel aware of the importance of limiting water wastage.	Conduct training for all operational personnel.	As and when required during operations and ensure that all new staff are inducted.	Facility Manager
11. Non respect of waste management practices.	Minimise the production of general waste. Ensure compliance with relevant waste management legislation.	11.1 Control and implement waste management plans. Ensure that relevant legislative requirements are respected. 11.2 Determine specific areas on site for temporary management of waste. 11.3 Promote waste reduction, re-use, and recycling.	Control of waste management practices throughout operation phase. Monitor waste generation and collection	Monthly	Facility Manager Facility Manager
	Minimise pollution of the environment.	opportunities on site during the operation phase.	throughout operation.		racinty Muliuger
12. Excessive generation of wastewater on site during the operation phase.	Maintain reasonable levels of wastewater generation.	12.1 Wastewater must be collected and disposed of at a suitable licenced disposal facility. Proof of disposal (i.e., waste disposal slips or waybills) should be retained on file for auditing purposes.	Wastewater generation to be monitored throughout the operational phase. Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	Quarterly	Facility Manager

D. DECOMMISIONING PHASE

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

APPENDIX D: ALIEN INVASIVE VEGETATION MANAGEMENT PLAN

Project aspect	Mitigation Objectives	Management actions	Monitoring		
			Methodology	Frequency	Responsibility
A. CONSTRUCTION P	HASE				
1. Impacts due to establishment of alien invasive plants.	Avoid establishment and spread of alien invasive plants due to the project activities.	1.1 Establish an ongoing monitoring programme for construction phase to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	monitor the presence of alien invasive specie	s e d f s s k	ECO and Contractor
		1.2 Do not import soil stockpiles from areas with alien plants.	Monitor the presence of alien invasive specie on the development site.	sOn-going	ECO and Contractor
		1.3 Rehabilitate disturbed areas as quickly as possible.	Rehabilitate disturbed areas and monitor the presence of alien invasive species on the development site.		ECO and Contractor
		1.4 Keep disturbance of indigenous vegetation to a minimum.	Monitor and manage vegetation clearing	On-going	ECO and Contractor

Project aspect	Mitigation Objectives Manage	ement actions	Monitoring		
			Methodology	Frequency	Responsibility
		ediately control any alien plants that become established	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.		ECO and Contractor
	cleaned 1.7 The	hinery/plant equipment used for construction must be prior to coming to site shallow topsoil layer must be stockpiled separately from oil layers, should the excavation exceed 0.5 m. When the	Stockpile the topsoil layer (0.5m top layer of	Daily (stockpiling) and	ECO and Contractor
	contain	tion has been completed, the topsoil layers, which seed and vegetative material, should be reinstated last to ents to rapidly re-colonise the bare soil areas	'		

Project aspect	Mitigation Objectives	Management actions	Monitoring			
1 Toject aspect			Methodology	Frequency	Responsibility	
			Record the GPS coordinates of where the topsoil is stockpiled. Record the date of cessation of constructional (or operational) activities at the particular site. Photograph the area on cessation of constructional activities. Record date and depth of respreading of topsoil. Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.			
B. OPERATIONA 5.2 Impacts due to establishment of alien invasive plants.	L PHASE Avoid establishment and spread of alien invasive plants.	2.1 Continue with ongoing monitoring programme to detect and quantify any alien species that may become established and identify the problem species during operational phase.	Annual audit of project area and immediate surroundings. If any alien invasive species are detected then the distribution of these 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	Management actions	Monitoring			
Froject aspect	Objectives	wanagement actions	Methodology	Frequency	Responsibility	
		2.2 Immediately control any alien plants that become established using registered control methods.	Take action to control alien plants as advised by a specialist.	Immediately	Operations and Maintenance Contractor	
C. DECOMMISS	IONING PHASE					
3. Rehabilitation of flora on site and alien plant removal	Re-vegetation of the disturbed site is aimed at approximating as near as possible	3.1 All natural areas must be rehabilitated with species indigenous to the area. Re-seed with locally- sourced seed of indigenous grass species that were recorded on site pre-construction.	that area is rehabilitated to an acceptable	Once off	Lead Contractor with advice from specialist	
programme.	the natural vegetative conditions prevailing prior to operational.	3.2 Maintain alien plant removal programme for 5 years after rehabilitation.	Monitor newly disturbed areas where infrastructure has been removed to detect and quantify any aliens that may become established for 5 years after decommissioning and rehabilitation. Final external audit of area to confirm that area is free of alien invasive plants after 5 years.	Once off Yearly	Operations and Maintenance Contractor with advice from specialist	

APPENDIX F: OPEN SPACE MANAGEMENT PLAN

Project aspect	Mitigation	Management actions	Monitoring		
Project aspect	Objectives		Methodology	Frequency	Responsibility
A. DESIGN PHASE					
 Loss of vegetation and habitat fragmentation. 	Keeping the area cleared of vegetation to a minimum.	1.1 Clearing of vegetation should be kept to a minimum and take into consideration the sensitivities on site.	Ensure that solar panel/array design and layout is uniform and well- adapted to the surrounding environment and that no areas are cleared of vegetation that are not required as part of the construction of the various infrastructure.	design	Project Developer
. Permanent barriers to animal novement and habitat ragmentation.	The reduction in the impact that barrier will have on animal movement	2.1 Fencing should allow for the passage of small and medium sized mammals and all forms of mesh fencing should be avoided.	•	Once-off during design	Contractor
	within the area.	2.2 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.	during the construction phase to	Once-off during design	Project Developer
		2.3Pigtails 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
B. CONSTRUCTION PHASE					
B. Potential visual intrusion of construction activities on	Limiting negative visual impact caused by	3.1 Preparation of the solar field area (clearance of vegetation, grading, contouring and compacting) and solar field construction should be phased in a way that makes practical sense in order to	Plan activities during the construction phase so that is it optimally phased.	As required	ECO and Contractor

	Mitigation		Monitoring		
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
existing views of sensitive visual receptors.	construction activities.	minimise the area of soil exposed and the shortest duration of exposure.			
4. Visual impacts of construction activities on the	Limiting negative visual	4.1 Maintain good housekeeping on site to avoid litter and minimise waste.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
regional environment.	impact caused by construction	4.2 Demarcate clearance areas and minimise surface disturbance.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
	activities.	4.3 Rehabilitation of temporarily cleared sites should start as soon as possible.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
		4.4 Implement dust suppression management actions.	Monitor throughout construction phase.	Continually as required	ECO and Contractor
5. Permanent barriers to animal movement and habitat fragmentation.	ement and habitat the impact that	5.1 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
		5.2 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
C. OPERATIONAL PHASE					
Potential visual intrusion of the proposed solar energy facility on the views of sensitive visual receptors.	Maintain an appropriate visual quality of solar energy facility to reduce visual impact on the rural landscape	a. Painted features should be maintained and repainted.	Continually as required.	During the operational phase	Operations and Maintenance Contractor

Objectives Methodology Frequency Responsibility	Project aspect	Mitigation	Management actions	Monitoring			
and layout of facility and security lighting is managed. It will minimise light spill beyond project boundaries. 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; Uplighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security; Uplighting and minimise requirements are adhered to. First year and then yearly should include a process for promptly addressing and mitigating complaints about potential lighting impacts; Uplighting of the facility should not exceed, in number of lights and brightness, the minimum required for safety and security; Uplighting and minimisel lighting plan should include a process for promptly addressing and mitigating complaints about potential lighting impacts; Uplighting 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; Light fixtures should be used to reduce light pollution; Light fixtures should be switched off when not in use	Froject aspect	Objectives		Methodology	Frequency	Responsibility	
	ghting of a large solar energy acility on the nightscape of the	and layout of facility and security lighting is managed. It will minimise light spill beyond project	 beyond project boundaries, avoid up-lighting and minimise lights in line with safety and security. The lighting plan should include and consider the following: 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 that are not occupied continuously; and Lights should be switched off when not in use 		first year and then	Project Developer	

Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
		•			
8. Visual impacts due to the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors.	Reduce effects of the intrusion of a utility-scale solar energy facility on views of sensitive visual receptors.	8.1 Painted features 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
9. Permanent barriers to animal movement and habitat fragmentation.	Avoid or reduce bird collisions with or due to infrastructure related to the project.	9.1 The impact on birds must be monitored by environmental staff member during the first six months of the operational phases for each of the projects and in conjunction with any efforts made by Eskom through management measures included in their OEMP in minimising bird collisions.	collisions, injury or other bird- related incidents (with GPS coordinates).	Weekly for the first month, thereafter, monthly	Project Developer
		9.2 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	Project Developer

Dunio et concet	Mitigation	Management actions	Monitoring			
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility	
		9.3 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	
D. DECOMMISSIONIN	G PHASE					
10. No specific impacts are associated with the decommissioning phase other than those from the operational		10.1Disturbed 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	
from the operational phase that will still be relevant for the duration of the decommissioning phase due to on- going occupation of the area.		10.2 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	
		10.3 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	
		10.4 Working at night should be avoided.	This should be monitored to ensure that it is being undertaken.	Continuous	Project Developer	
		10.5 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	

APPENDIX G: TRAFFIC MANAGEMENT PLAN INCLUDING TRANSPORTATION PLAN

	Mitigation	Management actions	Monitoring			
Project aspect	Objectives		Methodology	Frequency	Responsibility	
A. DESIGN PHASE	E					
1. Increase traffic generation.	Manage impact that additional traffic generation will have on road network.	1.1 Should abnormal loads have to be transported by road to the site, a permit needs to be obtained from the Provincial Government North West Department of Roads and Transport	Ensure permits are obtained.	Once-off during final design phase	Contractor	
		1.2 Registration details must be supplied for all vehicles that will use the Transnet Service Road to obtain official permit. All permit applications must be submitted.	Ensure permits are obtained.	Once-off during final design phase	Contractor	
		1.3 Provide a Transport Traffic Plan to SANRAL	Prepare and submit plan.	Once-off during final design phase	Contractor	
2. Decrease in quality surface condition of the roads.	Limit the deterioration of surface road condition.	2.1. A Road Maintenance Plan should be developed for the section of the Transnet Service Road that will be used and addresses the following: - Grading requirements; - Dust suppressant requirements; - Drainage requirements; - Signage; and - Speed limits.	Prepare plan.	Once-off during final design phase	Contractor	

Project aspect	Mitigation	Management actions		Monitoring		
Project aspect	Objectives	Wanagement actions		Methodology	Frequency	Responsibilit
3. Increase traffic generation.	Minimise the impact of the construction activities on the local traffic and	3.1. Should abnormal loads have to be transported by road to the sa permit needs to be obtained from the Provincial Government No West Department of Roads and Transport		Ensure permits are obtained.	During construction	Contractor and ECO
	avoid accidents with pedestrians, animals and other drivers on the surrounding tarred/gravel roads.	3.2 Registration details must be supplied for all vehicles that will the Transnet Service Road to obtain official permit. All perapplications must be submitted.		Ensure permits are obtained.	Once-off during final design phase	Contractor
		3.3 Ensure that roadworthy and safety standards are implemented all time for all construction vehicles		Monitoring of condition of vehicles coming to site.	During construction	Contractor and ECO
		3.4 Plan trips so that it occurs during the day but avoid construct vehicles movement on the regional road during peak time (06: 10:00 and 16:00-20:00).		Monitor and management traffic generated and when trips are made.	During construction	Contractor and ECO
4. Accidents with pedestrians, animals and other drivers on the surrounding	Avoidance of accidents.	4.1 Roadkill monitoring programme (inclusive of wildlife collisis record keeping) should be established and a product such as Anir fences installed, if needed, to direct animals to safe road crossings.	nex	Appropriate monitoring should be undertaken and Clear-vu fences installed, if needed to direct animals to safe road crossings.	Weekly	Contractor and ECO
tarred/gravel roads.		4.2 Adhere to all speed limits applicable to all roads used. All her load vehicles maintain a speed limit of 30 km/hr in proposed sect of the Transnet Freight Rail service road.	'	Ensure that speed limits are adhered to.	Daily	Contractor and ECO
	Mitigation		Monitoring			
Project aspect	Objectives	Management actions	Meth	nodology	Frequency	Responsibility

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

		Project Developer.	through checking the condition of vehicles.		
		5.7 Avoid using old and noisy construction equipment and ensure equipment is well maintained.	Manage the air pollutants form construction vehicles through checking the condition of vehicles.	On-going	Contractor and ECO
6. Decrease in quality surface condition of the roads.	Limit the deterioration of surface road condition.	6.1 Construction activities will have a higher impact than the normal road activity and therefore the road 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
		6.2 Implement management strategies for dust generation e.g. apply dust suppressant on the Transnet Service Road, exposed areas and stockpiles.	Ensure dust management measures are in place to decrease the dust generated.	On-going	Contractor and ECO
7. Soil contamination from leakage from battery (during transport and on-site	Avoid soil contamination during transportation and construction of batteries on site.	7.1 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 those trucks transporting batteries to site are appropriately identified with the required symbols.	, , ,	Contractor and ECO
construction).		7.2 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
		7.3 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	Management actions	Monitoring		
r roject aspect	Objectives	ividiagement actions	Methodology	Frequency	Responsibility

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

Equipment.					
10. Decrease in quality of surface condition of the roads.	Maintain condition of road.	10.1Implement requirements of the Road Maintenance Plan.	Adhere to requirements of the Road Maintenance Plan.	On-going	Operations and Maintenance Contractor

D. DECOMMISSIONING PHASE

11. Ensure that the construction mitigation and management measures are adhered to during this phase.

APPENDIX H: STORM WATER MANAGEMENT PLAN

Project aspect	Mitigation	Management actions	Monitoring		
Project aspect	Objectives	Wanagement actions	Methodology	Frequency	Responsibility
A. DESIGN PHA	SE				
Impact of the project if a detailed storm water	Watercourses present on site should retain their existing	1.1 Ensure that the development envelope avoids the watercourses (if any) shown in figures.	Check compliance with specified conditions.	Once-off during design followed by regular control	Contractor
management plan is not correctly prepared.	functioning and character throughout the lifetime of the solar facility.	1.2 Prepare a detailed stormwater management plan outlining appropriate treatment measures to address runoff from disturbed portions of the site, such that they	Check compliance with specified conditions.	Once-off during design followed by regular control	Contractor
p. opa. ca.	the solal facility.	1.2.1 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;			
		1.2.2 do not result in any necessity for concrete or other lining of natural water courses to protect them from concentrated flows off the development;			
		1.2.3do not divert flows out of their natural flow pathways, thus depriving downstream water courses of water.			
P. CONCEDUCE	ION BUASE				
B. CONSTRUCTI			Cl. I	II	500
2. Diversion and impedance surface water flows – Changes	Prevent interference with natural run-off patterns,	2.1 Stormwater and any run-off generated by the hard surfaces 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

Droinet aspect	Mitigation	Management actions	Monitoring			
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility	
to the hydrological regime and increased potential for erosion.	diverting flows and increasing the velocity of surface water flows.	2.2 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	
And Diversion and increased velocity of surface water flows – reduction in		2.3 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	
permeable surfaces.		2.4 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	
3. Impact of changes to water quality.	Prevent contamination of watercourse and decrease in water quality.	3.1Chemical 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	
	quanty.	3.2 Littering and contamination of water sources during construction must be prevented by effective construction camp management.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi- weekly	ECO	

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

Duration to account	Mitigation		Monitoring		
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
		3.8. The construction camp and necessary ablution facilities meant for construction workers must beyond any buffer.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi- weekly	ECO
		3.9. No ad hoc crossing of channels by vehicles during construction are allowed and access routes across the site should be are strictly demarcated.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi- weekly	ECO
		3.10 No waste materials or sediments are left in the channel after construction.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi- weekly	Contractor and ECO
		3.11 Access routes across the site are strictly demarcated and selected with a view to minimising impacts on drainage lines.	Check compliance with specified conditions of the stormwater management plan.	Weekly or bi- weekly	Contractor and ECO
C. OPERATION	AL PHASE				
4. Impact due to release of wash water in the environment after use.	Prevent runoff into drainage lines onsite.	4.1 An operational phase stormwater management plan 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	Management actions	Monitoring		
	Objectives		Methodology	Frequency	Responsibility

D. DECOMMISSIONING PHASE

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.

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.

APPENDIX I: EROSION MANAGEMENT PLAN

Duciest senset	Mitigation		Monitoring		
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
A. CONSTRUC	TION PHASE				
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.	1.1 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
		1.2During 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
2. Excessive loss of natural vegetation in development footprint area.	Prevent loss of natural vegetation through erosion.	2.1 Vegetation clearing during construction must be restricted to the footprint of the solar field and planned infrastructure only. It 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

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

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

Project aspect	Mitigation	Management actions	Monitoring		
	Objectives		Methodology	Frequency	Responsibility

C. DECOMMISSIONING PHASE

- 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.
- 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).

APPENDIX J: HARZADOUS SUBSTANCES LEAKAGE OR SPILLAGE MONITORING SYSTEM

	Mitigation		Monitoring		
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
CONSTRUCTION	PHASE				
11.1. Contamination of soil and risk of damage to vegetation and/or fauna through	Avoid soil contamination and risk of damage to vegetation and/or fauna through spillage	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 being done on board or plastic sheeting, which is to be removed from the site once concreting is completed; or in areas to be covered by further construction.	Check that sand, stone and cement are stored and handled as instructed	Daily	Contractor and ECO
spillage of concrete	of concrete	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

	Mitigation		Monitoring		
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility
		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	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	Avoid soil contamination	Batteries must be transported inside containers	Check that this is undertaken	During transport of batteries	Contractor and ECO
leakage from battery (during transport and onsite	during transport and construction of	Containers must be well packed to the transport vehicle	Check that this is undertaken	During transport of batteries	Contractor and ECO
construction)	battery storage facility	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

	Mitigation		Monitoring			
Project aspect	Objectives	Management actions	Methodology	Frequency	Responsibility	
		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: The off-loading point must be located in the bunded area to ensure that any potential spill during the offloading of the electrolyte solutions is contained; 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. Although highly unlikely, any spill/leakage from the battery storage facility must be attended to immediately and be handled in an environmental friendly manner (i.e. no discharge into the ground or any surface water body) and must be disposed of at an appropriate licenced hazardous waste disposal facility. According to the MSDSs attached in Appendix A: Small Spills: Absorb spill with absorbent, inert material, place in a labelled container for disposal by licensed Hazardous Waste Contractor. Clean area with water and detergent. Dispose of cleanup materials in appropriate containers. Wear safety glasses with splash shields. Wear	Provide secondary containment according to the specifications Immediately attend to any spillage	On-going On-going	Contractor and ECO	

Ducinet connet	Mitigation	Management actions	Monitoring		
Project aspect	Objectives		Methodology	Frequency	Responsibility
OPERATIONAL PI	IASE	 appropriate gloves to prevent skin exposure. Large Spills: Isolate and contain spill using absorbent pillows, mats or rolls. Keep unauthorized persons away from spill area. Contact Hazardous Materials Clean-up Contractor immediately for onsite response. Empty containers may still contain trace amounts of this material and are still hazardous. This substance is hazardous to the environment. Do not dump into drains. Dispose of only through proper hazardous waste methods. 			
11.4 Contamination of soil and risk of damage to	Avoid soil contamination and risk of damage to	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
vegetation and/or fauna through spillage of fuels and oils	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

Project aspect	Mitigation		Monitoring			
	Objectives	Management actions	Methodology	Frequency	Responsibility	
		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 DFFE notified and the notification process stipulated in the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 331, 2 May 2014) should be followed.	its location and instructions	Monthly	Operations and Maintenance Contractor	
		Bunded containment to be provided below and around any fuel storage containers.	Implement specifications for maintenance equipment use as specified by Contractor	Monthly	Operations and Maintenance Contractor	

DECOMMISSIONING PHASE

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