KONKOONSIES II PV SOLAR POWER PLANT, NEAR POFADDER, NORTHERN CAPE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME – REVISION 1

DEA REFERENCE: 14/12/16/3/3/2/2443 (12/12/20/2443)

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is 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.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

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.

Cumulative impacts: The impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

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.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that is made up of:

i. The land, water and atmosphere of the earth;
ii. Micro-organisms, plant and animal life;
iii. Any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Authorisation (EA): means the authorisation issued by a competent authority (Department of Environmental Affairs) of a listed activity or specified activity in terms of the National Environmental Management Act (No 107 of 1998) and the EIA Regulations promulgated under the Act.

Environmental assessment practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental Control Officer (ECO): An individual appointed by the Owner prior to the commencement of any authorised activities, responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: An operational plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: 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.

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.

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Photovoltaic effect: Electricity can be generated using photovoltaic panels (semiconductors) which are comprised of individual photovoltaic cells that absorb solar energy to produce electricity. The absorbed solar radiation excites the electrons inside the cells and produces what is referred to as the Photovoltaic Effect.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red Data Species List: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Vulnerable species: A taxon is **Vulnerable** when it is not Critically **Endangered** or **Endangered** but is facing a high risk of extinction in the wild in the medium-**term** future.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 of the NEM WAA; or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by that is identified as waste by the Minister of Environmental Affairs (by notice in the Gazette) but any waste or portion of waste, referred to in the section above , ceases to be a waste:

(i) once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;

(ii) where approval is not required, once a waste is, or has been re-used, recycled or recovered;

(iii) where the Minister of Environmental Affairs has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or
(iv) where the Minister of Environmental Affairs has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste

TABLE OF CONTENTS

PAGE

APPENDICES

INTRODUCTION CHAPTER 1

This Construction and Operational Environmental Management Plan (CEMP and OEMP) has been compiled for the Konkoonsies II PV Solar Power Plant being planned by Ramizone (RF) Proprietary Limited. The project involves the construction and operation of a PV Solar plant, utilising photovoltaic technology, as well as associated infrastructure. This project received Environmental Authorisation on 29 of July 2013 (refer to Appendix A). The project is a Preferred Bidder Project in terms of Round 4 of the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) being implemented by the Department of Energy. The project is expected to commence construction in 2016 following Financial Close.

This Environmental Management Programme (EMPr) is a amendment of the EMPr submitted with the Environmental Impact Assessment (EIA) for the project (in accordance with the requirement of Condition 13), and includes the conditions of the Environmental Authorisation of July 2013.

The EMPr has been developed on the basis of the findings of the EIA, and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Ramizone (RF) Proprietary Limited employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Konkoonsies II PV Solar Plant. The document will be adhered to, updated as relevant throughout the project life cycle.

PROJECT DETAILS *CHAPTER 2*

Konkoonsies PV Solar Power Plant is being developed by Ramizone (RF) Proprietary Limited on a site approximately thirty six kilometres north-west of Pofadder in the Northern Cape. The proposed Konkoonsies PV Solar Power Plant site falls within the Khai-Ma Local Municipality on portion 6 of the Farm Konkoonsies 91 (refer to Figure 2.1).

The following infrastructure is authorised (refer to Appendix A):

» Array of PV Panels
» A single axis tracking structure
» Access road and internal roads
» Inverter/transformer stations Combined guard house/control room/operations building; and
» Trenching

As part of a separate BA process (DEA ref: 14/12/16/3/3/1/1470) a 132kV powerline and substation was authorised on 19 February 2016. This has also been included in the final layout.

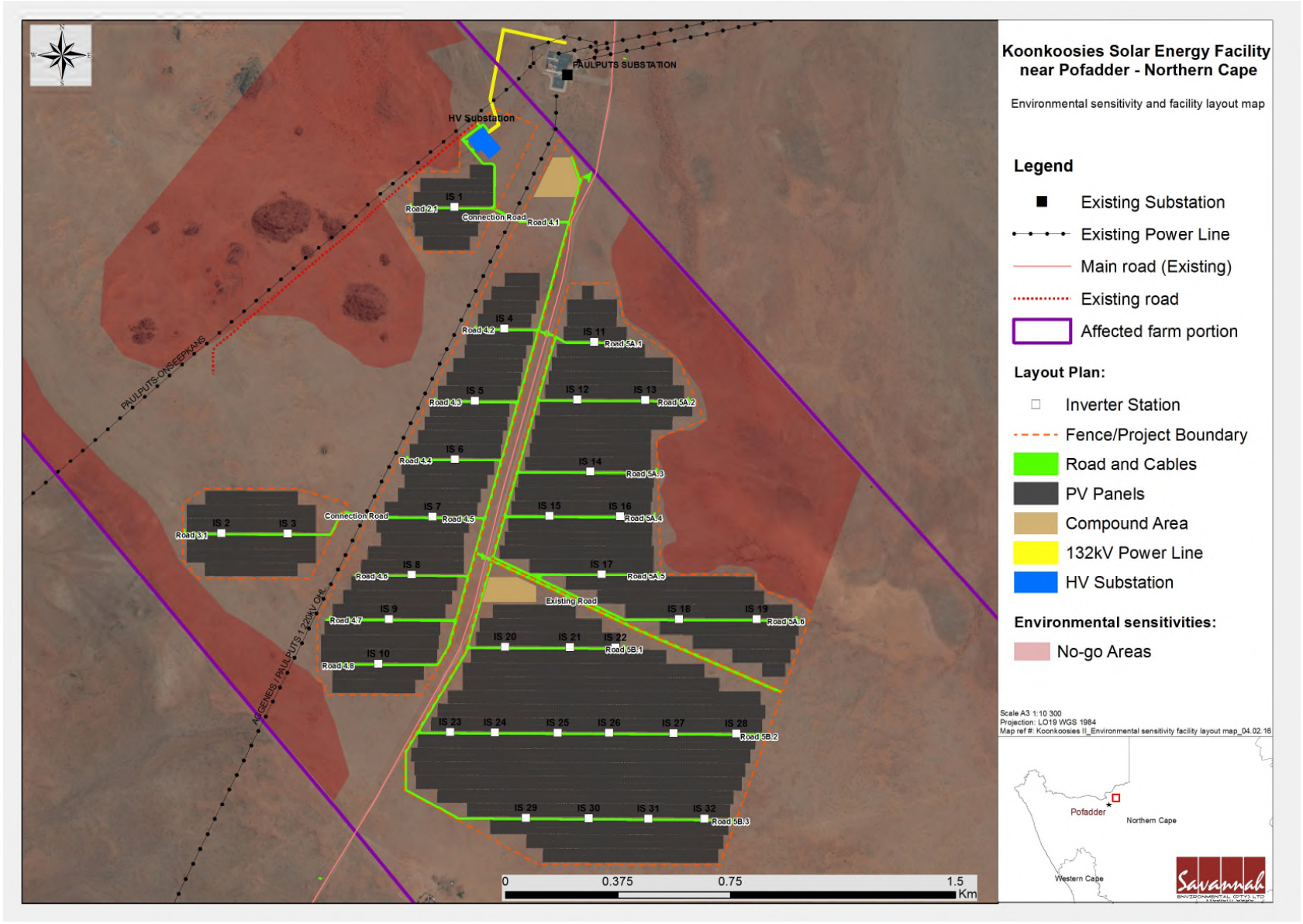

Figure 2.1: Locality map showing the broader Konkoonsies II PV Solar Power Plant site north-east of Pofadder

2.1. Findings of the Environmental Impact Assessment

The area infrastructure (i.e. PV Solar array etc.) will be entirely contained within the identified site and will have a developmental footprint of approximately 267 ha. In terms of the findings of the EIA Report, various planning, construction, and operation-related environmental impacts were identified, including:

» Disturbance of the ecological environment (i.e. flora and fauna)
» Impacts on water resources (i.e. in terms of quantity and quality)
» Impacts on the visual aesthetics and sensitive receptors
» Impacts on agricultural potential and soils (i.e. in terms soil disturbance and erosion)
» Impacts on heritage resources
» Socio-economic impacts
» Traffic

2.2. Final Layout

A final layout has been prepared (refer to Appendix B). This layout indicates the following:

» Position of solar facilities and associated infrastructure;
» Internal roads indicating width (construction period width and operation period width), and with numbered sections between the other site elements which they serve;
» All sensitive features near the facility and associated infrastructure;
» On site buildings
» All "no-go" areas, and
» Buffer areas.

As part of a separate BA process (DEA ref: 14/12/16/3/3/1/1470) a 132kV powerline and substation was authorised on 19 February 2016. This has also been included in the final layout.

This layout has been overlaid on the sensitivity map) (refer to Figure 2.2 and Appendix B). This layout avoids areas of high sensitivity identified within the EIA process.

2.3. Activities and Components Associated with the PV Solar Plant

The main activities/components associated with the proposed facility are detailed in the tables which follow.

Table 2.1: Activities to be undertaken during the pre-construction and construction phase

PRE-CONSTRUCTION AND CONSTRUCTION
Staff requirements – Staff requirements – on average an estimated labour force of 300 will be used the construction phase (at peak). These positions will be comprised of low skilled, semi-skilled, and skilled workers sourced from within and outside Pofadder (i.e. as these skills are unlikely to be available within the local community). The specialists forming part of the construction team are likely to make use of the local establishments for accommodation facilities. It is expected that most of the construction (i.e. civil works) will be undertaken by local South African companies. The use of local contractors such as Small, Medium, and Micro Enterprises (SMMEs) operating in the area will be considered by the EPC Contractor, and will be driven largely by what skills and services could be sourced from local SMMEs (i.e. as part of a competitive tendering process). The EPC Contractor will determine the standards which all workers need to comply to and this will be in line with South African standards and laws applicable to the construction industry. » *Construction materials and equipment requirements* **–** some of the construction material and equipment may be sourced locally (i.e. within South Africa), depending on technical capabilities and prices of local industry. The materials and equipment will be transported to site by road. » *Water requirements* - The proposed development will require approximately 6000 m^3 over a period of 24 months for construction. » *Housing of the labour force* – although the majority of the low and semi-skilled work force will be sourced from the local area and will be housed off-site. The security team will operate on site in shifts. » *Length of the construction phase* - commencement of the construction phase is planned for shortly after Financial Close. Thereafter, the construction phase is expected to take approximately 24 months to complete.

Activity	***Detailed description***
Pre-construction surveys	Prior to initiating construction, a number of detailed surveys will be required including, but not limited to: » *Geotechnical survey* – the geology and topography of the study area which was originally identified in the EIA Process will be confirmed. The geotechnical study will look at foundation conditions, potential for excavations, the sub-soil conditions and the availability of natural construction materials. This study will serve to inform the type of foundations required to be built (i.e. for the facility), and the extent of earthworks and compaction required in the establishment of the internal access roads. » *Site survey* - in order to finalise the design layout of the panels and the other associated infrastructure a site survey will be conducted. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the facility. A topographical survey has already been undertaken. »
Undertake site preparation	» Site preparation activities will include: * Clearance of vegetation at the footprint of the area infrastructure . * Levelling of site (as necessary). * Clearance of vegetation at the footprint of the linear component (i.e. internal access roads). * The development of Stormwater control management systems. » These activities will require the stripping of topsoil which will need to be stockpiled for future rehabilitation.
Establishment of access roads	» Access to the proposed project site will be from an provincial gravel road that joins up with Onseepkans tar road which joins the N14 national road. An internal network of roads will be required to access the different components of the proposed project. »
Transport of components to site	» Components will be transported from different parts of the country including from ports for imported components and from the local community where possible.
Establishment of construction laydown areas, storage facilities, and accommodation facilities	» Dedicated construction equipment camp(s), storage facilities, and laydown area/s will need to be established. These areas serve to confine activities to a designated area to limit potential site disturbance. The laydown area will be used as a logistical area for the contractors and as a

Activity	*Detailed description*
	prefabrication area. » Security personnel will be present on site on a permanent basis. Contractors and their employees will be accommodated at existing accommodation facilities in the local area. » The fuel required for on-site construction vehicles and equipment will need to be secured in a temporary bunded facility within the construction camp to prevent leakages and soil contamination.
Undertake site rehabilitation and establishment of the stormwater management plan	» Areas requiring rehabilitation will include those areas disturbed during the construction phase which are not required for operation and maintenance purposes. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area. » Where relevant disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. » All temporary facilities, temporary equipment, and waste materials must be removed from site. » Erosion control measures (i.e. drainage works and anti-erosion measures) should be used in sensitive areas (i.e. drainage lines), to minimise loss of topsoil and control erosion. » Any access points and/or access roads which are not required during the operational phase must be closed as part of the post-construction rehabilitation.

Table 2.2: Activities to be undertaken during the operational phase

OPERATION
» *Staff requirements* - approximately 80 staff members are expected to be required on-site during the operational phase of the project. » *Length of the operation phase* – the facility is expected to be commissioned in 2018 and is expected to be operational for at least 20 years, where after it could be decommissioned or its lifespan extended depending on the power generation requirements at the time.

Activity	*Detailed description*
Solar Panel Array	» The PV facility will be operational during daylight hours only but not under circumstances of mechanical breakdown, or maintenance activities.

Activity	***Detailed description***
	» No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed.
Treatment and disposal of waste water	» Any water from ablution facilities will be collected in a septic tank.
Water Use	» An estimated 2500 m^3 litres of water per annum would be required for the cleaning of the panels. » Alternative water sources were considered and it was decided that Ramizone (RF) Proprietary Limited will utilize a water service provider to bring water to the site during the operational phase for washing the panels. Ramizone (RF) Proprietary Limited has applied for water service provision from the local municipality.
Site operation and maintenance	» It is anticipated that a full-time security, maintenance, and control room staff will be required on site.

Table 2.3: Activities to be undertaken during the decommissioning phase

DECOMMISSIONING	
» *Length of the decommissioning phase* – following the operational phase the facility could be decommissioned or its lifespan extended depending on the power generation requirements at the time. » *Activities during the decommissioning phase* - it is most likely that decommissioning would comprise the disassembly and removal of the individual components.	
Activity	***Detailed description***
Site preparation	» Site preparation activities similar to those undertaken in the construction phase will be required during the decommissioning phase. This will include confirming the integrity of site access to the site in order to accommodate the required equipment (e.g. lay down areas and decommissioning camp) and the mobilisation of decommissioning equipment.
Disassemble and remove existing components	» The components would be disassembled, reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT CHAPTER 3

The following legislation and guidelines have informed the scope and content of this EMPr:

- National Environmental Management Act (Act No 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA (GNR 982 – 985December 2014)
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010)
  - Public Participation in the EIA Process (DEA, 2010)
- International Standards – IFC Standards and Equator Principles

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the EIA Report. A review of legislative requirements applicable to the proposed project is provided in the table that follows.

Table 3.1: Relevant legislative and permitting requirements applicable to the establishment of the Konkoonsies PV Solar Power Plant

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	National Legislation		
National Environmental Management Act (Act No. 107 of 1998)	» NEMA requires, inter alia, that: ∗ Development must be socially, environmentally, and economically sustainable." ∗ Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied." ∗ A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions." » EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations. » In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. » In terms of GNR 543 of 18 June 2010, a	» National Department of Environmental Affairs » Northern Cape Department of Environment and Nature Conservation (DENC)	An authorisation was issued for the project by the DEA in July 2013.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	full Scoping and EIA Process is required to be undertaken for the proposed project.		
National Environmental Management Act (Act No. 107 of 1998)	» A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts. » In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.	» National Department of Environmental Affairs	» While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the EIA Phase. » The implementation of mitigation measures are included as part of the Draft EMPr and will continue to apply throughout the life cycle of the project.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations).	» National Department of Environmental Affairs » NC DENC	» In terms of GNR 152 specialist flora and fauna studies were undertaken as part of the EIA process. » The ecological walk-through survey for the site has confirmed that there are protected species in terms of the NEM:BA which may be impacted on by the development. Permits have been obtained from the Northern Cape Department of Environment and Nature Conservation.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	» Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species.		
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	» The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » In terms of the regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified	» National Department of Environmental Affairs (hazardous waste) » NC DENC (general waste)	» In terms of GNR921, no waste license is required for the project » Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in this EMPr, as well as in accordance with the relevant Norms and Standards.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	listed activities. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unlit for the safe storage of waste; (b) Adequate measures are taken to prevent accidental spillage or leaking; (c) The waste cannot be blown away; (d) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) Pollution of the environment and harm to health are prevented.		
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	» S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas". » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. » The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act. » Dust control regulations promulgated in November 2013 may require the implementation of a dust management	» National Department of Environmental Affairs » Local authority	» While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. The Air Emissions Authority (AEL) may require the compilation of a dust management plan.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	plan.		
National Water Act (Act No. 36 of 1998)	» Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	» National Department of Water Affairs » Northern Cape Department of Water Affairs	» Requirements set by S19 will apply throughout the life cycle of the project.
Environment Conservation Act (Act No. 73 of 1989)	» National Noise Control Regulations (GN R154 dated 10 January 1992)	» National Department of Environmental Affairs » Northern Cape Department of Environment and Nature Conservation » Local Authorities	There is no requirement for a noise permit in terms of the legislation.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	» A mining permit or mining right may be required where a mineral in question is to be mined (i.e. materials from a borrow pit) in accordance with the provisions of the Act. » Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. » S53 Department of Mineral Resources: Approval from the Department of Mineral	» Department of Minerals and Energy	» As no borrow pits are expected to be required for the construction of the facility, no mining permit or mining right is required to be obtained. » The project has secured Section 53 approval from the DMR.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resource that might occur on site.		
National Heritage Resources Act (Act No. 25 of 1999)	» S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent » The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m^2; or the re-zoning of a site exceeding 10 000 m^2 in extent. This notification must be provided in the early stages of initiating that development,	» South African Heritage Resources Agency	» As per S38 an HIA has been undertaken as part of the EIA for the project. » In terms of comments from SAHRA a final walk-through survey of the site was undertaken prior to commencement of construction. » A permit may be required should identified cultural/heritage sites of significance on site be required to be disturbed or destroyed as a result of the proposed development. » If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately. The find must be reported to a

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	and details regarding the location, nature and extent of the proposed development must be provided. » Stand-alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.		heritage specialist so that systematic and professional investigation/ excavation can be undertaken.
National Forests Act (Act No. 84 of 1998)	» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister'. » GN 1042 provides a list of protected tree species.	National Department of Agriculture, Forestry and Fisheries (DAFF)	Protected trees are present on the site. Permits have been obtained from the Northern Cape Department of Environment and Nature Conservation.
National Veld and Forest Fire Act (Act 101 of 1998)	» Provides requirements for veld fire prevention through firebreaks and required measures for fire-fighting. Chapter 4 places a duty on landowners to prepare and maintain firebreaks, and Chapter 5 places a duty on all landowners to acquire equipment and have available personnel to fight fires.	» Department of Forestry	While no permitting or licensing requirements arise from this legislation, this Act will find application during the operational phase of the project in terms of fire prevention and management.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	» In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land. » In terms of S13 (a) the firebreak would need to be wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. » In terms of Section 17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.		
Hazardous Substances Act (Act No. 15 of 1973)	» This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising, or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or	» Department of Health	» It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	» An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
Provincial Legislation			
Northern Cape Nature Conservation Act, No. 9 of 2009	» This Act provides for: * The sustainable utilisation of wild animals, aquatic biota and plants. * Offences and penalties for contravention of the Act. * The appointment of nature conservators to implement the provisions of the Act. » The Act provides lists of protected species for the Province.	NC DENC	Permits have been obtained from the Northern Cape Department of Environment and Nature Conservation.

Table 3.2: Standards applicable to the Konkoonsies PV Solar Power Plant

Theme	Standard	Summary
Air	South African National Standard (SANS) 69	Framework for setting and implementing national ambient air quality standards
	SANS 1929: Ambient Air Quality	Sets limits for common pollutants
Noise	SANS 10328:2003: Methods for Environmental Noise Impact Assessments	General procedure used to determine the noise impact
	SANS 10103:2008: The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication	Provides noise impact criteria
	National Noise Control Regulations	Provides noise impact criteria
	SANS 10210: Calculating and Predicting Road Traffic Noise	Provides guidelines for traffic noise levels
Waste	DWAF (1998) Waste Management Series. Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste	DWAF Minimum Requirements
	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) – National norms and standard for the storage of waste.	» Provides uniform national approach relating the management of waste facilities » Ensure best practice in management of waste storage » Provides minimum standards for the design and operation of new and existing waste storage
Water	Best Practise Guideline (G1) Storm Water Management DWA 2006	Provides guidelines to the management of storm water
International Guidelines	IFC Standards and Equator Principles	The Equator Principles is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. IFC requires its clients to apply the 8 Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced.

PURPOSE AND OBJECTIVES OF THE EMPR CHAPTER 4

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced."[1] The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (i.e. site clearing and site establishment), during the construction activities themselves (i.e. erosion, noise, dust, and visual impacts), during site remediation (i.e. soil stabilisation, re-vegetation), during operation and decommissioning (i.e. similar to construction phase activities).

This EMPr has been compiled in accordance with Section 19 of the 2014 EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

» Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the facility.
» Ensure that all the phases of the project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.

[1] Provincial Government Northern Cape, Department of Environmental Affairs and Development Planning: *Guideline for Environmental Management Plans*. 2005

» Identify entities responsible for the implementation of the measures and outline functions and responsibilities.
» Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
» Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the EIA process.

The management and mitigation measures identified within the Environmental Impact Assessment (EIA) process are systematically addressed in this EMPr, and ensure the minimisation of adverse environmental impacts to an acceptable level.

Ramizone (RF) Proprietary Limited must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr and through its integration into the contract documentation. Since this EMPr is part of the EIA process it is important that this document be read in conjunction with the final Scoping and EIA Reports. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in current legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the construction and operational phases and shall be enforceable at all levels of contract and operational management within the project.

STRUCTURE OF THIS EMPR CHAPTER 5

The preceding chapters provide background to the EMPr and the proposed project, while the chapters which follow consider the following:

» Planning and design activities
» Construction activities
» Operation activities
» Decommissioning activities

These chapters set out the procedures necessary for the project, as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation for the solar energy facility project, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The management programme has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies

Project Component/s	» List of project components affecting the objective.
Potential Impact	» Description of potential environmental impact if objective is not met.
Activity/Risk Source	» Description of activities which could affect achieving objective.
Mitigation: Target/Objective	» Description of the target and/or desired outcomes of mitigation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management programme.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into

	consideration responsibility, frequency, methods, and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified whenever changes, such as the following, occur:

» Planned activities change (i.e. in terms of the components and/or layout of the facility)
» Modification to or addition to environmental objectives and targets
» Relevant legal or other requirements are changed or introduced
» Significant progress has been made on achieving an objective or target such that it should be re-examined to determine if it is still relevant, should be modified, etc.

5.1. Project Team

This draft EMP was compiled by Jo-Anne Thomas and Tara Lockwood of Savannah Environmental, with input from the following specialists:

» Escience Associates (Pty) Ltd
» Archaetnos CC
» Propaganda Studios CC
» Simon Todd Consulting
» Professor Andries Classens

The Savannah Environmental team has extensive knowledge and experience in EIA and environmental management, having been involved in EIA processes over the past ten years. The company has managed and drafted EMPrs for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

MANAGEMENT PROGRAMME: PRE-CONSTRUCTION CHAPTER 6

Overall Goal: To undertake the pre-construction (planning and design) phase in a way that:

» Ensures that the design of the PV Plant responds to the identified environmental constraints and opportunities.
» Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements
» Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
» Ensures that the best environmental options are selected for the linear components, including the pipe line, access road and power line alignment.
» Enables the solar energy facility construction activities to be undertaken without significant disruption to other land uses and activities in the area.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

6.1. Objectives

OBJECTIVE 1: Ensure the facility design responds to identified environmental constraints and opportunities

The following potentially sensitive areas were identified:

» Ecologically sensitive areas: The majority of the study area is considered not highly sensitive and provided that all the sensitive features of the site is avoided, especially the rocky outcrop and their immediate environment, the impact associated with the development is likely to be low especially after all mitigation measures within the associated EMPr are successfully implemented.
» Archaeological sensitive areas include: Various archaeological materials were observed on site, mostly dating to the stone age. These areas are however mainly concentrated around the rocky outcrops and stony hills on site. The specialist recommended that these area be avoided by the development to preserve these.

Project Component/s	» Solar field and associated infrastructure » Access roads.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of all the facilities components (i.e. including the infrastructure and across the broader site to include the access road, and the power line towers).
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	Developer/Owner EPC Contractor	Pre-construction
Provision of the appointment of service providers (waste management) should be undertaken during site establishment	EPC Contractor	Site Establishment
All no-go areas must be clearly demarcated before construction commences. Contractors and construction workers must be clearly informed of the no-go areas.	EPC Contractor/ECO	Pre-construction
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the EIA Report and relevant appendices.	Engineering design consultant, solar component supplier, and Developer	Design review
External access point and internal access road to be carefully planned to maximise road user safety.	Developer/Owner EPC Contractor	Design
Compile a comprehensive storm water management plan for hard surfaces as part of the final design of the project. This must include appropriate means for the handling of stormwater within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the mirrors), as well as appropriate drainage around the site.	Developer/Owner EPC Contractor	Design
Water usage design - optimise the design or technology to reduce consumptive water requirements as far as possible.	Developer/Owner EPC Contractor	Design
Consult a lighting engineer in the planning and placement of light fixtures for the plant and the ancillary infrastructure.	Developer/Owner EPC Contractor	Planning.
Plan the placement of lay-down areas and temporary construction accommodation in order to minimise vegetation clearing.	Developer/Owner EPC Contractor	Planning
Develop a comprehensive construction rehabilitation	Developer/Owner	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
plan for the site.		
Fourteen (14) days written notice must be given to the Department that the activity will commence. The notification must include a date on which the activity will commence as well as the reference number.	Developer/Owner	Pre-construction
ECO to be appointed prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.	Developer/Owner	Pre-construction
The terms of this EMPr and the Environmental Authorisation must be included in all tender documentation and Contractors contracts	Developer/Owner EPC Contractor	Tender process
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should be undertaken where possible.	EPC Contractor Owner	Tender process
Borrow materials must be obtained only from authorized and permitted sites.		

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA Report. » Minimal impact on the riparian environment.
Monitoring	» Review of the design by the Construction Manager and the Environmental Control Officer prior to the commencement of construction.

OBJECTIVE 2: Minimise stormwater runoff and subsequent alteration of the local hydrological regime

Project Component/s	» Stormwater management components. » All hard engineered surfaces (i.e. pipeline, access roads).
Potential Impact	» Poor stormwater management and alteration of the hydrological regime.
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of stormwater to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe

Mitigation: Action/Control	Responsibility	Timeframe
Existing drainage must not be altered, especially in sensitive areas.	EPC Contractor	Pre-construction
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system through increased sedimentation.	Developer/Owner EPC Contractor	Planning and design
Construction must include appropriate design measures that allow surface and sub-surface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of stormwater runoff.	Developer/Owner EPC Contractor	Planning and design
Design must ensure the separation of dirty and clean water runoff from the site	Developer/Owner EPC Contractor	Planning and design
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures.	Developer/Owner EPC Contractor	Planning and design
Wind screening and stormwater control systems should be implemented to reduce/prevent erosion from the project site.	Developer/Owner EPC Contractor	Planning and design
All stormwater mitigation measures must be undertaken according to the Stormwater Management Plan compiled by (refer to Appendix C).	Developer/Owner EPC Contractor	Planning and design, construction

Performance Indicator	» Sound water management.
Monitoring	» Appropriate stormwater management system in place

OBJECTIVE 4: To ensure effective communication mechanisms

On-going communication with 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.

Project component/s	» PV Solar plant » Power line
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	» Activities associated with PV Solar plant construction » Activities associated with PV Solar plant facility operation
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.	Developer/Owner EPC Contractor O&M Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Implement a transparent approach and open consultation with adjacent property owners, prior and throughout the construction period in order to provide a platform where grievances or requests can be addressed before issues become contentious.	Developer/Owner EPC Contractor	Pre-construction (construction procedure) Pre-operation (operation procedure)
Before construction commences, representatives from the local municipality, community leaders, community-based organisations and the surrounding property owners, should be informed of the details of the contractors, size of the workforce and construction schedules.	Owner	Pre-construction

Performance Indicator	» Effective communication procedures in place.
Monitoring	» An incident reporting system should be used to record non-conformances to the EMP.

MANAGEMENT PROGRAMME: CONSTRUCTION CHAPTER 7

Overall Goal: Undertake the construction phase in a way that:

» Ensures that construction activities are appropriately managed in respect of environmental aspects and impacts.
» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
» Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value (i.e. drainage lines and pans).
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage sites should they be uncovered.

7.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, Ramizone (RF) Proprietary Limited must ensure that the implementation of the facility complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and implementation of the EMPr, and through its integration into the contract documentation. Ramizone (RF) Proprietary Limited will retain various key roles and responsibilities during the construction of the facility.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during construction

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Internal Environmental Officer, Safety and Health Representative; Independent Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below. Formal responsibilities are necessary to ensure that key procedures are executed. Figure 6.1 provides an organogram indicating the organisational structure for the implementation of the EMPr.

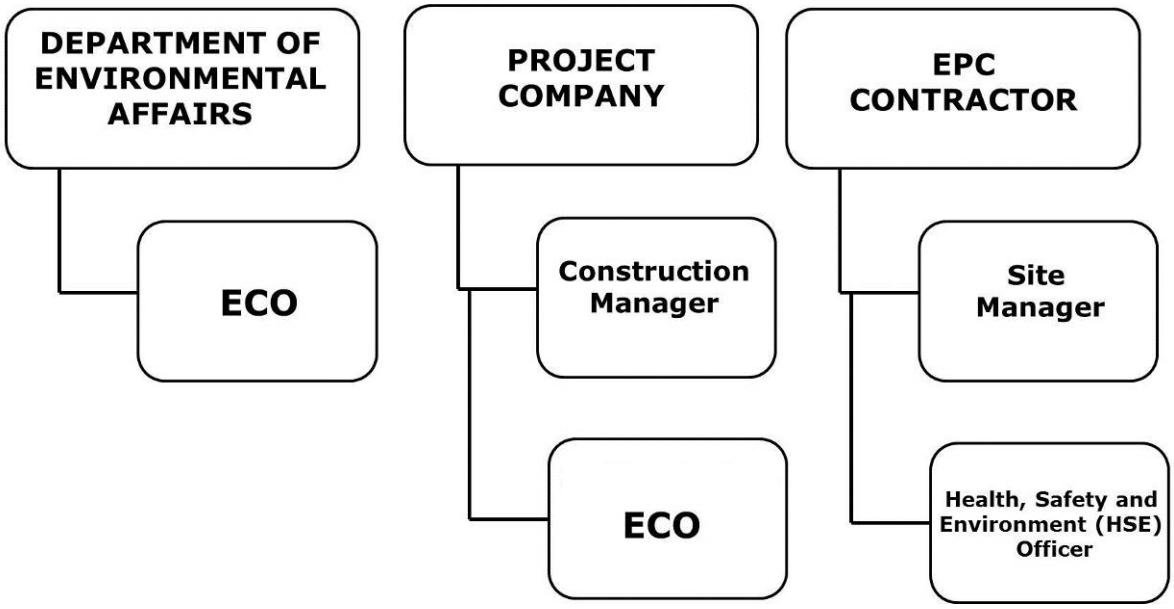

Figure 6.1: Organisational structure for the implementation of the EMPr

Construction Manager will:

» Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
» Ensure that Ramizone (RF) Proprietary Limited and its Contractor(s) are made aware of all stipulations within the EMPr.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes through input from the independent ECO.
» Be fully conversant with the EIA for the project, the EMPr, the conditions of the Environmental Authorisation, and all relevant environmental legislation.
» Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (EPC Contractor's on-site Representative) will:

» Be fully knowledgeable with the contents of the EIA and risk management.
» Be fully knowledgeable with the contents and conditions of the Environmental Authorisation.
» Be fully knowledgeable with the contents of the EMPr.
» Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
» Have overall responsibility of the EMPr and its implementation.
» Conduct audits to ensure compliance to the EMPr.
» Ensure there is communication with the Technical Director, the ECO, the Internal Environmental Officer and relevant discipline engineers on matters concerning the environment.
» Be fully knowledgeable with the contents of all relevant licences and permits.

» Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
» Confine activities to the demarcated construction site.

An independent **Environmental Control Officer (ECO)** must be appointed by the project proponent prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

» Be fully knowledgeable with the contents with the EIA.
» Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
» Be fully knowledgeable with the contents with the EMPr.
» Be fully knowledgeable of all the licences and permits issued to the site.
» Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
» Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
» Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
» Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
» Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
» Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
» Ensure that there is communication with the Site Manager regarding the monitoring of the site.
» Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient. However, in the absence of the ECO there should be a designated owner's environmental

officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The Contractor will appoint an Internal Environmental Officer to whom will be responsible for informing contractor employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Internal Environmental Officer and Contractor's obligations in this regard include the following:

» Must be fully knowledgeable on all environmental features of the construction site and the surrounding environment.
» Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
» Be fully knowledgeable with the contents with the EMPr.
» Be fully knowledgeable of all the licences and permits issued to the site.
» Ensure a copy of the Environmental Authorisation and EMPr must be easily accessible to all on-site staff members.
» Ensure contractor employees are familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the proposed facility.
» Ensure that prior to commencing any site works, all contractor employees and sub-contractors must have attended an environmental awareness included in the induction training which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor
» Manage the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports.
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken, including those of the Independent ECO.
» Staff will be informed of environmental issues as deemed necessary by the Independent ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

» Ensuring adherence to the environmental management specifications.

» Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken.
» Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr.
» Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to.
» Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
» Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO.
» Ensuring that a register of all public complaints is maintained.
» Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations).

Contractor's Safety and Health Representative: The Contractor's Safety and Health Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of health and safety policies, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all health and safety related issues.

The Contractor's Safety and Health Representative should:
» Be well versed in safety, health and environmental matters.
» Understand the relevant safety, health and environmental legislation and processes.
» Understand the hierarchy of Compliance Reporting, and the implications of Non-Compliance.
» Know the background of the project and understand the implementation programme.
» Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
» Keep accurate and detailed records of all EMPr-related activities on site.

7.2. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 1: Minimise impacts related to inappropriate site establishment

The contractor must take all reasonable measures to ensure the safety of the public in the surrounding area.

Project Component/s	» Area infrastructure (i.e. troughs, power block, etc.). » Linear infrastructure (i.e. pipeline, access road).
Potential Impact	» Hazards to landowners and public. » Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located. » Loss of threatened plant species and protected tree species.
Activities/Risk Sources	» Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager and ECO.	EPC Contractor	Site establishment, and duration of construction
A designated site access to the site must be created and clearly marked to ensure safe entry and exit.	EPC Contractor	Site establishment, and duration of construction
Prior to the commencement of construction activities, the project site must be clearly demarcated with fencing. No construction activities are allowed outside of the demarcated footprint area.	EPC Contractor	Site establishment
The Contractor is to provide a method statement, including a construction site layout plan, before site clearance commences. The method statement must clearly indicate all material storage areas, offices and other site infrastructure, waste disposal/ storage areas etc., designed to minimize removal of vegetation and damage to surrounding areas.	EPC Contractor	Site establishment
Fence and secure contractor's equipment camp as agreed with the ECO.	EPC Contractor	Site establishment
Night lighting of the construction sites should be minimised within the requirements of safety and efficiency.	EPC Contractor	Site establishment and duration of

Mitigation: Action/Control	Responsibility	Timeframe
		contract
Develop an efficient access control system which allows for the identification of all people on site	EPC Contractor	Site establishment and duration of contract
Where access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out.	EPC Contractor	Design, before and during construction
Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager.	EPC Contractor	Site establishment and duration of contract
All unattended open excavations must be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape).	EPC Contractor	Site establishment and duration of contract
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	EPC Contractor	Site establishment and duration of contract
Minimise vegetation clearance or removal associated with site establishment activities. Compile a method statement specific to vegetation clearance.	EPC Contractor	Site establishment
Topsoil is to be stripped to a depth of at least 150 mm where possible from construction areas and preserved for rehabilitation. Stockpiles must be established in a designated area, not exceeding a height of 2 m. The stockpile must be located away from seepage zones, floodlines, water courses and other ecological sensitive areas. Topsoil, if any, can be used to create storm water management berms around the facility.	EPC Contractor	Site establishment
Establish SABS 089: 1999 Part 1 approved bunded areas for storage of hazardous materials and hazardous waste.	EPC Contractor	Site establishment
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	EPC Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m of water courses and wetlands.	EPC Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shadecloth) at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	EPC Contractor	Site establishment, and duration of construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site. » Unnecessary vegetation clearing and levelling is not undertaken.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPr. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager.

OBJECTIVE 2: Appropriate management of the construction site and construction workers

Only security personnel will be accommodated on site. Contractors and their employees are expected to be accommodated at existing accommodation facilities in the study area or within an appropriately sited construction camp. Construction equipment will need to be stored at appropriate locations on site.

In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.

Project Component/s	» Area and linear infrastructure.
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk	» Vegetation clearing and levelling of equipment storage area/s.

Sources	» Access to and from the equipment storage area/s. » Ablution facilities. » Accommodation facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the EIA studies and reflected on the site layout plan included within this EMPr. No temporary site camps will be allowed outside the footprint of the development area.	EPC Contractor	Pre-construction
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.	EPC Contractor	Duration of construction
Safety representatives, managers and workers must be trained in workplace safety. The construction process must be compliant with all safety and health measures as prescribed by the relevant Act.	EPC Contractor	Duration of contract
Emergency numbers for the police, fire department, clinic and relevant responsible staff will be made available in conspicuous locations.	EPC Contractor	Duration of contract
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas.	EPC Contractor and sub-contractor/s	Duration of contract
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site.	EPC Contractor	Site establishment, and duration of construction
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	EPC Contractor and sub-contractor/s	Duration of contract
Informal vending stations should not be allowed on or near the construction site.	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Fire-fighting equipment and training must be provided before the construction phase commences.	EPC Contractor and sub-contractor/s	Duration of contract
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.	EPC Contractor and sub-contractor/s	Duration of contract
Ensure waste disposal facilities are maintained and emptied as and when required.	EPC Contractor	Site establishment, and duration of construction
All work sites must be kept free of waste. No solid waste may be burned or buried on site or disposed of by any other method on site or within quarries or borrows pits. Solid waste (general waste) to be disposed of at the closest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	EPC Contractor	Site establishment, and duration of construction
No one may disturb flora or fauna outside of the demarcated construction area/s.	EPC Contractor and sub-contractor/s	Duration of contract
Sub-contractors appointed by the Contractor 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.	EPC Contractor and sub-contractor/s	Construction
Water resources to be used sparingly and use not to exceed the resource potential or recharge rate. Contractor to keep detailed records of water quantities used.	EPC Contractor	Pre-Construction
Access and internal road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan to be developed with emergency procedures in the event of a fire.	EPC Contractor	Erection: during site establishment Maintenance: duration of contract
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	EPC Contractor	Duration of Contract
Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce.	Owner EPC Contractor	Construction
No vehicles or machinery are to be washed on site, outside of the designated areas.	EPC Contractor	Duration of contract

Performance Indicator	» The construction equipment camps have avoided sensitive areas, as approved by the ECO. » Ablution and waste removal facilities are appropriately maintained and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Contractors' Code of Conduct drafted before commencement of construction phase.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of maintenance of ablution facilities available on site » An incident reporting system should be used to record non-conformances to the EMP. » Complaints investigated and, if appropriate, acted upon.

OBJECTIVE 3: Maximise local employment and business opportunities associated with the construction phase

Limited employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers.

Project Component/s	» Construction activities associated with the establishment of the facility, including the associated infrastructure.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business.
Activities/Risk Sources	» Contractors who make use of their own labour for unskilled tasks, thereby reducing the employment and business opportunities for locals. » The inflow of various specialists from outside the study area and even abroad. » Sourcing of individuals with skills similar to the local labour pool outside the municipal area.
Mitigation: Target/Objective	» Employment of a maximum number of low-skilled to semi-skilled workers for the project from the local area where possible.

Mitigation: Action/Control	Responsibility	Timeframe
Employment of local community members (i.e. source labour from within the municipal area focused on the communities in closest proximity to the site) should	EPC Contractor Owner	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
be undertaken where possible.		
An equitable process should be promoted whereby locals and previously disadvantaged individuals (including women) are considered for employment opportunities.	EPC Contractor	Duration of construction
Create conditions that are conducive for the involvement of entrepreneurs, small businesses, and SMMEs during the construction process.	EPC Contractor Owner	Pre-construction
Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses, and SMMEs from the local sector.	EPC Contractor	Pre-construction
A local labour desk should be set-up (if not already established) in the beneficiary communities to co-ordinate the process of involving local labour.	EPC Contractor	Pre-construction
Skills training and capacity building should be embarked upon as early as possible in the construction process.	EPC Contractor	Pre-construction and construction
Develop a transparent communication and recruitment process to minimise the influx of jobseekers to the area.	EPC Contractor	Pre-construction
The recruitment process and the use of contractors should be clearly communicated to the local communities. The communication strategy should ensure that unrealistic employment expectations are not created.	Owner EPC Contractor	Pre-construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are awarded to members of local communities as appropriate. » Locals and previously disadvantaged individuals (including women) are considered during the hiring process. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation. » The involvement of local labour is promoted. » Reports are not made from members of the local communities regarding unrealistic employment opportunities or that only outsiders were employed.
Monitoring	» The Owner and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 4: Minimise the potential impact on health, safety and security

An inflow of workers could, as a worst case scenario and irrespective of the size of the workforce, pose some security risks. Criminals could also use the opportunity due to "outsiders" being in the area to undertake their criminal activities. Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce.

The actual safety of construction workers is also of concern. Further health and safety issues associated with the actual construction site include unauthorised entry to the site and construction areas, the usage of large equipment on site, the risks associated with the storage of equipment and material on site, as well as the increased risk of accidents due to the increased movement of construction vehicles on the local roads.

Other concerns relate to littering, unwanted behaviour of construction workers, transmission of Sexually Transmitted Diseases (STDs), environmental pollution, an increase risk in fires and so forth. Although such perceptions cannot be substantiated or be changed it should be sensitively dealt with. It is thus clear that even though the construction phase when these impacts could occur is only of a short duration, the effects of the impacts could remain in the medium term.

Project Component/s	» Inflow of workers could result in increased safety and security risks.
Potential Impact	» Outside workers are involved in criminal activities and/or fires occur.
Activities/Risk Sources	» Theft of construction material. » On-site accidents. » Spread of STDs. » Littering and environmental pollution.
Mitigation: Target/Objective	» Employment of local labour should be maximised and strict security measures should be implemented at the construction site.

Mitigation: Action/Control	Responsibility	Timeframe
On-site security should be active prior to the construction phase.	EPC Contractor	Pre- construction
Construction workers should be easily identifiable by wearing uniforms and identification tags/ induction cards.	EPC Contractor	Construction
All staff should undergo a general H&S induction and simplified environmental awareness training session	EPC Contractor (and sub-contractor/s)	Duration of contract
The construction site should be fenced and access to	EPC Contractor	All phases of

Mitigation: Action/Control	Responsibility	Timeframe
the area controlled.		project
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners and the Local Municipality	Owner, Local Municipality, and local communities	Pre- construction and when required
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	EPC Contractor	Construction
Contact details of emergency services should be prominently displayed on site.	EPC Contractor	Construction
Signs must be placed along construction roads to identify speed limits, travel restrictions and other standard traffic control information.	EPC Contractor	Construction
Construction workers working in areas where the 8 hour ambient noise levels exceed 75dBA, must wear ear protection equipment.	EPC Contractor	Construction

Performance Indicator	» No fires originating on the site or on-site accidents occur. » No theft of material or equipment on site
Monitoring	» The EPC Contractor and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 5: Minimise the potential impact on the daily living and movement patterns

Some intrusion impacts due to the construction activities and vehicular movements (noise and dust) on the surrounding property owners could be experienced.

Project Component/s	» Construction activities associated with the area and linear infrastructure. » Delivery of any component required within the construction phase.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads. » Possible increase in dust, noise, and general intrusion.
Activities/Risk Sources	» Construction vehicle movement. » Increased risk of accidents due to increase in vehicle movement.

	» Mobile construction equipment movement on-site. » Possible degradation of local roads. » Site preparation and earthworks. » Emissions from construction vehicles. » Excavation, grading, scraping, levelling, digging, drilling
Mitigation: Target/Objective	» Limit any negative impacts on the surrounding property owners' daily living and movement patterns. » Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Adequate parking for all employees, contractors and sub-contractors will be made available and should not impact negatively on neighbouring farmers.	EPC Contractor	Pre-construction and construction
Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users and to limit any accident risks. Additional access roads should be kept to a minimum.	EPC Contractor	Pre-construction and construction
Source general construction material and goods locally where available to limit transportation over long distances.	EPC Contractor	Construction
Local labourers should be used during the construction phase to limit the inflow of outsiders to the area.	EPC Contractor	Construction
Construction activities should not interfere with the farming activities on surrounding properties.	EPC Contractor	Construction
Compile and implement a traffic management plan for the site access roads to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted.	EPC Contractor	Pre-construction
Gravel roads and cleared areas should be sprayed with an appropriate dust suppressant to limit dust creation.	EPC Contractor	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	EPC Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	Developer/Owner	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	EPC Contractor (or appointed transportation	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
	contractor)	
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	EPC Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	EPC Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	EPC Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	EPC Contractor	Duration of contract
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 to be in accordance with prescribed standards and must be appropriately maintained for the duration of the construction period.	EPC Contractor	Duration of contract
Ensure that any damage to internal roads because of construction activities is repaired before completion of the construction phase.	EPC Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown will be covered with suitable material.	EPC Contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the EPC contractor.	EPC Contractor	Duration of contract
Dust-generating activities or earthworks may need to be rescheduled or the frequency of application of dust control/suppressant increased during periods of high winds if visible dust is blowing toward nearby residences outside the site.	EPC Contractor	Duration of contract

Performance Indicator	» Limited noise and dust pollution. » Limited intrusions on surrounding property owners. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » Local road conditions and road surfaces are maintained » No reports from property owners regarding problems with construction activities and workforce. » Limited degradation of local roads.
Monitoring	» Owner, and appointed ECO must monitor indicators listed above to

	ensure that they have been implemented. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMP.

OBJECTIVE 6: Minimisation of development footprint

In order to minimise impacts on flora, fauna, and ecological processes, the development footprint should be limited.

Project Component/s	» PV Solar Array » Power line. » Offices and workshops. » Access roads.
Potential Impact	» Impacts on natural vegetation. » Loss of indigenous natural vegetation due to construction activities. »
Activity/Risk Source	» Vegetation clearing » Site preparation and earthworks. » Excavation of foundations. » Construction of site access roads. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Power line construction activities. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To retain natural vegetation, where possible. » To minimise footprints of disturbance of vegetation/habitats on-site » » Minimise spoil material.

Mitigation: Action/Control	Responsibility	Timeframe
Permits must be obtained to translocated or destroy all the identified protected species that are located in the development footprint	Developer/Owner and ECO	Pre-construction
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	EPC Contractor in consultation with the ECO	Duration of Construction
Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.	EPC Contractor	Site establishment &

Mitigation: Action/Control	Responsibility	Timeframe
		duration of contract
No-Go areas are to be demarcated with tape and warning signs prohibiting access erected. Plant and vehicle operators must be instructed by the SHE on where these No-Go sites are.	EPC Contractor	Construction
No vegetation removal must be allowed outside the designated project development footprint.	EPC Contractor	Construction
Ridges and areas which include protected and red data species must be avoided at all costs during construction.	ECO/SHE	Pre-construction; Site establishment
A site rehabilitation programme must be implemented.	EPC Contractor in consultation with ECO/Ecologist	Duration of contract
Disturbed areas should be rehabilitated when construction in an area is completed. Rehabilitated areas must be inspected on a monthly basis and maintained, if necessary	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» No disturbance outside of designated work areas. » Minimise clearing of existing vegetation. »
Monitoring	» Observation of vegetation clearing activities by ECO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 7: Appropriate management of topsoil

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss of topsoil
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations. » Construction of site access roads. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Power line construction activities. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To minimise footprints of disturbance » Minimise loss of topsoil

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil must be stockpiled and appropriately managed to ensure viability for reuse during rehabilitation.	EPC Contractor	Duration of contract
No mixing of topsoil and subsoil must be permitted. Stockpiles must be stored separately and returned for backfilling in the correct soil horizons.	EPC Contractor	Site establishment, during construction
Should topsoil be stockpile for longer than 6 months it must be vegetated.	EPC Contractor	Site establishment & duration of contract
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	EPC Contractor	Site establishment Maintenance: for duration of contract
The maximum topsoil stockpile height must not exceed 2m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.	EPC Contractor	Duration of contract
The stockpile shall be located away from seepage zones, floodlines, water courses and other ecological sensitive areas (drainage lines).	EPC Contractor	Site establishment, during construction

Performance Indicator	» Minimised loss of topsoil. » Appropriate stockpiling and management of topsoil
Monitoring	» Monitoring of topsoil clearing activities » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 8: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

» Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
» Incorrect storage of topsoil
» Accidental spillages
» Poor rehabilitation
» Erosion from rainwater

Project Component/s	» PV Solar Array. » Power line. » Offices and workshops. » Access roads.
Potential Impact	» Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Removal of vegetation, excavation, stockpiling, compaction, and pollution of soil. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » High velocity discharge of water from construction activity.
Mitigation: Target/Objective	» Minimise extent of disturbance areas. » Minimise activity within disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc.). » Minimise soil erosion. » Minimise deposition of soil into drainage lines as a result of runoff. » Minimise instability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	EPC Contractor	During and after construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	EPC Contractor	Design and construction
Minimise removal of vegetation which adds stability to soil.	EPC Contractor	Construction
Erosion and loss of soil must be prevented by minimizing the construction site exposed to surface water run-off. Where necessary erosion stabilizing actions such as gabions or re-vegetation must be implemented to prevent further habitat deterioration.	EPC Contractor	Construction
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, gabions or temporary mulching over denuded area as required.	EPC Contractor	Erection: Before construction Maintenance: Duration of contract
No soil is to be stripped from areas within the site that the contractor does not require for construction works.	EPC Contractor ECO	Construction
Erosion control measures to be regularly maintained.	EPC Contractor ECO	Construction

Performance Indicator	» No activity outside demarcated disturbance areas. » Limited soil erosion around site. » No increase in siltation in drainage lines as a result of construction activities. » No activity in restricted areas.
Monitoring	» On-going inspections of the site by the ECO. » Monthly inspections of sediment control devices by the ECO » Monthly inspections of surroundings, including drainage lines by the ECO. » An incident reporting system will record non-conformances.

OBJECTIVE 10: Minimise the impacts on fauna

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss or displacement of fauna
Activity/Risk Source	» Site preparation and earthworks. » Construction-related traffic. » Foundations or plant equipment installation. » Mobile construction equipment. » Powerline construction activities
Mitigation: Target/Objective	» To minimise footprints of habitat destruction » To minimise disturbance to (and death of) resident and visitor faunal and avifaunal species

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing/disturbance.	EPC Contractor in consultation with the ECO	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	EPC Contractor	Site establishment & duration of contract
Where roads pass right next to major water bodies provisions should be made for fauna such as toads to pass under the roads by using culverts or something similar.	EPC Contractor	Construction Operation
Vehicles to adhere to speed limits at all times	EPC Contractor	Construction Operation
The intentional harming or killing of animals will be prohibited through on-site supervision and worksite rules.	EPC Contractor	Construction Operation
Anti-collision devices such as bird flappers must be installed where powerlines cross avifaunal corridors. The input of an avifaunal specialist must be obtained for the fitting of the anti-collision devices onto specific sections of the line once the exact position of the towers have been surveyed and pegged.	ECO/EPC Contractors	Construction and post-construction
A site rehabilitation programme should be implemented.	EPC Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation and habitats for

	fauna » Limited impacts on faunal species (i.e. noted/recorded fatalities)
Monitoring	» Observation of vegetation clearing activities by ECO throughout construction phase » Supervision of all clearing and earthworks » Recording faunal fatalities to monitor success of relocation efforts » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE 11: Minimise impacts on water resources

Project Component/s	» Construction activities » Storage of chemicals and hazardous materials. » Ablution facilities.
Potential Impact	» Pollutants such as hydrocarbons, etc. could be harmful to aquatic biota, particularly during low flows when dilution is reduced.
Activity/Risk Source	» Fuelling, usage and maintenance of construction vehicles. » Cement batching and usage. » Labourer using ablution facilities. » Use of any chemicals or hazardous materials during construction.
Mitigation: Target/Objective	» No incidents related to spills of chemicals and hazardous materials. » No release of contaminated water in drainage lines. » No misbehaviour of construction workers (i.e. ablution activities, washing).

Mitigation: Action/Control	Responsibility	Timeframe
Implement strict management of all hazardous materials used on site.	EPC Contractor	Construction
Ensure strict management of potential sources of pollution (hydrocarbons from vehicles and machinery n, etc.).	EPC Contractor	Construction
No unauthorised groundwater abstraction may occur on site.	EPC Contractor	Construction
Should any dirty water be discharged from the site, the water is to comply with national effluent standards. No contaminated water may be discharged from site.	EPC Contractor	Construction
Potentially contaminated water originating from site must be directed through an oil and water separator. Oil is to be removed and/or recycled from site by a licensed contractor.	EPC Contractor	Construction
Proper use of chemical toilets should be strictly enforced.	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
No activities shall be allowed to encroach into a water course or wetland/pan without a Water Use License being in place from the Department of Water and Sanitation (DWS).	EPC Contractor Owner	Design Construction
All electrical collector lines must be buried in a manner that minimizes additional surface disturbance. Underground cables must be aligned as much as possible along the existing infrastructure to limit damage to vegetation and watercourses.	EPC Contractor	Following execution of the works

Performance Indicator	» None
Monitoring	» Monitor management measures in place for potentially hazardous materials

OBJECTIVE 12: Appropriate Stormwater Management

Project Component/s	» Alteration of sandy substrata into hard surfaces impacting on the local hydrological regime
Potential Impact	» Poor stormwater management and the alteration hydrological regime
Activities/Risk Sources	» Placement of hard engineered surfaces
Mitigation: Target/Objective	» Reduce the potential increase in surface flow velocities and the impact on dry riverbeds and the localised drainage systems

Mitigation: Action/Control	Responsibility	Timeframe
Any stormwater within the site must be handled in a suitable manner, i.e. clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, shade nets, or gabions trapping sediments and reduce flow velocities.	EPC Contractor O&M Operator	Planning, design and operation
Stormwater control systems must be implemented to reduce erosion on the project site.	EPC Contractor	Design Construction
New access roads within the site are to be constructed according to design and contract specifications. The access routes must have suitable stormwater management plans and erosion control measures.	EPC Contractor	Design Construction
Drainage measures must promote the dissipation of storm water run-off.	EPC Contractor Owner	Design Construction
All stormwater mitigation measures must be implemented	EPC Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
according to the Stormwater Management Plan (refer to Appendix C).		

Performance Indicator	» Water quality and quantity management
Monitoring	» Appropriate stormwater management system in place »

OBJECTIVE 13: Protection of heritage resources

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. The heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose archaeological artefacts, the artefacts are relatively meaningless once removed from the area in which they were found. Large-scale excavations for foundations will damage archaeological sites, as will road construction activities.

Archaeological or other heritage materials occurring in the path of any surface or sub-surface disturbances associated with any aspect of the development are highly likely to be subject to destruction, damage, excavation, alteration, or removal. The objective should be to limit such impacts to the primary activities associated with the development and hence to limit secondary impacts during the medium and longer term working life of the facility.

Project Component/s	» Solar Array » Power line. » Offices and workshops. » Access roads.
Potential Impact	» Heritage objects or artefacts found on site are inappropriately managed or destroyed
Activity/Risk Source	» Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Pipeline construction activities.
Mitigation: Target/Objective	» To ensure that any heritage objects found on site are treated appropriately and in accordance with the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	Heritage Specialist	Pre-construction
No disturbance of areas outside of the planned layout footprint should occur;	EPC Contractor	Duration of contract
Project employees and any contract staff must maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	EPC Contractor	Duration of contract
If a heritage object is found, work in that area must be stopped immediately, and appropriate specialists brought in to assess to site, notify the administering authority of the item/site, and undertake due/required processes.	EPC Contractor in consultation with Heritage Specialist	Duration of contract
In the event that fossils resources are discovered during excavations, immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils. Inform the site foreman and the ECO. ECO to inform the developer, the developer contacts archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images by email.	Contractor and ECO	Construction

Performance Indicator	» No disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
Monitoring	» Observation of excavation activities by SHE throughout construction phase » Supervision of all clearing and earthworks » Due care taken during earthworks and disturbance of land by all staff and any heritage objects found reported. » Appropriate permits obtained from SAHRA prior to the disturbance or destruction of heritage sites (if required). » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 14: Minimisation of visual impacts associated with construction

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility. Secondary visual impacts

associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust-suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

Project Component/s	» Construction site and laydown areas.
Potential Impact	» Visual impact of general construction activities and laydown areas and the potential scarring of the landscape due to vegetation clearing.
Activity/Risk Source	» The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	» Minimal visual intrusion by construction activities and laydown areas and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	EPC Contractor	Construction
Ensure that rubble, litter, and disused construction materials are managed and removed regularly.	EPC Contractor	Construction
Ensure that all infrastructure and the site and general surrounds are maintained in a neat a manner.	EPC Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques.	EPC Contractor	Construction
As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	EPC Contractor	Construction
Rehabilitate all disturbed areas, construction areas, roads, and servitudes to acceptable visual standards.	EPC Contractor	Construction
Any additional external lighting of the facility will be limited.	EPC Contractor	Construction

Performance Indicator	» Vegetation cover on and near the site is intact with no evidence of degradation or erosion. » Construction site is kept in a neat and tidy state.
Monitoring	» Monitoring of vegetation clearing during construction. » Monitoring of rehabilitated areas post construction.

OBJECTIVE 15: Appropriate handling and management of waste

The construction of the solar energy facility will involve the generation of various wastes. In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented. The main wastes expected to be generated by the construction of the solar energy facility will include:

» general solid waste
» hazardous waste
» liquid waste (including grey water and sewage)

Project Component/s	» Solar array » Power line » Offices and workshops » Access roads
Potential Impact	» Inefficient use of resources resulting in excessive waste generation » Litter or contamination of the site or water through poor waste management practices
Activity/Risk Source	» Packaging » Other construction wastes » Hydrocarbon use and storage » Spoil material from excavation, earthworks and site preparation
Mitigation: Target/Objective	» To comply with waste management legislation » To minimise production of waste » To ensure appropriate waste storage and disposal » To avoid environmental harm from waste disposal. » A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	EPC Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	EPC Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control.	EPC Contractor	Duration of contract
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and	EPC Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).		
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	EPC Contractor	Duration of contract
Uncontaminated waste must be removed regularly for disposal; other wastes must be removed for recycling/ disposal at an appropriate frequency.	EPC Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	EPC Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	EPC Contractor	Duration of contract
No sewage may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Slips of disposal to be retained as proof of responsible disposal	EPC Contractor	Maintenance: duration of contract within a particular area
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. Hazardous waste to be disposed of at a registered landfill site. Depending on the classification of the waste, a registered service provider with the necessary permits is to collect, transport and dispose of hazardous waste. Proof of appropriate disposal to be provided to the ECO.	EPC Contractor	During and post construction.
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.	EPC Contractor	Duration of contract
SABS approved spill kits to be available and easily accessible.	EPC Contractor	Duration of contract
Regularly serviced chemical toilets and septic tank facilities must be used to ensure appropriate control of sewage.	EPC Contractor	Duration of contract
Under no circumstances may waste be burnt on site.	EPC Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with	EPC Contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
regard to waste management.		
Implement an integrated waste management approach that is based on waste minimisation and incorporates reduction, recycling, re-use and disposal where appropriate.	EPC Contractor	Duration of construction
Upon the completion of construction, the area must be cleared of potentially polluting materials. Spoil stockpiles must also be removed and appropriately disposed of or the material re-used for an appropriate purpose.	EPC Contractor	Completion of construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » Proof of disposal of sewage at an appropriate waste water treatment works. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 16: Appropriate handling and storage of chemicals, hazardous substances

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. Chemical storage is likely to occur within the power block site.

Project Component/s	» Storage and handling of chemicals, hazardous substances.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Pollution of water and soil resources.
Activity/Risk	» Vehicles associated with site preparation and earthworks.

Source	» Construction activities of area and linear infrastructure. » Hydrocarbon use and storage. » Oil in transformers
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.

Mitigation: Action/Control	Responsibility	Timeframe
All chemicals, fuels and other hazardous materials are to be stored in designated and bunded areas, where the bunded area is impermeable and is impervious to the stored substance as per the requirements of SABS 089:1999 Part 1. The bunded area will contain 110% volume of the largest container stored.	EPC Contractor	Construction
Bunds and service area platforms to be cleaned and maintained regularly.	EPC Contractor	Construction
SABS approved Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants. The relevant construction crew members must be trained in their use.	EPC Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures. Refer to Emergency Response procedure included in the appendices.	EPC Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	EPC Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible, stored as hazardous waste and disposed of at a suitably licensed waste disposal site.	EPC Contractor	Duration of contract
Any contaminated/polluted soil must be removed, stored as hazardous waste and disposed of at a licensed hazardous waste disposal facility.	EPC Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	EPC Contractor	Duration of contract
Fuel storage areas must be inspected regularly to	EPC Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
ensure bund stability, integrity, and function.		contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor O&M contractor	During and post construction.
Any water that collects in bunds must not be allowed to stand. Should the water be contaminated, it is to be removed and treated prior to discharge, or disposed of as hazardous waste. Clean stormwater contained within the bunds may be reused.	EPC Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area. If machinery cannot be stored in a sealed area then a drip tray must be used to prevent spillage from any leaks.	EPC Contractor	Duration of contract
All generators on site, including generators that are not in use should be located in a bunded area or on a drip tray. Bunded areas and drip trays must be maintained on a regular basis.	EPC Contractor	Duration of contract
No chemicals must be stored or vehicle maintenance undertaken within 100m of wetlands or drainage lines.	EPC Contractor	Duration of contract
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.	EPC Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	EPC Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	EPC Contractor	Duration of contract
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	EPC Contractor	Construction
Precautions must be in place to limit the possibility of oil and other toxic liquids from entering the soil or clean stormwater system.	EPC Contractor	Construction
Upon the completion of construction, the area must be cleared of potentially polluting materials.	EPC Contractor	Completion of construction

Performance	» No chemical spills outside of designated storage areas.

Indicator	» No unattended water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPr.

7.3. Detailing Method Statements

OBJECTIVE 18: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO. Method statements must be reviewed by the ECO and owner's engineering team for further technical, legislative and health and safety input.

A Method Statement is defined as "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". The Method Statement must cover applicable details with regard to:

» Details of the responsible person/s
» Construction procedures
» Materials and equipment to be used
» Getting the equipment to and from site
» How the equipment/material will be moved while on-site
» How and where material will be stored
» The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
» Timing and location of activities
» Compliance/non-compliance with the Specifications, and

» Any other information deemed necessary by the Site Manager.

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

» Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).
» Preparation of the site (i.e. Clearing vegetation, compacting soils and removing existing infrastructure and waste).
» Soil management/stockpiling and erosion control.
» Excavations and backfilling procedure.
» Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
» Stipulate the storm water management procedures recommended in the storm water management method statement.
» Ablution facilities (placement, maintenance, management and servicing)
» Solid Waste Management:
  * Description of the waste storage facilities (on site and accumulative).
  * Placement of waste stored (on site and accumulative).
  * Management and collection of waste process.
  * Recycle, re-use and removal process and procedure.
» Liquid waste management:
  * To design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
  * Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
» Dust and noise pollution
  * Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
  * Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
» Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).

- Lists of all potentially hazardous substances to be used.
- Appropriate handling, storage and disposal procedures.
- Prevention protocol of accidental contamination of soil at storage and handling areas.
- All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).

» Fire prevention and management measures on site.
» Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
- Rehabilitation, re-vegetation process and bush clearing.

» Incident and accident reporting protocol.
» General administration
» Designate access road and the protocol on while roads are in use.
» Requirements on gate control protocols.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the owner's Construction/Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

7.4. Awareness and Competence: Construction Phase of the Solar Energy Facility

OBJECTIVE 19: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- All Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the facility.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended site induction training which includes the environmental impacts associated with the. The training must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
    - Records must be kept of those that have completed the relevant training.
    - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
    - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors should have a basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

7.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the EPC Contractor and must take the form of an on-site talk and demonstration by the ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management within the contractor team. A record of attendance of this training must be maintained by the ECO on site.

7.4.2 Induction Training

Environmental impacts and requirements should be included in induction training and be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should be undertaken by the Contractor's Environmental Officer and should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and the importance and reasons for compliance to these. The induction training must highlight overall "dos and don'ts" on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

7.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least twice a month) where foremen, environmental and safety representatives of different components of the Works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

7.5. Monitoring Programme: Construction Phase of the Solar Energy Facility

OBJECTIVE 20: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be

stipulated by the Environmental Authorisation. Where this is not clearly dictated, Ramizone (RF) Proprietary will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

» Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications
» Ensure adequate and appropriate interventions to address non-compliance
» Ensure adequate and appropriate interventions to address environmental degradation
» Provide a mechanism for the lodging and resolution of public complaints
» Ensure appropriate and adequate record keeping related to environmental compliance
» Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site
» Aid communication and feedback to authorities and stakeholders

The ECO will ensure compliance with the EMPr, will conduct monitoring activities, and will report any non-compliance or where corrective action is necessary to the Site Manager and/or any other monitoring body stipulated by the regulating authorities. The ECO must have the appropriate experience and qualifications to undertake the necessary tasks.

7.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, IEO and the ECO must be provided the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

7.5.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a weekly and monthly basis and must be submitted to the Contractor and Developer.. This report should include details

of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out.

7.5.3. Final Audit Report

A final environmental audit report must be compiled by the independent ECO and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr. Further details of the audit report are contained in Condition 24 - 25 of the Environmental Authorisation (Appendix A).

MANAGEMENT PROGRAMME: REHABILITATION CHAPTER 8

Overall Goal: Undertake the rehabilitation measures in a way that:

» Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

8.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project Component/s	» Area and linear infrastructure.
Potential Impact	» Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion and increased runoff, and the requirement for on-going management intervention.
Activity/Risk Source	» Temporary construction areas. » Temporary access roads/tracks. » Pipeline servitude » Other disturbed areas/footprints.
Mitigation: Target/Objective	» Ensure and encourage site rehabilitation of disturbed areas. » Ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/Control	Responsibility	Timeframe
All areas of disturbed soil must be reclaimed using soil only from excavations and construction activities.	EPC Contractor	Following execution of the works
Implement re-vegetation and rehabilitation plan.	EPC Contractor	Following execution of

Mitigation: Action/Control	Responsibility	Timeframe
		the works
Foundations and trenches must be backfilled with originally excavated materials as much as possible. Excess excavation materials must be disposed of only in approved areas, or if suitable, stockpiled for use in reclamation activities.	EPC Contractor	Following execution of the works
Restoration must be undertaken as soon as possible after completion of construction activities to reduce the area of habitat converted at any one time and to speed up recovery of natural habitats.	EPC Contractor	Following execution of the works
All temporary facilities, equipment, and waste materials must be removed from site.	EPC Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	EPC Contractor	Following completion of construction activities in an area
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.	EPC Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be disced, all imported materials removed, and the area shall be top soiled and re-vegetated.	EPC Contractor	Following completion of construction activities in an area
Temporary roads (if any) must be closed and access across these blocked	EPC Contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	EPC Contractor	Following completion of construction activities in an area
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist as applicable.	EPC Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area

Mitigation: Action/Control	Responsibility	Timeframe
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	O&M Operator in consultation with the ECO/rehabilitation specialist	Post-rehabilitation
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.	EPC Contractor	Construction/ operation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	O&M Operator in consultation with rehabilitation specialist	Post-rehabilitation
All compacted areas to be rehabilitated should be ripped to allow organic breakdown and promote vegetation establishment.	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Completed site free of erosion and alien invasive plants.
Monitoring	» On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented during the operational lifespan of the facility. » On-going alien plant monitoring and removal should be undertaken on an annual basis.

MANAGEMENT PROGRAMME: OPERATION CHAPTER 9

Overall Goal: To ensure that the operation of the solar energy facility does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the solar energy facility in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts
» Enables the solar energy facility's operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents

» Minimises impacts on fauna using the site

An environmental manager must be appointed during operation whose duty it will be to ensure the implementation of the operational EMPr.

9.1. Objectives

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management programme during operation

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:

» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
» Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
» Take appropriate action as a result of findings and recommendations in management reviews and audits.
» Provide forums to communicate matters regarding environmental management.

The **Environmental Manager** will:

» Develop and Implement an Environmental Management System (EMS) for the solar energy facility and associated infrastructure.
» Manage and report on the facility's environmental performance.
» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.
» Liaise with statutory bodies such as the National and Provincial Department of Environmental Affairs (DEA) on environmental performance and other issues.
» Conduct environmental training and awareness for the employees who operate and maintain the solar energy facility.
» Compile environmental policies and procedures.
» Liaise with interested and affected parties on environmental issues of common concern.
» Track and control the lodging of any complaints regarding environmental matters.

The ECO must provide fourteen (14) days written notification to the DEA that the operational phase will commence.

OBJECTIVE 2: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Areas requiring regular maintenance. » Route of the security team. » Areas disturbed during the construction phase and subsequently rehabilitated at its completion
Potential Impact	» Disturbance to or loss of vegetation and/or habitat. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» Movement of employee vehicles within and around site. » Maintenance activities
Mitigation:	» Maintain minimised footprints of disturbance of vegetation/habitats

Target/Objective	on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Vehicle movements must be restricted to designated roadways.	O&M Operator	Operation
Operation and maintenance personnel must restrict all activities to within the solar energy facility. No disturbance of the surrounding areas must be permitted.	O&M Operator	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	O&M Operator	Operation
Implement appropriate management plan for offset area, as agreed with the relevant authorities	O&M Operator	Operation

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts. »
Monitoring	» Observation of vegetation on-site by O&M Manager and environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.

OBJECTIVE 3: Minimise the establishment and spread of alien invasive plants

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Invasion of natural vegetation surrounding the site by declared weeds or invasive alien species.
Activities/Risk Sources	» Construction, environmental management.
Mitigation: Target/Objective	» There is a target of no alien plants within project control area during the construction and operation phases.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per the	O&M Operator	Construction and operation

Mitigation: Action/Control	Responsibility	Timeframe
NEM: Biodiversity Act (No. 10 of 2004).		
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	O&M Operator	Construction and operation
Weeds, alien plants and invasive vegetation will be removed should ingress into the site occur. Category 1 (declared weeds) and Category 2 (declared invader plants with a value) according to the Biodiversity Act (No. 10 of 2004) will be removed whenever possible.	O&M Operator	Construction and operation
On-going alien vegetation clearing must be implemented.	O&M Operator	Construction and operation
Immediately control any alien plants that become established using registered control methods.	O&M Operator	Construction and operation
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides.	O&M Operator	Construction and rehabilitation
All areas of the site disturbed by construction must be rehabilitated using locally occurring indigenous plant species.	EPC Contractor	Rehabilitation; Post-construction

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	» Ongoing monitoring of area by Environmental Manager and Operational Manager during operation. » Annual audit of project area and immediate surroundings by qualified botanist. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. » The Environmental Manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE 4: Minimisation of visual impacts

The primary visual impact of the facility and its infrastructure, including the power line, is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Project Component/s	» PV Solar Array » Power line. » Offices and workshops. » Access roads.
Potential Impact	» Visual impact of facility degradation and vegetation rehabilitation failure. » Lighting influences from the facility on surrounding areas.
Activity/Risk Source	» The proposed facility. » Power line. » Access roads
Mitigation: Target/Objective	» To minimise potential for visual impact. » To ensure a well maintained and neat facility.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain the general appearance of the facility in an aesthetically pleasing way.	O&M Operator	Operation.
Monitor rehabilitated areas, and implement remedial action as and when required.	O&M Operator	Operation.
Use of light fixtures and the fitment of covers and shields will be designed to contain rather than spread light.	O&M Operator	Operation and maintenance

Performance Indicator	» Well maintained and neat facility with intact vegetation on and near the facility. » Lighting impact and visual intrusion is minimal and no complaints received from settlements or homesteads.
Monitoring	» Monitoring of rehabilitated areas.

OBJECTIVE 5: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

» Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern across the entire site which is underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
» Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion.
» Degradation of the natural soil profile due to pollution.

Project Component/s	» PV Solar Array » Power line. » Offices and workshops. » Access roads.
Potential Impact	» Soil degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	» Poor rehabilitation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation. » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	Owner O&M Operator	Operation
Ensure dust control on site through the use of an appropriate dust suppression measure.	Owner O&M Operator	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	Owner O&M Operator	Operation

Performance Indicator	» Minimal soil erosion around site. » No increased siltation in drainage lines as a result of the project.
Monitoring	» Water management plan

OBJECTIVE 6: Minimise dust and air emissions

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicle), and from the augmentation plant. Windy conditions and the movement of vehicles on site may lead to dust creation.

Project Component/s	» Hard engineered surfaces » On-site vehicles
Potential Impact	» Dust and particulates from vehicle movement to and on-site.
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle and combustion engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure that nuisance to the community from dust is not visibly excessive.	O&M Contractor	Site establishment and construction
Appropriate dust suppressant must be applied to the roads as required to minimise/control airborne dust.	O&M Contractor	Duration of contract
Speed of vehicles must be restricted, as defined by the Environmental Manager or Operational Manager.	O&M Contractor	Duration of contract
Vehicles and equipment must be maintained in a road-worthy condition at all times.	O&M Contractor	Duration of contract

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented for where required. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.
Monitoring	» Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, and thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 7: Ensure the implementation of an appropriate fire management plan during the operation phase

The vegetation in the study area may be at risk of fire. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Operation and maintenance of the solar energy facility and associated infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the solar energy facility infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods and the solar energy facility and associated infrastructure.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain adequate fire fighting equipment on site.	O&M Operator	Operation
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	O&M Operator	Operation
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.	O&M Operator	Operation
Contact details of emergency services should be prominently displayed on site.	Owner O&M Operator	Operation

Performance Indicator	» Fire fighting equipment and training provided before the construction phase commences. » Appropriate fire breaks in place.
Monitoring	» The project developer must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 8: Maximise local employment, business opportunities and skills development

The proposed facility is expected to require approximately 107 permanent employees including security personnel who would be on site on a permanent basis.

Some local procurement of goods, materials and services could occur which would result in positive economic spin-offs. These opportunities for local service providers to render services to the proposed facility could include maintenance of the guardhouse, gardening at the guardhouse, cleaning services, security services and maintenance or replacement of general equipment

Project Component/s	» Operation and maintenance of the facility.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised. » Capacity building and skills training undertaken during the operational phase.
Activities/Risk Sources	» Locals are not employed where the skills exist. » Local procurement is not undertaken if possible. » Local businesses are not supported. » No contribution towards local development initiatives. » Inefficient training or lack of capacity building and skills training.
Mitigation: Target/Objective	» Maximise the appointment of local employees. » Capacity building and skills training continuously undertaken during the operational phase of the project. » Positive social responsibility initiatives.

Mitigation: Action/Control	Responsibility	Timeframe
A skills development plan should be developed which should concentrate on the transfer of skills to employees to increase their capacity.	O&M Operator	Operation
The Owner should employ local community members where practical.	O&M Operator	Operation
The Owner should consider training and capacity building programmes to lessen the skills disparity.	O&M Operator	Operation
The skill requirements should be communicated to the local community leaders and community based organisations.	O&M Operator	Operation
Make use of local recruitment agencies or other relevant community based organisations to obtain a list of jobseekers.	O&M Operator	Operation
An equitable process whereby minorities and previously	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
disadvantaged individuals (including women) are taken into account should be implemented.		
Local sourcing of materials, general services to assist in providing economic, and employment opportunities for the local people.	O&M Operator	Operation
Capacity building and skills training programmes should form part of the social development support provided to local communities. These programmes should be undertaken according to the needs identified as part of the IDP of the Khai-Ma Local Municipality.	O&M Operator	Operation
In cases for the middle to lower skilled jobs, where the relevant skills do not exist, training should be provided to willing local community members to enable them to fill the positions.	O&M Operator	Operation

Performance Indicator	» Local procurement and employment is undertaken. » Local development initiatives are supported. » Capacity building and skills training programmes part of the social development support provided to local communities
Monitoring	» The project developer should be able to demonstrate that the above indicators are implemented.

OBJECTIVE 8: Appropriate handling and management of hazardous substances and waste

The operation of the solar energy facility will involve the storage of chemicals and hazardous substances, as well as the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste, hazardous waste and liquid waste.

Project Component/s	» Substation. » Fuel for auxiliary supply if required. » Water treatment facilities. » Operation and maintenance staff. » Workshop.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk	» Water storage

Source	» Fuel and oil. » Maintenance building.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	O&M Operator	Operation
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Operator	Operation
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Operator	Operation and maintenance
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.	O&M Operator	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Operator	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	O&M Operator waste management contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority » Waste must be stored and handled according to the relevant legislation and regulations	O&M Operator	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Operator	Operation

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits identifying that waste segregation recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil or water.
Monitoring	» Waste collection must be monitored on a regular basis. » Waste documentation must be completed and available for inspection. » An incidents/complaints register must be maintained, in which any complaints from the community must be logged. » Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the Operational Manager. » All appropriate waste disposal certificates with the monthly reports.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 10

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of at least 20 years and eventual extensions (i.e. with maintenance). Equipment associated with this facility would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the facility would comprise the disassembly and replacement of the solar infrastructure with more appropriate technology/infrastructure available at that time.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section.

» ***Site Preparation***
Site preparation activities will include confirming the integrity of the access to the site to accommodate required equipment, preparation of the site (e.g. lay down areas, construction platform) and the mobilisation of construction equipment.

» ***Disassemble and Remove Infrastructure***
Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

10.1. Objectives

In decommissioning the facility, Ramizone (RF) Proprietary Limited must ensure that:

» All sites not already vegetated are vegetated as soon as possible after operation ceases with species appropriate to the area.
» Any fauna encountered during decommissioning should be removed to safety by a suitably qualified person,
» All structures, foundations and sealed areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as requirement by the relevant legislation.
» All access/service roads not required to be retained by landowners are closed and fully rehabilitated.
» All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» All rehabilitated areas are monitored for erosion.
» Components of the facility are removed from the site and disposed of appropriately.

» Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 7 (Construction) and Chapter 8 (Rehabilitation 8) are also relevant to the proposed project and must be adhered to.

REVISION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME CHAPTER 10

The EMPr is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this draft EMPr be updated to include any site-specific information and specifications as the project develops. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features. In addition, the EMPr should be updated throughout the life of the facility in order to ensure that appropriate measure are included for the minimisation of impacts on the environment. Any amendments must be approved by the Competent Authority (i.e. DEA) prior to implementation, unless these are required to address an emergency situation.