PROPOSED PHOTOVOLTAIC (PV) SOLAR FACILITY ON A SITE NORTH-EAST OF UPINGTON, NORTHERN CAPE PROVINCE,

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the Final Environmental Impact Assessment Report
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Prepared for

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

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.

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.

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.

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 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 on-going maintenance after implementation.

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.

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.

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: 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.

TABLE OF CONTENTS

PURPOSE AND OBJECTIVES OF THE EMP CHAPTER 1

An Environmental Management Programme (EMP) 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 EMP 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 EMP 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 EMP is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMP 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 rehabilitation (i.e. soil stabilisation, re-vegetation), during operation and decommissioning (i.e. similar to construction phase activities).

This EMP has been compiled in accordance with Section 33 of the EIA Regulations (GG No 33306 of 18 June 2010) and will be further developed in terms of specific requirements listed in any authorisations issued for the proposed project. The EMP 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 EMP 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.

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

- 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.
- 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 EMP, and ensure the minimisation of adverse environmental impacts to an acceptable level.

African Rainbow Energy (Pty) Ltd 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 EMP and through its integration into the contract documentation. Since this EMP 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 EMP 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 EMP and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMP, unless otherwise agreed by the authorities in writing. Similarly, any provisions in current legislation overrule any provisions or interpretations within this EMP.

This EMP 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.

PROJECT DETAILS *CHAPTER 2*

African Rainbow Energy (Pty) Ltd is proposing the establishment of a commercial solar energy facility and associated infrastructure for the purpose of electricity generation on a site northeast of Upington in the Northern Cape Province. The facility will have a generating capacity of ~**25 MW**. A locality map of the site is shown in Figure 2.1.

The proposed solar energy facility is to make use of photovoltaic (PV) technology and will be comprised of the following infrastructure:

» An array of **photovoltaic panels** (100 000 modules).
» **Support structures** to mount the photovoltaic panels. The angle of the panels will be tilted at 25^{o} from the horizontal plane, facing north and may be adjusted to optimise for summer or winter solar radiation characteristics and for daily movement of the sun east to west. The maximum height of the PV panels once mounted will be approximately 2 metres from ground level.
» **Invertors** which are required to convert the electricity from direct current to alternating current.
» Either one of the two grid connection options are being considered for this project (Note that the choice of grid connection option):
  o Building an onsite switching station (70m x 70m in extent) and a short turn-in power line (132 kV and ~550 m in length) to connect into the existing Gorona – Gordonia powerline which is located north of the site **(See Figure 2.2)**; OR
  o Building a new 22 kV power line from the site to Gordonia substation (for this option a switching station will be built next to or within the Gordonia substation) **(See Figure 2.3).**
» **Cabling** between project components, to be laid underground where practical.
» **Access roads** with a width of less than 5 m within the site (for the purposes of construction and limited maintenance during operation).
» Temporary **laydown** and **storage areas** in an area less than 1 hectare close to an existing house to be used as the site office.

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. drainage lines, flora, habitat loss for fauna and a protected tree species)
» Impacts on soils
» Potential impact on heritage and/or palaeontological resources
» Social Impacts

The specialist studies undertaken in the EIA Phase did not identify any absolute "No-Go" areas for the proposed facility. However, the following ecologically sensitive areas were identified:

» All non-perennial drainage lines and dry river beds on site indicated as being of high sensitivity. These are considered to be areas that provide high value ecosystem goods and services and also contain high numbers of protected trees.
» All other remaining natural areas on site, all of which contain moderate densities of protected trees are indicated as being of moderate sensitivity.

A preliminary layout has been prepared by African Rainbow Energy taking cognisance of these identified sensitivities.

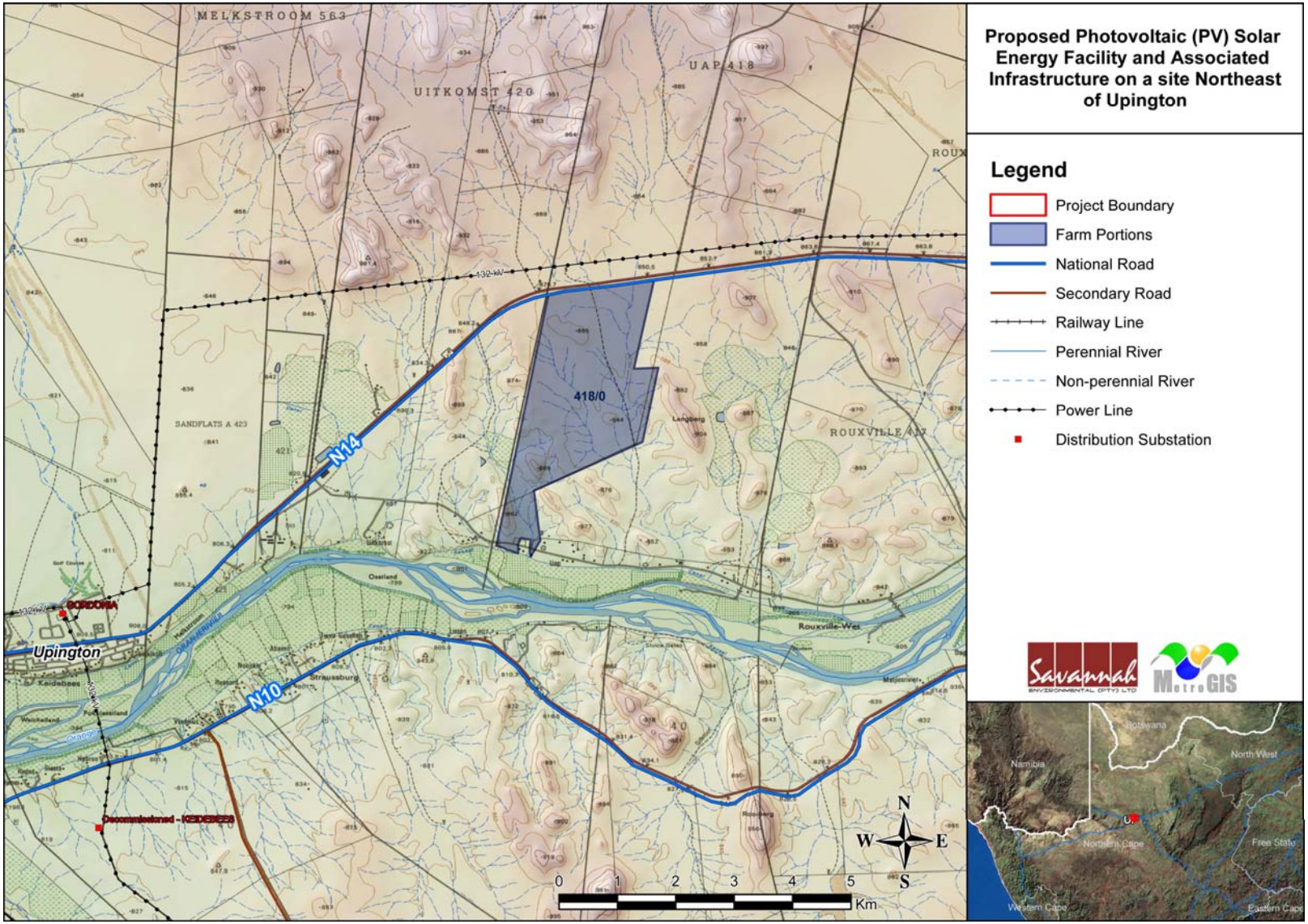

Figure 2.1: Locality map illustrating the location of the proposed development site for the PV Solar Energy Facility on Portion 0 of Farm UAP

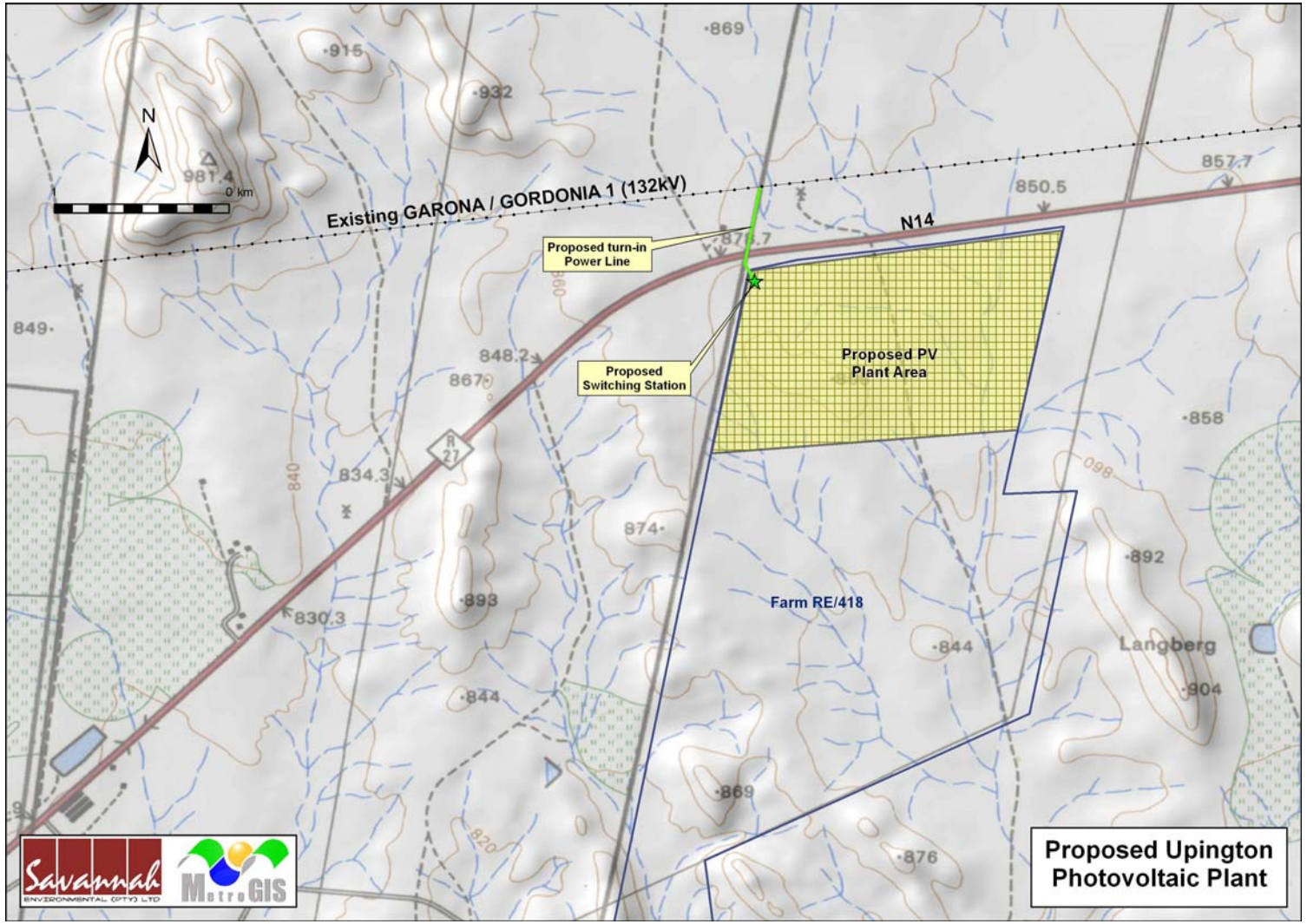

Figure 2.2: Grid connection Option A: Building an onsite switching station and a short turn-in power line

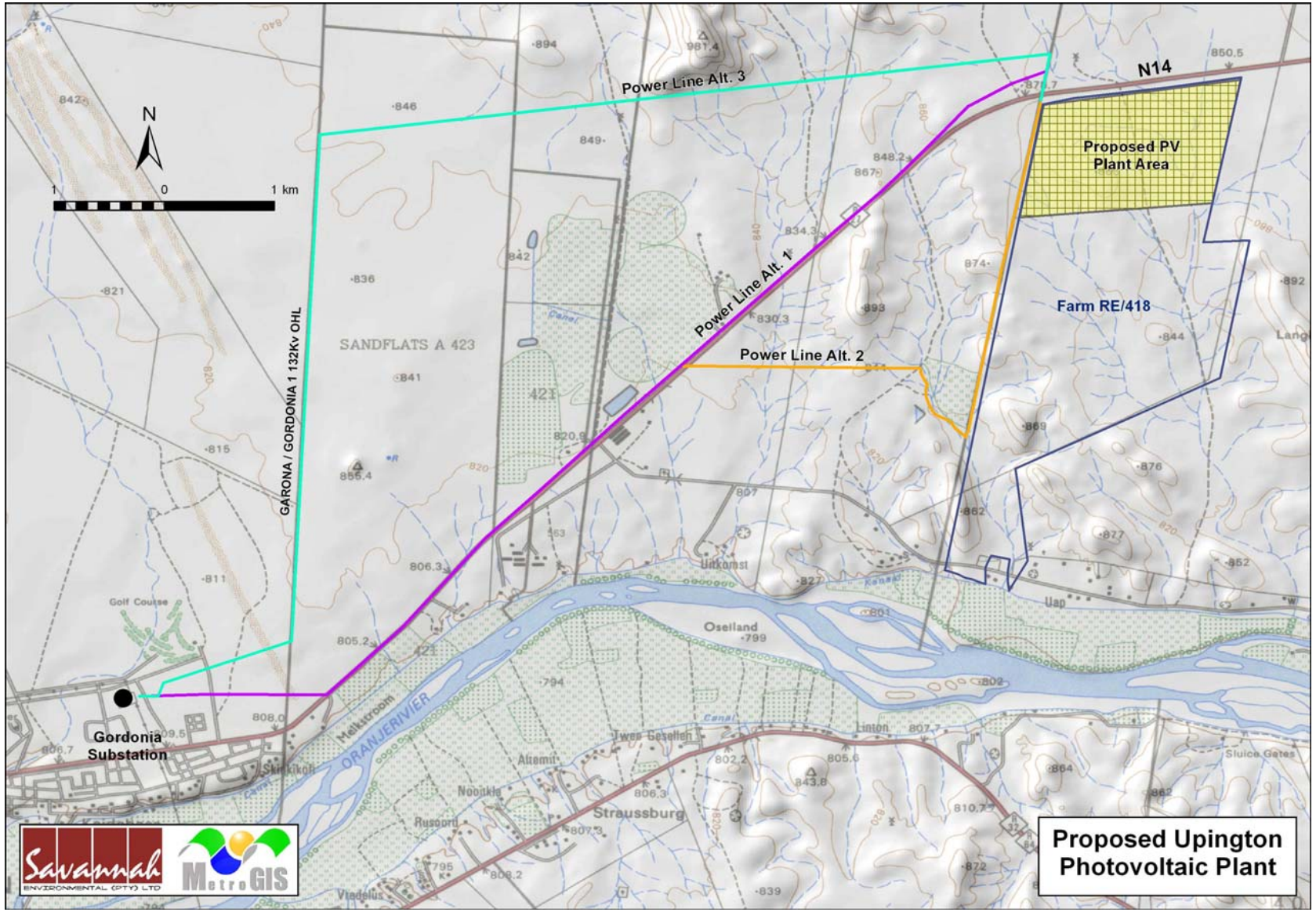

Figure 2.3: Grid connection Option B: Building a new 22 kV power line from the site to Gordonia substation (and potential corridors)

2.1 Activities and Components associated with the Solar Energy Facility

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

The construction of the project is expected to extend over a period of 6 months. Approximately 250 employment opportunities will be created at peak of construction. The low skilled personnel are likely to be sourced from the nearest towns and will commute from their homes on a daily basis to the site, possibly through buses arranged by lead contractor ABB South Africa. Therefore any overnight on-site employees would be limited to security. Workers not living in the area, including those for skilled positions, will not be housed on site.

Activity	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 will be confirmed. The geotechnical study will look at flood potential, foundation conditions, potential for excavations, and the availability of natural construction materials. This study will serve to inform the type of foundations required to be built and the extent of earthworks and compaction required in the establishment of any internal access roads. » *Site survey* – this will be required to finalise the design layout of the solar field and other associated infrastructure. The finalisation will need to be confirmed in line with the Environmental Authorisation issued for the facility. » *Power line servitude survey* – once the placement of the towers for the powerline has been finalised, a walk through survey will be undertaken for ecological, archaeology and heritage resources which may necessitate certain towers to be moved to avoid sensitivities.
Upgrade of main access to the site road and existing access on the site	» The identified farm portion for the proposed facility can be accessed via the N14 and an unnamed existing access road to the site. The access gravel road will have to be improved. » Internal access roads will be established for construction and maintenance purposes. The extent of earthworks and compaction required in the establishment of the access roads will be established through the detailed geotechnical study which will be undertaken as part of the design phase.
Undertake site preparation	» Site preparation activities will include clearance of vegetation at the footprint of the area infrastructure (i.e.

Activity	Description
	PV panels, switching station), and linear components (i.e. internal access roads, powerline towers). These activities will require partial stripping of topsoil which will need to be stockpiled, backfilled and/or spread on site.
Transport of components and equipment to site	» The components for the proposed facility will be transported to site, in sections, by road. Some of the transformer may be defined as abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989)[2] by virtue of the dimensional limitations (i.e. length and weight). The typical civil engineering construction equipment will need to be brought to the site (e.g. excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the establishment of the substation and powerline. .
Establishment of construction camps and laydown areas	» Once the required construction equipment has been transported to site, dedicated equipment camp(s) and laydown area(s) will be required. » The construction camp(s) serve to confine activities and storage of equipment to designated area(s) to limit the potential ecological impacts associated with this phase of the project. The laydown area(s) will be used for assembly purposes and the general placement/storage of construction equipment. » Fuel required for the on-site construction vehicles and equipment might need to be secured in a temporary bunded facility within the construction camp(s) to prevent leakages and soil contamination.
Establishment of the PV panels and invertors	» Foundation holes for the PV panels will be mechanically excavated to a depth of approximately 100 - 130 cm. Thereafter the panel mounting will be assembled. » The installation of the underground cables between the PV panels and the inverters and between the inverters and the switching station will require the excavation of trenches of approximately 40cm – 100cm deep within which they can then be laid.
Construction of the switching station	» The substation, if adopted, will be constructed with footprint of up to 70m x 70m. The substation would be constructed in the following simplified sequence: » Step 1: Survey of the site » Step 2: Site clearing and levelling » Step 3: Construction of terraces and foundations » Step 4: Assembly, erection and installation of equipment (including transformers)

[2] A permit will be required for the transportation of these abnormal loads on public roads.

Activity	Description
	» Step 5: Connection of conductors to equipment; and » Step 6: Rehabilitation of any disturbed areas and protection of erosion sensitive areas.
Place waste storage tanks underground	» The water storage tanks required for rainwater harvesting will be located underground. This system will require gutters to be developed underneath the PV panels, with drainage pipes leading to the storage tank. » The holes for the storage tanks will be excavated.
Undertake site rehabilitation	» Once construction is complete and all construction equipment is removed, the site must be rehabilitated where practical and reasonable. On full commissioning of the facility, any access points to the site which are not required during the operational phase must be closed and prepared for rehabilitation.

2.1.1. Operation and Maintenance Phase

Approximately 11 staff members are expected to be required on-site (consisting of technicians; general employees and security staff).

The following operation and maintenance activities are expected to form part of the project scope of works.

Activity	Description
Operation of the photovoltaic panels and the associated electrical infrastructure	» Multiple PV panels will be linked to form numerous loops. The PV panels will convert the light energy from the incoming radiation into electrical energy (i.e. as direct current). An individual inverter which will service each loop to change the power to alternating current. Thereafter the electricity will be conveyed to the substation via the underground cabling, the powerline, and then to one of the proposed powerline alternatives.
Site operation and maintenance	» It is anticipated that full-time security, maintenance, and control room staff will be required on site. » Each component within the facility will be operational except under circumstances of mechanical breakdown, unfavourable weather conditions, or routine maintenance activities. » Regular Grass cutting / vegetation trimming » Cleaning of the PV panels (twice a year) using water from the water storage tanks

2.1.2. Decommissioning Phase

The facility is expected to have a lifespan of 25+ years (i.e. with maintenance). The facility infrastructure would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities would comprise the disassembly and replacement of the individual components with more appropriate technology/infrastructure available at that time. The following decommissioning activities will form part of the project scope.

Activity	Description
Site preparation	Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment (e.g. lay down areas and decommissioning camp) and the mobilisation of decommissioning equipment.
Disassemble and replace existing components	The components would be disassembled, and reused and recycled (where possible), or disposed of in accordance with regulatory requirements.

STRUCTURE OF THIS EMP CHAPTER 3

The first two chapters provide background to the EMP and the proposed project, while the chapters which follow consider the following:

» Key legislation applicable to the development
» Planning and design activities
» Construction activities
» Operation activities
» Decommissioning activities

These chapters set out the procedures necessary for African Rainbow Energy, as the project developer, 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 EMP table has been established for each environmental objective. The information provided within the EMP 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 EMP 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.

3.1. Project Team

This Draft EMP was compiled by:

Name	Company
EMP Compilers	
Ravisha Ajodhapersadh – Environmental Assessment Practitioner (EAP) Jo-Anne Thomas – Project Manager	Savannah Environmental
Specialists	
David Hoare – fauna, flora and ecology	David Hoare Consulting
Iain Paton	Outeniqua Geotechnical Services
Johnny van Schalkwyk (Archaeologist)	-
Lourens du Plessis – Visual aesthetics	MetroGIS
Ingrid Snyman- Social	Batho Earth
Bruce Rubridge - Palaeontology	Rubridge Trading

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

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT CHAPTER 4

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

- National Environmental Management Act (Act No. 107 of 1998)
- EIA Regulations, published under Chapter 5 of the NEMA (GN R385, GN R386 and GN R387 in Government Gazette 28753 of 21 April 2006)
- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
  - Guideline 4: Public Participation in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, May 2006)
  - Guideline 5: Assessment of alternatives and impacts in support of the Environmental Impact Assessment Regulations, 2006 (DEAT, June 2006)
- Integrated Environmental Management Information Series (published by DEA)
- International guidelines – the 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 4.1: Relevant legislative and permitting requirements

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed 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 assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GNR 387 of 21 April 2006, a Scoping and EIA Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority Department of Environment and Nature Conservation – commenting authority	The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA). This EIA Report will be submitted to the competent and commenting authority in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	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	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.		consideration of potential impacts (cumulative, direct, and indirect). It will continue to 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)	Department of Environmental Affairs Department of Environment and Nature Conservation Local Authorities	Noise impacts are expected to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation. On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act 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.	Department of Water Affairs Provincial Department of Water Affairs	A water use license (WUL) is required to be obtained if drainage lines are impacts on. Currently only non-perennial drainage lines occur on the site and will not be impacted by the proposed layout of the facility.
National Water Act (Act No 36 of 1998)	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.	Department of Water Affairs Provincial Department of Water Affairs	This section of the Act will apply with respect to the potential impact on drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
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 (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Environmental Management Plans are set out in S39 of the Act.		
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.	Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation. 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.
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, powerline, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and » Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent.	South African Heritage Resources Agency	A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development. A HIA has been undertaken as part of the EIA Process to identify heritage sites.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Stand alone HIAs are not required where an EIA Process 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.		
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007. In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations	Department of Environmental Affairs	As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard. Specialist flora and fauna studies have been undertaken as part of the EIA Phase. As such the potentially occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered, within the EIA report.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.	Department of Agriculture	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.
National Forests Act (Act No. 84 of 1998)	» In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or	National Department of Forestry	As protected tree species have been identified on the proposed development site, a permit would need to be obtained for any protected trees that are affected by the development.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated". » GN 1042 provides a list of protected tree species.		
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land. In terms of S12 the applicant must ensure that the firebreak is 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 S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.	Department of Water Affairs	While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and operational phase of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
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 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 as Group I or Group II substance Group IV: any electronic product; and	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. If applicable, a license is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	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.		
Development Facilitation Act (Act No 67 of 1995)	Provides for the overall framework and administrative structures for planning throughout the Republic. S(2 - 4) provide general principles for land development and conflict resolution.	Local Municipality District Municipality	The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the Act.
Subdivision of Agricultural Land Act (Act No 70 of 1970)	Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province	Local Municipality District Municipality	Subdivision will have to be in place prior to any subdivision approval in terms of S24 and S17 of the Act.
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. The Minister may amend the list by – » Adding other waste management	National Department of Water and Environmental Affairs Provincial Department of Environmental Affairs (general waste)	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 718), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » 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. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away.		the requirements of the Act, as detailed in the EMP (refer to Appendix J). The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.		
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,	» 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
	limitations, and 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.		
Promotion of Access to Information Act (Act No 2 of 2000)	All requests for access to information held by state or private body are provided for in the Act under S11.	Department of Environmental Affairs	No permitting or licensing requirements.
Promotion of Administrative Justice Act (Act No 3 of 2000)	In terms of S3 the government is required to act lawfully and take procedurally fair, reasonable, and rational decisions. Interested and affected parties have right to be heard.	Department of Environmental Affairs	No permitting or licensing requirements.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
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; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of a property; » Aquatic habitats may not be destroyed or damaged; and » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species.	Department of Environment and Nature Conservation	No permitting or licensing requirements.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	The Act provides lists of protected species for the Province.		
Nature Conservation Ordinance (Act No. 19 of 1974)	» Article 63 prohibits the picking of certain fauna (including cutting, chopping, taking, and gathering, uprooting, damaging, or destroying). » Schedule 3 lists endangered flora and Schedule 4 lists protected flora. » Articles 26 to 47 regulate the use of wild animals.	Provincial Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation for the proposed activities to be undertaken for the proposed project.

MANAGEMENT PROGRAMME: PLANNING AND DESIGN CHAPTER 5

Overall Goal: undertake the planning and design phase in a way that:

» Ensures that the design of the facility responds to the identified environmental constraints and opportunities.
» 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 (i.e. access roads and the power line).
» 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.

5.1 Objectives

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

No absolute *'no go'* areas were identified by the specialists during the EIA Phase. However, a number of potentially sensitive areas / features were identified to be associated with the proposed project, which included:

» All non-perennial drainage lines and dry river beds on site. They are considered to be areas that provide high value ecosystem goods and services and also contain high numbers of protected trees.
» All other remaining natural areas on site, all of which contain moderate densities of protected trees.

Project Component/s	» Solar field and associated infrastructure » Power generation components and associated infrastructure » Access roads. » Power line.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of all the facilities components (i.e. including area infrastructure, the powerline and access roads).

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
Site survey to peg the location of the PV panels and power line.	Project Engineer	Design
Obtain tree cutting permit for the removal of protected trees from the Provincial DAFF: Forestry Branch for all affected tree species.	African Rainbow Energy	Project planning
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 African Rainbow Energy	Design review
External access point and internal access road to be carefully planned to maximise road user safety.	African Rainbow Energy	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).	African Rainbow Energy	Design
Before construction commences, representatives from the Khara Heis 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.	African Rainbow Energy, EPC Partner and Contractor, Khara Hais Local Municipality	Construction
Ensure that layout of the power line towers are constructed at least 50 m from the drainage lines (i.e. span the watercourses).	African Rainbow Energy	Design
Drainage lines and their associated riparian vegetation should be avoided as far as possible. Where this is not possible, a water use license to impact on these areas may be required to be obtained from the Department of Water Affairs.	African Rainbow Energy	Design
A buffer of approximately 30 m in width of intact natural vegetation to be left along the perimeter of the development area and/or along the site boundary	African Rainbow Energy	Design

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.
Monitoring	» Review of the design by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction.

MANAGEMENT PROGRAMME: CONSTRUCTION CHAPTER 6

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

» Ensures that construction activities are properly 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 and habitats of ecological value (i.e. drainage lines).
» Minimises impacts on fauna using the site.
» Minimises the impact on heritage resources
» Establishes an environmental baseline during construction activities on the site, where possible.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

As the proponent, African Rainbow Energy 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 of the EMP, and the implementation of the EMP through its integration into the contract documentation. African Rainbow Energy will retain various key roles and responsibilities during the construction of the facility.

OBJECTIVE: Establish clear reporting, communication, and responsibilities in relation to overall implementation of environmental management plant

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager; Site Manager; Safety, Health and Environment Representative; Environmental Control Officer (ECO) and Contractor for the construction phase of this project are as detailed below.

Project 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 African Rainbow Energy and its Contractor(s) are made aware of all stipulations within the EMP
- Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes
- Be fully conversant with the EIA for the project, the EMP, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation

Site Manager (African Rainbow Energy'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 (once issued)
- Be fully knowledgeable with the contents of the EMP
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these
- Have overall responsibility of the EMP and its implementation
- Conduct audits to ensure compliance to the EMP
- Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- 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

Environmental Control Officer (ECO) will be responsible for monitoring, reviewing, and verifying compliance by the Contractor with the environmental specification and accordingly will:

- Be fully knowledgeable with the contents with the EIA.
- Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
- Be fully knowledgeable with the contents with the EMP.
- 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 EMP is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Ensure that if the EMP conditions or specifications are not followed then appropriate measures are undertaken to address this.

- 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.
- Ensure that activities on site comply with all relevant environmental legislation.
- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMP.
- Ensure that the compilation of progress reports for submission to the Project Manager, 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.
- Ensure that any non-compliance or remedial measures that need to be applied are reported

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 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 contractor's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- A copy of the EMP must be easily accessible to all on-site staff members.
- Employees must be familiar with the requirements of this EMP and the environmental specifications as they apply to the construction of the proposed facility.
- Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Staff will be informed of environmental issues as deemed necessary by the 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 EMP.
- 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 EMP (i.e. ensure their staff are appropriately trained as to the environmental obligations).

6.2 Objectives

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

OBJECTIVE: Minimise impacts related to site establishment

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

All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consist of a minimum of three strands of wire wrapped with danger tape). Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.

Project Component/s	» Area infrastructure (i.e. PV panels, etc.). » Linear infrastructure (i.e. powerline, 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 animal species
Activities/Risk Sources	» Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation:	» To secure the site against unauthorised entry.

Target / Objective	» 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 ECO.	Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area.	Contractor	Site establishment, and duration of construction
Fence and secure contractor's equipment camp.	Contractor	Site establishment
Establish appropriately bunded areas for storage of hazardous materials.	Contractor	Site establishment
All development footprints for the roads and powerline should be clearly demarcated.	Contractor	Site establishment, and duration of construction
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.	Contractor	Site establishment, and duration of construction
Supply adequate waste collection bins 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.	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.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMP. » 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: Appropriate management of the construction site and construction workers

No construction workers will be accommodated on site. Construction workers are to be accommodated in the closest towns. Construction equipment will need to be stored at appropriate locations on site, and security personnel will be required to be full-time 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 (once issued), the EIA Report, and this EMP, as well as the requirements of all relevant environmental legislation.

Project Component/s	» PV plant » Access roads » Power line
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 Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMP, 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 will take cognisance of any sensitive areas identified by the EIA studies. The location of this construction equipment camp/s shall be approved by the project ECO.	Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment,

Mitigation: Action/Control	Responsibility	Timeframe
		and during construction
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract
Ensure ablution facilities are well maintained.	Contractor	Site establishment, and duration of construction
Ensure waste removal facilities are maintained and emptied as and when required.	Contractor	Site establishment, and duration of construction
The terms of this EMP and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors' contracts	African Rainbow Energy	Tender process
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.	Contractor	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas. These facilities must be regularly serviced by appropriate contractors. A minimum of one toilet shall be provided per 15 persons at each working area such as the Contractor's camp	Contractor and sub-contractor/s	Duration of contract
Cooking/meals must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	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.	Contractor and sub-contractor/s	Duration of contract
No one other than the ECO or personnel authorised by the ECO may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Fire fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
Provide opportunities for workers to go home over weekends where required and practically possible.	Contractor and sub-contractor/s	Construction
On completion of the construction phase, all	Contractor and	Construction

Mitigation: Action/Control	Responsibility	Timeframe
construction workers must leave the site within one week of their contract ending.	sub-contractor/s	

Performance Indicator	» The construction camps have avoided sensitive areas, as approved by the ECO. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mis-management. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not reported by the ECO. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » 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 disposal of sewage at an appropriate waste water treatment works. » An incident reporting system should be used to record non-conformances to the EMP. » Observation and supervision of Contractor practices throughout construction phase by the ECO. » Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMP.

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

Although limited, employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers. The unemployment rate in the study area is quite high and there are therefore various individuals in the area in search of employment. Employment of locals and the involvement of local SMMEs would enhance the social benefits associated with the project, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs.

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
Make maximum use of local employment and set up a labour desk that undertakes a skills audit of the available workforce within the closest communities.	African Rainbow Energy ,Local Municipality, and contractor	Duration of construction
Make use of any existing databases of available workers and include the local councillor and other representative community structures in the process.	African Rainbow Energy, Local Municipality, and contractor	Pre-construction
Project contracts between African Rainbow Energy and the main contractor should stipulate the use of local labour for unskilled and semi-skilled positions and tasks	African Rainbow Energy, and Local Municipality	Duration of construction
Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project.	African Rainbow Energy, Local Municipality, and contractor	Pre-construction
Reserve a percentage of the workforce for women and the disabled (if possible).	African Rainbow Energy, and Contractor	Pre-construction
Recruitment adverts could be placed at strategic public localities in the local towns (e.g. Upington).	African Rainbow Energy, and Contractor	Pre-construction
Project requirements should be discussed with community representatives so avoid unrealistic expectations among local community members	African Rainbow Energy, and Contractor	Pre-construction and construction

Mitigation: Action/Control	Responsibility	Timeframe
Remuneration packages should take cognisance of existing remuneration provided to local labourers	African Rainbow Energy	Pre-construction and construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily 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	» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Maximise capacity building and skills training, and address economic inequities within the study area

As the construction phase would involve unskilled, semi-skilled, and skilled workers it is likely that locals could be sourced for the unskilled and semi-skilled positions, thereby there should be sufficient numbers of individuals to choose from. There would be various unemployed individuals in search of employment, even if they can only secure temporary positions. Even though all those that would be employed might not have the necessary applicable skills, this issue could be addressed through proper focussed skills training and capacity building initiatives after locals have been sourced, but prior to construction activities starting.

Project Component/s	» Availability of required skills in the local communities.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business could be maximised.
Activities/Risk Sources	» Unavailability of locals with the required skills resulting in locals not being employed and labour being sourced from outside the municipal area. » Locals are unavailable to assist farmers during pruning and

	harvesting seasons. » Higher skilled positions might be sourced internationally.
Mitigation: Target/Objective	» Employment of a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible. » Appropriate skills training and capacity building

Mitigation: Action/Control	Responsibility	Timeframe
The developer, in discussions with the Local Municipality, should aim to employ a maximum number of the low-skilled and/or semi-skilled workers from the local area where possible.	African Rainbow Energy, and Local Municipality	Duration of construction
A broad-based approach should be followed to identify and involve relevant organisations in identifying people whose skills may correspond with the job specifications.	African Rainbow Energy, and Local Municipality	Pre-construction
In cases for the semi-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.	African Rainbow Energy, and Local Municipality	Duration of construction
A proactive consultative skills-audit should be undertaken in the local communities where job creation is currently a significant need.	African Rainbow Energy, and Local Municipality	Pre-construction, and construction
Appropriate training should be provided as per a skills development plan to narrow the gap between skills and demand. It is preferable that training be of such a nature that the skills thereby acquired are transferable and of real benefit in other employment contexts.	African Rainbow Energy, and Local Municipality	Pre-construction, and construction

Performance Indicator	» A skills development plan is developed. » Job opportunities, especially of lower skilled positions, are primarily awarded to members of local communities. » Skills training and capacity building initiatives are developed and implemented. » Local SMMEs and/or entrepreneurs awarded the opportunity to become involved in the tender process.
Monitoring	» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE: Avoid negative social impacts associated with the inflow of outsiders to the area

Approximately 250 construction workers would be involved with the project at the peak of the construction period. The timeframe for the proposed construction period is approximately 9 months. Even though the inflow of jobseekers is likely to occur, the probability of this issue becoming problematic and resulting in severe negative social impacts is seen to be improbable.

Other possible negative impacts due to the workforce's presence in the area and especially when jobseekers come to the area would include misconduct of workers, trespassing of workers on privately owned farms, the possible increase in crime, littering, increase in traffic, increase in noise, the development of informal vending stations, and poaching of livestock.

Project component/s	» Construction and establishment of activities associated with the establishment of the facility and associated infrastructure and the inflow of workers and jobseekers as a result of these activities.
Potential Impact	» Intrusion impacts on neighbouring property owners » Outsiders placing an additional burden on the provision of services and infrastructure » Possible negative social impacts due to jobseekers at the site and the impact on infrastructure and services should they remain in the area
Activities/risk sources	» EPC partner and/or contractor not employing local labour where possible. » The inflow of various specialists from outside the study area and even abroad » Sourcing of individuals outside the municipal area
Mitigation: Target/Objective	» The developer should aim to employ a maximum number of the low-skilled to semi-skilled workers from the local area where possible. This should also be stipulated in the tender documentation and contractors should adhere to this guideline. Inputs from the Kheis Municipality in this regard would be critical.

Mitigation: Action/control	Responsibility	Timeframe
The use of local labour will help to avoid many of the negative impacts and conflict that might occur due to friction between a local and 'outside' labour force.	African Rainbow Energy, !Kheis Municipality, EPC Partner & Contractor	Pre-Construction and Construction

Mitigation: Action/control	Responsibility	Timeframe
Local labourers should remain at their existing residences and no workers can be allowed on site during night time, apart from security guards. No workers should thus be accommodated on site at night except for the security personnel.	African Rainbow Energy, EPC Partner & Contractor	Construction
Establish a labour desk that deals with job seekers and to discourage the gathering of people at unsuitable localities. The contractor and labour desk should clearly communicate the extent of the work and number of workers required to the affected Municipalities and job seekers to avoid unnecessary expectations regarding employment opportunities.	African Rainbow Energy, !Kheis Municipality, EPC Partner & Contractor	Pre-Construction and Construction
The contractor should be contractually obliged to give preference to a local labour force, as far as possible.	African Rainbow Energy, EPC Partner & Contractor	Pre-Construction and Construction
Co-ordinate and work through the !Kheis Municipality and relevant community organisations to source individuals with the relevant skills and those in need of employment	African Rainbow Energy, !Kheis Municipality, EPC Partner & Contractor	Pre-Construction and Construction and Operation
Outside members of the construction team must be accommodated in suitable existing housing facilities within the area.	African Rainbow Energy, !Kheis Municipality, EPC Partner & Contractor	Construction
Construction workers should wear uniforms and identity tags.	African Rainbow Energy, EPC Partner & Contractor	Construction
Working hours should remain at normal working hours (e.g. 7 am to 5 pm during weekdays).	African Rainbow Energy, EPC Partner & Contractor	Construction
The construction area should be properly fenced and security personnel should be on site on a permanent basis.	EPC Partner & Contractor	Construction
Security cameras should be places at all entrances to the site and any identified strategic locations	African Rainbow Energy, EPC Partner & Contractor	Pre-Construction and Construction
Trespassing of workers on adjacent privately owned farms should be avoided at all costs. Construction workers should remain at the construction site.	EPC Partner & Contractor	Construction
The public participation process and	African Rainbow	Pre-Construction and

Mitigation: Action/control	Responsibility	Timeframe
communication efforts as part of the EIA for this project should continue. A communication process should thus be maintained by African Rainbow Energy to ensure transparent communication between African Rainbow Energy and the directly affected property owners. Property owners should be kept informed of the size of the workforce and timeframes for construction and completion.	Energy, EPC Partner & Contractor	Construction
Sufficient water and sanitation facilities should be provided for the workers on site during the construction period.	African Rainbow Energy, EPC Partner & Contractor	Construction
The construction site should be properly managed to avoid any environmental pollution (due to inadequate water and waste infrastructure and services) and littering.	African Rainbow Energy, EPC Partner & Contractor	Construction
If any type of informal vending stations develop on or near the construction site it should be strictly managed.	African Rainbow Energy, EPC Partner & Contractor	Construction

Performance Indicator	» Job opportunities, especially of low to semi-skilled positions, are primarily awarded to members of local communities. » Locals and previously disadvantaged individuals (women) are taken into account during the hiring process. » SMMEs are awarded with contracts during the construction and operational phase. » Labour, entrepreneurs, businesses, and SMME's from the local sector are awarded with jobs, 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	» Appointed ECO must monitor indicators listed above to ensure compliance.

OBJECTIVE: Minimise impacts related to traffic management and transportation of equipment and materials to site

This would include heavy and light vehicles transporting goods and building materials. At this stage it is not clear how many vehicles would make use of this road on a daily basis but it is expected that it would increase the traffic volume on the N14 from Upington to the site.

Project Component/s	» 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.
Activities/Risk Sources	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix cement from off-site batching plant to the site. » Mobile construction equipment movement on-site. » Powerline and substation construction activities.
Mitigation: Target/Objective	» 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 potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions

Mitigation: Action/Control	Responsibility	Timeframe
The contractor's plans, procedures and schedules, as well as the anticipated intrusion impacts should be clarified with affected parties prior to the commencement of construction activities on site.	African Rainbow Energy and ECO	Pre-construction
Gravel roads should be sprayed with water to limit dust creation if economically feasible and reasonable from an environmental perspective (water scarce area), or an appropriate alternative dust suppressant should be	African Rainbow Energy and ECO	Construction

Mitigation: Action / Control	Responsibility	Timeframe
used.		
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.	Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	African Rainbow Energy and ECO	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction
A designated, sign-posted access to the proposed site must be created to ensure safe entry and exit.	Contractor	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	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.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards).	Contractor	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor	Duration of contract

Performance Indicator	» Vehicles keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules. » No construction traffic related accidents are experienced. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE: 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. 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	» Safety of individuals and animals are at risk. » Theft of livestock. » Theft of construction material. » On-site accidents. » Spread of sexually transmitted diseases. » 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
Inspect construction vehicles on a regular basis to ensure their road worthiness.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operational Phases
Ensure that heavy vehicles comply with speed limits and other traffic rules. Display a contact telephone number on the vehicles whereby other motorists could lodge complaints.	African Rainbow Energy, EPC Partner and Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Install penalties for drivers disobeying traffic rules.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operational Phases
Ensure a safe turn-off from secondary roads to the access route.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operational Phases
Rehabilitation of local roads should be undertaken if damaged by construction vehicles.	African Rainbow Energy, EPC Partner and Contractor	Construction
The contractor should be responsible for regular upgrading of the local gravel access road (grading) and the internal access roads.	African Rainbow Energy, EPC Partner and Contractor	Construction
The entrance to the site should be clearly indicated. Should any road upgrading at the entrance be required, it should be undertaken in consultation with the Northern Cape Department of Transport, Roads and Public Work and SANRAL (for national roads).	African Rainbow Energy, EPC Partner and Contractor	Pre-Construction and Construction
Fence off the construction area and restrict unauthorised access.	African Rainbow Energy, EPC Partner and Contractor	Construction
Prohibit any movement of workers outside the designated footprint area and implement measures to prevent stock theft and poaching (e.g. surveillance cameras at strategic locations).	African Rainbow Energy, EPC Partner and Contractor	Construction
Security cameras to be installed at the entrance to the site.	African Rainbow Energy, EPC Partner and Contractor	Construction
Construction workers and permanent employees should be easily identifiable by wearing uniforms and even identity tags.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operational Phases
The construction site should be properly managed to avoid any environmental pollution (due to inadequate water and waste infrastructure and services) and littering.	African Rainbow Energy, EPC Partner and Contractor	Construction
Information distributed as part of the existing HIV/Aids awareness campaigns should again be focused on and communicated to the local workforce.	African Rainbow Energy, EPC Partner and Contractor	Construction
Only workers that are on duty and security personnel should be allowed on	African Rainbow Energy, EPC Partner	Construction

Mitigation: Action/control	Responsibility	Timeframe
site.	and Contractor	
The use of alcohol and illegal substances should not be allowed on site.	African Rainbow Energy, EPC Partner and Contractor	Construction
Limit noise generating activities at the site after hours.	African Rainbow Energy, EPC Partner and Contractor	Construction
Workers must not be allowed to overnight on the premises and must be brought in and taken to their places of residence by bus on a daily basis.	African Rainbow Energy, EPC Partner and Contractor	Construction
The access road south-east of the site (which is the only access road planned) must be fitted with security cameras and equipped with a controlled barrier (or equivalent), and must only be accessible to authorised neighbours.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
The two other access points to the farm are not to be used by construction vehicles and should be fitted with video surveillance for the duration of the construction period.	African Rainbow Energy, EPC Partner and Contractor	Construction
The PV facility must be fenced (partially by electrical fencing) to limit access.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
The PV facility should be equipped with surveillance around its perimeter.	African Rainbow Energy	Operation
The proponent could be held liable for proven stock or game theft during construction by having insurance to cover losses.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
A Health and Safety Plan should be implemented and it must be ensured that all team leaders are qualified in First Aid and other relevant safety courses.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Workers should wear identifiable clothes and should not be allowed to leave the construction site or trespass on private properties.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Apart from security personnel and other authorised workers, no one is allowed to enter the construction site without permission.	African Rainbow Energy, EPC Partner and Contractor	Construction
African Rainbow Energy could assist	African Rainbow	Construction and

Mitigation: Action/control	Responsibility	Timeframe
neighbouring property owners with regular inspections of the fence around the entire farm.	Energy, EPC Partner and Contractor	Operation
Implement safety measures at the plant to limit fire hazards, such as maintain short grass, implement fire breaks around the facility and install a lightning pole.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Safety monitoring on the access road should be implemented	African Rainbow Energy	Operation
African Rainbow Energy should, in conjunction with the property owners, develop management and implement emergency procedures for veld fire management and for lightening.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Make the contact details of the Health and Safety Officer of the contractor's team available to the local community and communicate procedures to lodge complaints to the Municipality and community representatives.	African Rainbow Energy, EPC Partner and Contractor	Pre-Construction
Provide adequate drinking water and appropriate sanitation facilities to the workers. Sanitation facilities to be cleaned and serviced on a regular basis.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Dispose of rubble and other household waste appropriately and on a regular basis.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Implement a social responsibility strategy and embark on a HIV/Aids awareness campaign amongst the workers.	African Rainbow Energy, EPC Partner and Contractor	Construction and Operation
Appointment of a local labour force will reduce the possibility of promiscuous social practices usually associated with construction sites.	African Rainbow Energy, EPC Partner and Contractor	Construction
Develop and implement a fire management procedure and plan for use in the event of fire.	African Rainbow Energy, EPC Partner and Contractor	Construction & Operation

Performance Indicator	» No criminal activities and theft of livestock are reported. » No fires or on-site accidents occur.
Monitoring	» African Rainbow Energy and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE: Management of dust and air emissions

During the construction phase, limited gaseous or particulate emissions are anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the main and internal access roads.

Project Component/s	» Construction activities associated with the area and linear infrastructure.
Potential Impact	» Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment
Activities/Risk Sources	» Clearing of vegetation and topsoil. » Excavation, grading, scraping, levelling, digging, drilling. » Transport of materials, equipment, and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles and construction engines are minimised, where possible, for the duration of the construction phase » 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
Roads must be maintained to a manner that will ensure that nuisance to the community from dust emissions from road or vehicle sources is not visibly excessive	Contractor	Site establishment and construction
Ensure that any damage to roads because of construction activities is repaired before completion of the construction phase.	Contractor	Site establishment and construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise and control airborne dust.	Contractor	Duration of contract
Haul vehicles moving outside the construction site	Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
carrying material that can be wind-blown must be covered with tarpaulins if required by the wind conditions.		contract
Speed of construction vehicles must be restricted, as defined by the ECO.	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.	Contractor	Duration of contract
Strictly control vibration pollution from compaction plant or excavation plant.	Contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable once construction in an area is completed.	Contractor	Completion of construction
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Duration of contract

Performance Indicator	» No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed. » All heavy vehicles equipped with speed monitors before they are used in the construction phase in accordance with South African vehicle legislation. » Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.
Monitoring	Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods: » 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: Minimisation of development footprint and disturbance to topsoil

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

Project Component/s	» Area infrastructure. » Power line. » Substation » Access roads.
Potential Impact	» Impacts on natural vegetation. » Impacts on soil. » Loss of topsoil.
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations. » Construction of site access road. » Site preparation (e.g. compaction). » Foundations or plant equipment installation. » Powerline 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. » Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas. » Minimise spoil material.

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction
The extent of clearing and disturbance to the native vegetation must be kept to a minimum so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
All fill material must be sourced from a commercial off-site suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Excavated topsoil must be stockpiled in designated areas separate from base material and covered until replaced during rehabilitation. As far as possible, topsoil must not be stored for longer than 3 months.	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.	Contractor	Site establishment Maintenance: for duration of contract
As far as possible, 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.	Contractor	Duration of contract

Performance Indicator	» Minimal disturbance outside of designated work areas. » Minimise clearing of existing vegetation. » Topsoil appropriately stored.
Monitoring	» Observation of vegetation clearing and soil management 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 EMP.

OBJECTIVE: Minimise the impacts on and loss of indigenous vegetation

The natural vegetation across most of the site is not considered to have high conservation status. Impacts on natural vegetation as a result of the proposed development are considered acceptable relative to the total extent of the vegetation type. However, management measures are required to be put in place to ensure any impacts on natural vegetation are minimised as far as possible.

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Loss of indigenous natural vegetation due to construction activities, or poor behaviour on the part of the construction team.
Activity/Risk Source	» Vegetation clearing. » Construction of access roads. » Placement of power line towers. » Chemical contamination of the soil by vehicles and machinery. » Operation of construction camps.

	» Storage of materials required for construction.
Mitigation: Target/Objective	» Retain natural vegetation in the highly sensitive areas of the site. » Minimise footprints of disturbance of vegetation/habitats on-site. » Minimise loss of indigenous vegetation. » Minimise loss of species of conservation concern.

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing.	Contractor	Construction
Limit unnecessary impacts on surrounding natural vegetation, e.g. driving around in the veld, use access roads only.	Contractor	Construction
A site rehabilitation programme must be implemented (refer Chapter 7).	Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» Minimal disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation. » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation.
Monitoring	» Observation of vegetation clearing activities by ECO throughout construction phase. » Monitoring of vegetation clearing activities in terms of permit conditions. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE: Minimise the establishment and spread of alien invasive plants

There are very few concentrations of alien plants on site. The shrub, *Prosopis glandulosa* (honey mesquite), is found adjacent to existing disturbances on site. Construction of the solar arrays will require the total clearing of vegetation within the footprint and this will probably be maintained as clear areas for the lifetime of the project. It is possible that there will be some invasion by aliens along the margins of disturbed areas. This could to lead to general invasion of surrounding vegetation.

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**
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.	Contractor	Construction and operation
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	Contractor	Construction and operation
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction and operation

Performance Indicator	» For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	» On-going monitoring of area by ECO during construction. » On-going monitoring of area by environmental manager during operation. » Annual audit of project area and immediate surroundings by qualified botanist. » If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants. » The results should be interpreted in terms of the risk posed to sensitive habitats within and surrounding the project area. » The environmental manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE: Minimise the impacts on fauna and associated habitats

There is a low likelihood of any threatened or near threatened animal species being affected by the proposed project. Birds and other animals that could potentially occur on site are relatively mobile and will move away during construction. The footprint of the solar array is small relative to the overall availability of habitat in the broader area. The potential impact on these animal species due to a loss of a small area of habitat is therefore not considered to be a significant impact.

Project Component/s	» Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	» Vegetation clearance and associated impacts on faunal habitats. » Traffic to and from site.
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 of habitats.	Contractor in consultation with Specialist	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.	Contractor	Site establishment & duration of contract
Animals that cannot flee from the affected areas by themselves (e.g. tortoises, amphibians, small mammals) must be removed from the affected areas before the start of site clearing/construction and relocated to safe areas.	Specialist	Pre-construction
A site rehabilitation programme should be implemented.	Contractor in consultation with Specialist	Duration of contract

Performance Indicator	» Minimal 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) » No incidents of poaching attributed to construction workers
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: Minimise impacts on water resources

Project Component/s	» Construction activities, » Storage of chemicals and hazardous materials. » Ablution facilities.
Potential Impact	» Pollutants such as lime-containing (high pH) construction materials such as concrete, cement, grouts, etc. could be harmful to aquatic biota, particularly during low flows when dilution is reduced. » Health risk to locals using the river water for domestic purposes.
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 into the river and drainage lines » No misbehaviour of construction workers (i.e. ablution activities, washing).

Mitigation: Action/Control	Responsibility	Timeframe
Strict use and management of all hazardous materials used on site.	Contractor	Construction
Strict management of potential sources of pollution (hydrocarbons from vehicles and machinery, cement during construction, etc.).	Contractor	Construction
Strict control over the behaviour of construction workers.	Contractor	Construction
Ensure that powerline tower structures are placed outside watercourses (a minimum of 50 m away	African Rainbow Energy and Contractor	Construction

Performance Indicator	» Compliance with the terms and conditions of the water use license in terms of quality control.
Monitoring	» Surface water monitoring plan

OBJECTIVE: Minimise soil degradation and erosion

The proposed activity may potentially cause a negative direct impact on degradation of soil, rock, and/or geological landforms. The proposed activity could also result in negative indirect impacts, such as increased siltation in waterways downstream from the site or dust pollution in the area surrounding the site. The severity or significance of the various impacts is related to the nature and extent of the activity.

Project Component/s	» Area infrastructure » Power line. » 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. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Minimise extent of disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc.). » Minimise soil erosion. » Minimise deposition of soil into drainage lines. » Minimise instability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Identify disturbance areas and restrict construction activity to these areas.	Contractor	Before and during construction
Rehabilitate disturbance areas as soon as practicable when construction in an area is complete.	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.	Engineer/ECO/ Contractor	Design and construction

Mitigation: Action/Control	Responsibility	Timeframe
Where access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out.	Engineer/ECO/ Contractor	Design, before and during construction
Dust control on construction site: wetting of denuded areas.	Contractor	Construction
Minimise removal of vegetation which adds stability to soil.	ECO/Contractor	Construction
Soil conservation: Stockpile topsoil for re-use in rehabilitation phase, protect stockpile from erosion	Contractor	Before and during construction
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, shade nets, or temporary mulching over denuded area as required.	Contractor/ECO	Erection: Before construction Maintenance: Duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	Engineer/ECO/ Contractor	Before construction and Maintenance Duration of contract
During construction the contractor shall protect areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking other measures necessary to prevent the surface water from being concentrated in streams and from scouring the slopes, banks or other areas.	Engineer/ECO/ Contractor	Before construction and Maintenance Duration of contract
A method statement shall be developed and submitted to the ECO to deal with erosion issues prior to bulk earthworks operations commencing.	Contractor	Prior to commencement of earthworks
Stabilisation of cleared areas to prevent and control erosion shall be actively managed. The method of stabilisation shall determine in consultation with the ECO. Consideration and provision shall be made for the following methods (or combination): » Brush cut packing » Mulch or chip cover » Straw stabilising » Watering » Planting/sodding » Hand seed-sowing » Hydroseeding » Soil binders and anti-erosion compounds » Gabion bolsters & mattresses for flow attenuation » Geofabric	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
» Hessian cover » Log/ pole fencing		
Traffic and movement over stabilised areas shall be restricted and controlled and damage to stabilised areas shall be repaired and maintained to the satisfaction of the ECO.	ECO	Construction

Performance Indicator	» No activity outside demarcated disturbance areas. » Acceptable level of activity within disturbance areas, as determined by the ECO. » Acceptable level of soil erosion around site, as determined by the ECO. » Acceptable level of increased siltation in drainage lines, as determined by the ECO. » Acceptable state of excavations, as determined by the ECO. » No activity in restricted areas.
Monitoring	» Monthly inspections of the site by the ECO. » Monthly inspections of sediment control devices. » Monthly inspections of surroundings, including drainage lines. » Immediate reporting of ineffective sediment control systems. » An incident reporting system will record non-conformances.

OBJECTIVE: 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.

The study site exhibits limited Stone Age artefacts that were found during the field survey by the archaeologist. Graves also occur on the site and are considered heritage sites.

Project Component/s	» Area infrastructure » Power line. » 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. » Powerline 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
Areas required to be cleared during construction must be clearly marked in the field to avoid unnecessary disturbance of adjacent areas (which will not be surveyed in detail by a heritage specialist).	Contractor in consultation with Specialist	Pre-construction
Familiarise all staff and contractors with procedures for dealing with heritage objects/sites / graves.	ECO/specialist	Pre-construction
Project employees and any contract staff will maintain, at all times, a high level of awareness of the possibility of discovering heritage sites.	African Rainbow Energy / Contractor	Duration of contract
If a heritage object is found, work in that area will 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.	African Rainbow Energy / Contractor in consultation with Specialist	Duration of contract
Apply for sampling permits from SAHRA for work on any archaeological sites identified as needing intervention.	African Rainbow Energy in consultation with Specialist	Pre-construction
Any human remains (or any other concentrations of archaeological heritage material) are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. Recommendations	African Rainbow Energy	Construction

Mitigation: Action/control	Responsibility	Timeframe
will follow from the investigation.		

Performance Indicator	» Zero disturbance outside of designated work areas » All heritage items located are dealt with as per the legislative guidelines
Monitoring	» Observation of excavation activities by ECO 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 » An incident reporting system will be used to record non-conformances to the EMP

OBJECTIVE: 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.

The primary visual impact of the facility and ancillary infrastructure, including the powerline, is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts. Secondary impacts anticipated as a result of the proposed facility (i.e. visual character, sense of place and tourism potential) are not possible to mitigate.

Project Component/s	» Construction site.
Potential Impact	» Visual impact of general construction activities 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 construction accommodation and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Reduce the construction period through careful planning and productive implementation of resources.	African Rainbow Energy or contractor	Planning
Plan the placement of lay-down areas and temporary construction accommodation in order to minimise vegetation clearing.	African Rainbow Energy or contractor	Planning
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	African Rainbow Energy or Contractor	Construction
Ensure that rubble, litter, and disused construction materials are managed and removed regularly.	African Rainbow Energy or Contractor	Construction
Ensure that all infrastructure and the site and general surrounds are maintained in a neat a manner.	African Rainbow Energy or Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques.	Contractor	Construction
As far as possible, restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Contractor	Construction
Rehabilitate all disturbed areas, construction areas, roads, and servitudes to acceptable visual standards.	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: 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	» Area infrastructure » 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 methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	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.	Contractor	Duration of contract
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
wood, metals, general refuse etc.).		
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Uncontaminated waste must be removed at least weekly for disposal. Other wastes must be removed for recycling/ disposal at an appropriate frequency.	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	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.	Contractor	Duration of contract
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.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities must be used to ensure appropriate control of sewage.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction
Dispose of all solid waste collected must be at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site.	Contractor	Duration of construction
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	Contractor	Duration 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. » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon.

	» An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE: 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.

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
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.
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
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	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.	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.	Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract
Routine servicing and maintenance of vehicles must not	Contractor	Duration of

Mitigation: Action / Control	Responsibility	Timeframe
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.		contract
All stored fuels to be maintained within a bund and on a sealed surface.	Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
Oily water from bunds at the substations must be removed from site by licensed contractors.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	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.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas. » 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 EMP.

6.3 Detailing Method Statements

OBJECTIVE: 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 EMP 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.

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:

- 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.

The Contractor may not commence the activity covered by the Method Statement until it has been approved, 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.

6.4 Awareness and Competence: Construction Phase of the Solar Energy Facility

OBJECTIVE: 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 EMP. 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:

» Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
» Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document.
» Employees will be familiar with the requirements of the EMP 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 some form of Environmental Awareness Training (i.e. as part of induction)
» The training should be sufficient to provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Awareness of any other environmental matters, which are deemed 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.
» Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
» 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.

6.5 Monitoring Programme: Construction Phase of the Solar Energy Facility

OBJECTIVE: 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 EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP 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 (once issued). Where this is not clearly dictated, African Rainbow Energy will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

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 EMP, 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.

MANAGEMENT PROGRAMME: REHABILITATION CHAPTER 7

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

7.1. Objectives

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

OBJECTIVE: 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 activities. 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. » Power line 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 temporary facilities, equipment, and waste materials must be removed from site once construction is complete.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been	Contractor	Following completion of

Mitigation: Action/Control	Responsibility	Timeframe
completed.		construction activities in an area
The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked.	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.	Contractor	Following completion of construction activities in an area
A rehabilitation plan should be drawn up during the planning phase that specifies the rehabilitation process and should be approved by the ECO.	Contractor, African Rainbow Energy and ECO	Pre-construction
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.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	African Rainbow Energy in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as drainage lines, as necessary.	African Rainbow Energy in consultation with rehabilitation specialist	Post-rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	African Rainbow Energy in consultation with rehabilitation	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
	specialist	

Performance Indicator	» All portions of the site, including the construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas disturbed during construction, and stabilised where practicable. » Disturbed areas rehabilitated and acceptable plant cover achieved. » 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 for the operational life of the facility.

MANAGEMENT PROGRAMME: OPERATION CHAPTER 8

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 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
» Establishes an environmental baseline for solar energy facility sites in South Africa

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

8.1. Objectives

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

OBJECTIVE: 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 rehabilitation 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.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats 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.	African Rainbow Energy	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	African Rainbow Energy	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	African Rainbow Energy	Operation
A botanist familiar with the vegetation of the area should monitor the alien plant removal on an annual basis for two years after construction.	African Rainbow Energy or Specialist	Annual monitoring

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

OBJECTIVE: Minimisation of visual impacts

The primary visual impact of the facility and its ancillary 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	» Area infrastructure. » Power line. » 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 PV facility. » Power line.

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.	African Rainbow Energy	Operation.
Monitor rehabilitated areas, and implement remedial action as and when required.	African Rainbow Energy	Operation.
Use of light fixtures and the fitment of covers and shields will be designed to contain rather than spread light.	African Rainbow Energy	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: Minimise soil degradation and erosion

Project Component/s	» Area infrastructure » Power line » 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 (i.e. wetting). » 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. .	African Rainbow Energy	Operation
Ensure dust control on site: wetting of denuded areas or the use of an appropriate dust suppression measure.	African Rainbow Energy	Operation
Maintain erosion control measures implemented during	African Rainbow	Operation

Mitigation: Action/Control	Responsibility	Timeframe
the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	Energy	
Control depth of excavations and stability of cut faces/sidewalls.	African Rainbow Energy	Operation

Performance Indicator	» Acceptable level of soil erosion around site, as determined by the environmental manager. » Acceptable level of increased siltation in drainage lines, as determined by the environmental manager.
Monitoring	» Inspections of site on a bi-annual basis. » Water management plan

OBJECTIVE: Minimise dust and air emissions

During the operational phase, limited gaseous or particulate emissions are anticipated from exhaust emissions (i.e. from operational vehicles).

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. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and the augmentation plant.
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle and construction 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.	African Rainbow Energy	Site establishment and construction
Appropriate dust suppressant must be applied to the roads as required to minimise/control airborne dust.	African Rainbow Energy	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Speed of vehicles must be restricted, as defined by the Environmental Manager.	African Rainbow Energy	Duration of contract
Vehicles and equipment must be maintained in a road-worthy condition at all times.	African Rainbow Energy	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 Environmental 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: Ensure the implementation of an appropriate fire management plan during the operation phase

The proposed fire management plan drafted by African Rainbow Energy is attached to Appendix A. This plan must be implemented during the construction and operational phase of the project.

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.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire fighting equipment on site.	African Rainbow Energy	Operation

Mitigation: Action/Control	Responsibility	Timeframe
Provide fire-fighting training to selected operation and maintenance staff.	African Rainbow Energy	
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	African Rainbow Energy	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.).	African Rainbow Energy	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.	African Rainbow Energy	Operation
Contact details of emergency services should be prominently displayed on site.	African Rainbow Energy	Operation

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

OBJECTIVE: Maximise local employment and business opportunities

The proposed facility is expected to require approximately 20 permanent employees including security personnel who would be on site on a permanent basis.

Therefore, long-term direct job opportunities for locals could exist, although limited. However, in an area with such high unemployment figures, these limited opportunities should still be seen as a positive impact on the quality of life of those benefiting from the employment.

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.
Activities/Risk Sources	» Locals are not employed where the skills exist. » Local procurement is not undertaken if possible. » Local businesses are not supported.
Mitigation: Target/Objective	» Maximise the appointment of local employees.

Mitigation: Action/Control	Responsibility	Timeframe
Local labourers should be employed where applicable and the employment of outsiders during the operational process should not be pursued.	African Rainbow Energy	Operation
Appoint as many local employees as would be feasible and possible.	African Rainbow Energy	Operation
Should locals with applicable skills not be available, African Rainbow Energy should embark on a skills development process during the construction phase to allow locals to be employable for the operational phase	African Rainbow Energy	Operation
Implement training and capacity building programmes for the workers throughout the operational period of the PV facility.	African Rainbow Energy	Operation
Local sourcing of materials, goods and services should be undertaken where possible to assist in providing more economic and employment opportunities for the local people	African Rainbow Energy	Operation

Performance Indicator	» An employee list drawn up indicating the percentage of locals employed. » Local procurement is undertaken.
Monitoring	» African Rainbow Energy should be able to demonstrate that the above indicators are implemented.

OBJECTIVE: Minimise the potential impact on farming activities and on the surrounding landowners

Once operational, the impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site on a daily basis is anticipated to have minimal negative social impacts in this regard.

Individuals leaving their existing full time employment positions at farms in the area to obtain work at the facility could result in possible negative impacts on the farming community. Employing outsiders on the other hand and accommodating them at the planned accommodation facility on site could also affect the community's social dealings with each other as well as the traditional character of the area. In worst cases it could result in social conflict between the various groupings. The recruitment and employment process would thus have to be sensitively dealt with to limit any possible negative impacts on the daily living patterns of the existing farming community and other community members.

The operations at the facility, however is not anticipated to have severe negative impacts on the neighbouring farmers' living and movement patterns, apart from a limited increase in the movement of people to and from the site, as well as the presence of these employees on-site on a permanent basis. Concerns about rental agreements should be considered.

Vehicle movement to and from the site (e.g. transportation of workers and goods) could influence road users' daily movement patterns, although it is anticipated that this impact would only materialise intermittently.

Project Component/s	» Possible negative impacts of activities undertaken on site on the activities of surrounding property owners.
Potential Impact	» Possible limited intrusion impact on surrounding land owners. » Possible phasing out of cattle farming.
Activities/Risk Sources	» Increase in traffic to and from site could affect daily living and movement patterns of surrounding residents.
Mitigation: Target/Objective	» Effective management of the facility. » Mitigation of intrusion impacts on property owners.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Effective management of the facility and accommodation facility to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	African Rainbow Energy	Operation

Performance Indicator	» No environmental pollution occurs (i.e. waste, water, and sanitation). » No intrusion on private properties and on the activities undertaken on the surrounding properties. » Continuation of farming activities.
Monitoring	» Developer should be able to demonstrate that facility is well managed without environmental pollution and that the above requirements have been met.

OBJECTIVE: 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. » Operation and maintenance staff.
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 Source	» Transformers and switchgear – substation.
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 (such as used/new transformer oils, etc.) must be stored in sealed containers within a clearly demarcated designated area.	African Rainbow Energy	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	African Rainbow Energy	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.	African Rainbow Energy	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.	African Rainbow Energy	Operation and maintenance

Mitigation: Action/Control	Responsibility	Timeframe
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	African Rainbow Energy	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	African Rainbow Energy / waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	African Rainbow Energy / 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	African Rainbow Energy	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	African Rainbow Energy	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	African Rainbow Energy	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	African Rainbow Energy	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. » All appropriate waste disposal certificates accompany the monthly reports.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 9

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of 20 - 30 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.

9.1. 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.

9.2 Disassemble and Replace Infrastructure

Disassembled components will be reused, recycled, or disposed of in accordance with regulatory requirements.

OBJECTIVE: To avoid and or minimise the potential impacts associated with the decommissioning phase

Project Component/s	» Decommissioning phase of the solar energy facility.
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life. » Decommissioning is similar to the construction phase in that it will also create temporary employment opportunities.
Activity/Risk Source	» Decommissioning of the solar energy facility.
Mitigation: Target/Objective	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the solar energy facility.

Mitigation: Action/control	Responsibility	Timeframe
Retrenchments should comply with current South African Labour Legislation.	African Rainbow Energy	At de-commissioning

Performance Indicator	Relevant South African Labour Legislation.
Monitoring	No occurrences of dismissals not in-line with South African Labour Legislation.

FINALISATION OF THE EMP CHAPTER 10

The EMP is a dynamic document, which must be updated to include any additional specifications as and when required. It is considered critical that this Draft EMP be updated to include site-specific information and specifications following the final walk-through survey by specialists of the powerline and development site. This will ensure that the construction and operation activities are planned and implemented considering sensitive environmental features.