
**EMP FOR THE PROPOSED
CONSTRUCTION OF A POWER LINE
FROM THE AGGENEYS SOLAR ONE
ENERGY FACILITY TO THE AGGENEIS
MTS SUBSTATION, NORTHERN CAPE
PROVINCE**

**DRAFT ENVIRONMENTAL MANAGEMENT
PROGRAMME**

Submitted as part of the Draft Basic Assessment Report

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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Assessment: The process of collecting, organising, analysing, interpreting and communicating information which is relevant.

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

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

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

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.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

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

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

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

Environment: the surroundings within which humans exist and that are 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 (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

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.

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

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

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment (Van der Linde and Feris, 2010;pg 185).

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

Indirect impacts: Indirect or induced changes that may occur as a result 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 as a result 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 general public.

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

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

Red data species: 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.

Waste: Any substance, whether or not that substance can be reduced re-used, recycled and recovered; that is surplus, unwanted, rejected, discarded, abandoned or disposed of which the generator has no further use for the purposes of production. Any product which must be treated and disposed of, that is identified as waste by the minister of Environmental affairs (by notice in the Gazette) and includes waste generated by the mining, medical or other sectors, but: A by-product is not considered waste, and portion of waste, once re-used, recycled and recovered, ceases to be waste (Van der Linde and Feris, 2010; pg. 186).

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Appendix A: Grievance Mechanism for Public Complaints and Issues

Applications for Environmental Authorisation were undertaken for photovoltaic solar energy facilities situated on the remaining extent of Portion 3 of the Farm Zuurwater 62 situated near Aggeneys in the Khai Ma Local Municipality of the Namakwa District Municipality in the Northern Cape Province. Five solar energy facilities were authorised, namely:

- » Unit 4 and Unit 5 (known as Aggeneys Solar 1)
- » Phase 1
- » Phase 2
- » Phase 3
- » Phase 4

Units 4 and Unit 5, collectively known as **Aggeneys Solar 1 Energy Facility** were authorised in August 2012. No power line route was however assessed or approved as part of the project.

In order to evacuate the generated power of the authorised Aggeneys Solar 1 Energy Facility into the Eskom grid, the construction of overhead distribution power lines is required. PV Africa Development (Pty) Ltd is therefore proposing to construct an overhead power line (of less than 275kV) from the Aggeneys Solar 1 Energy Facility on-site substation to the existing Eskom Aggeneis MTS Substation, situated approximately 4 km east of the authorised project site.

The proposed power line will share a common corridor with the existing Aggeneis – Nama 220kV power line as well as the authorised power line routes for the Zuurwater PV Projects (Phases 1 – 4).

Based on the conclusions of the Basic Assessment studies undertaken, the option of constructing the proposed new power line adjacent to the existing and authorised power lines was nominated as the preferred alternative (shown as the green line on Figure 1.1). A corridor of 300m was assessed within which the power line is to be constructed.

Figure 1.1: Locality map showing the development area for the proposed power line

1.1. Potential impacts

Through the assessment of impacts associated with the proposed power line, both potentially positive and negative impacts have been identified. The most significant environmental impacts associated with the proposed project include:

- » The main impacts on the **ecology** will occur during the construction phase of the proposed project. These impacts were assessed to have **low significance**. Activities that will result in impacts include:
 - * Impacts on vegetation and listed plant species
 - * Impacts on terrestrial fauna at the site due to operation of heavy machinery and the presence of construction personnel;
 - * Faunal impacts due to operation activities;
 - * Avifaunal impacts due to overhead power lines especially on priority species such as Bustards;
 - * Ecological degradation impacts associated with power line servitude maintenance activities.
 - * Site rehabilitation activities.

- » The main impacts on **surface water** systems will occur during the construction phase of the proposed project. These impacts were assessed to have **low significance**. The proposed alignments and its associated alternatives will have a negligible impact on aquatic features (identified as a single wash along the route). This is based on the assumption that no towers will be placed within any of the delineated systems or their buffers. Furthermore, during the site visit, no protected or species of special concern (fauna & flora) were observed within the washes. Therefore, the significance of the impacts assessed for the aquatic systems after mitigation would be LOW.

- » The main impacts on the **visual** environment will occur during the construction phase of the proposed project. These impacts were assessed to have **low** significance. Activities that will result in impacts include:
 - * Increase in vehicular and other activity levels during the construction phase;
 - * The clearance of vegetation at the footprint of the construction lay-down yard, power line and infrastructure.

- » The main impacts on **heritage** of the project site will occur during the construction phase of the proposed project. These impacts were assessed to have **low** significance. Activities that will result in impacts include:
 - * The clearance of vegetation at the footprint of the construction lay-down yard power line and infrastructure;

- * Removal of topsoil from the footprint of the power line and stockpiling of topsoil for use during site rehabilitation.

- » It is considered highly unlikely that paleontological resources or artefacts are present in the area. Paleontological studies illustrate that the Mid Proterozoic basement rocks found in Namaqua-Natal Province are not fossil bearing (Almond and Pether 2008), a result of porous dune sands that are not favourable for fossil preservation. The proposed power line route and its alternatives are situated within an area of **Low to Very Low** paleontological sensitivity.

- » The main impacts on **avifauna** due to the construction of the proposed power line are:
 - * Disturbance of birds will be of medium to high significance, and mitigations have been proposed to avoid the sensitive areas.
 - * Throughout the remainder of the study area, the impact to birds is anticipated to be of low significance.
 - * Electrocutation of birds will be of medium to high significance, but can be relatively easily mitigated by using a bird friendly pylon structure.
 - * Collision of birds is probably the most significant impact that will affect birds, and several of the species likely to be affected are Red Listed. In order to mitigate this risk it will be necessary to mark high risk sections of the line with an appropriate line marking device on the earth wire in order to make it more visible to birds in flight.

A sensitivity map has been prepared from the findings of the Basic Assessment studies undertaken (refer to **Figure 1.2**). The study area is considered to have a low sensitivity based on the extent of the area to be used for the power line. Some features of high sensitivity such as dune ridges and washes have been identified. The siting and spacing of pylons and laydown areas within these sensitive areas should be avoided as far as possible.

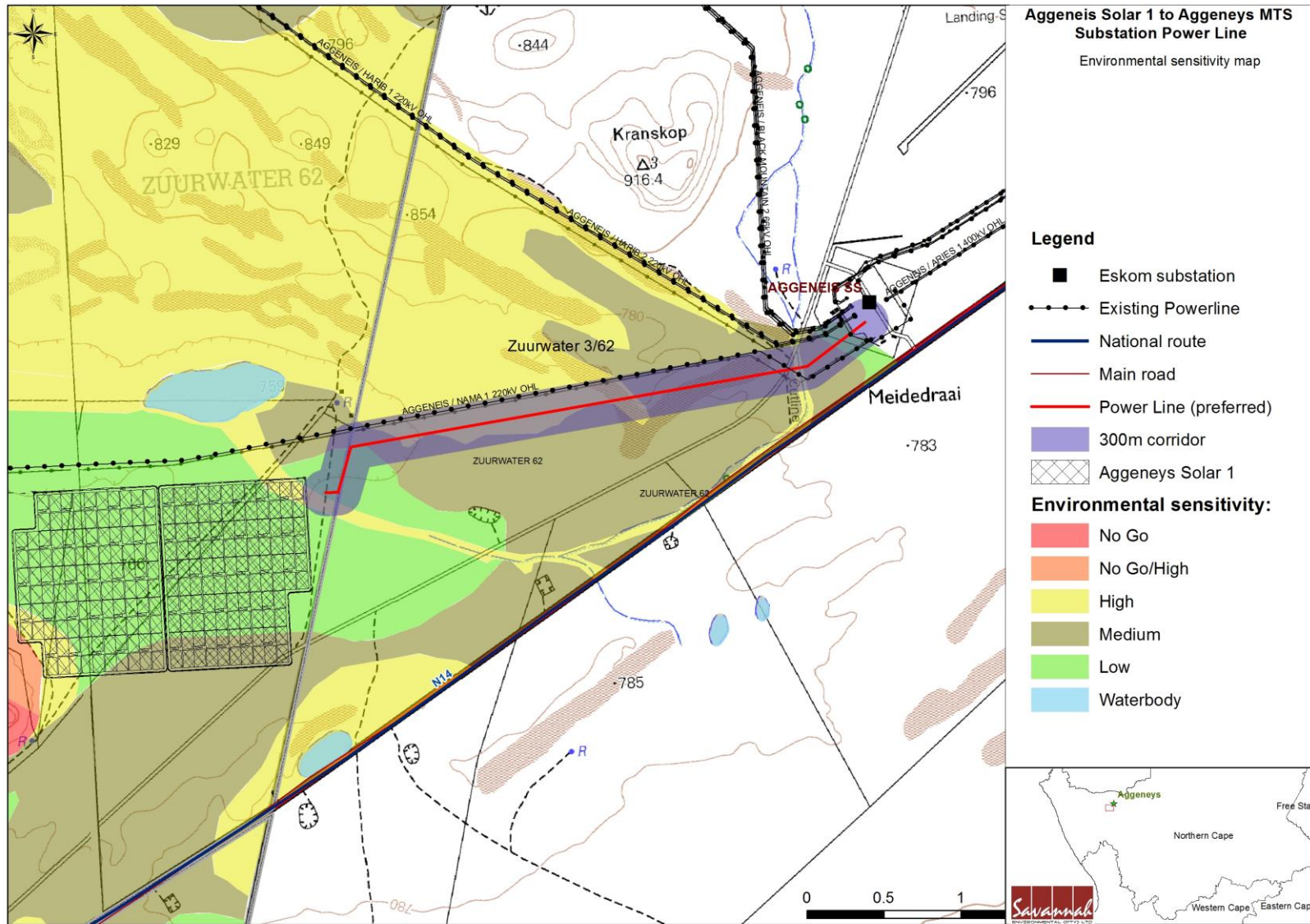


Figure 1.2: Environmental Sensitivity map for the power line between the approved Aggeneys Solar 1 Energy Facility to the Aggeneys MTS Substation

1.2. Activities and Components associated with the Construction Power Lines

1.2.1. Construction Phase

The activities associated with the construction of the Aggeneys Solar 1 Energy Facility to the Aggeneys MTS Substation power line will include site clearance and construction of access roads to facilitate access the site (where required).

Power lines are constructed in the following simplified sequence:

- Step 1:** Determination of technically feasible route/s
- Step 2:** EIA input into route selection
- Step 3:** Negotiation of final route with affected landowners
- Step 4:** Survey of the route
- Step 5:** Determination of the conductor type
- Step 6:** Selection of best-suited conductor, towers, insulators, foundations
- Step 7:** Final design of line and placement of towers
- Step 8:** Issuing of tenders, and award of contract to construction companies
- Step 9:** Vegetation clearance and construction of access roads (where required)
- Step 10:** Tower pegging
- Step 11:** Construction of foundations
- Step 12:** Assembly and erection of towers
- Step 13:** Stringing of conductors
- Step 14:** Rehabilitation of disturbed area and protection of erosion sensitive areas
- Step 15:** Testing and commissioning

Construction of the proposed power line will take approximately 12 – 24 months to complete. A servitude of between 33m and 38.5m will be required along the length of the power line, depending on the final capacity of the line to be determined by Eskom.

1.2.2. Operation Phase

The proposed power line and associated servitude and access roads will require routine maintenance work throughout the operation period. The site will be accessed using existing roads in the area as well as via access tracks established during the construction phase.

1.2.3. Decommissioning Phase

The power line is expected to have a lifespan of more than 40 years (with maintenance) and the infrastructure would only be decommissioned once it has

reached the end of its economic life, or if no longer required. Upon decommissioning, the power line would be disassembled and removed from site.

PURPOSE AND OBJECTIVES OF THE EMPr

CHAPTER 2

An Environmental Management Programme (EMPr) is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts associated with the planning, construction, operation and decommissioning of a project are avoided or mitigated, and that the positive benefits of the projects are enhanced.”¹ The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMP is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation. 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 during decommissioning (i.e. similar to construction phase activities).

This EMP has been compiled in accordance with Section 33 of the EIA Regulations and will be further developed in terms of specific requirements listed in any authorisations or permit issued for the proposed project. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

This EMPr has the following objectives:

- » Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the power line.

¹ Provincial Government Western 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 BA process.

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

PV Africa Development (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 EMPr and through its integration into the contract documentation. Since this EMP is part of the BA process, it is important that this document be read in conjunction with the Basic Assessment Report compiled for this project. 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 EMPr and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

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

STRUCTURE OF THIS EMPr

CHAPTER 3

The first two chapters provide background to the EMPr 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; and
- » Decommissioning activities.

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

a). OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the BA 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?	Periods for implementation.

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the EMP.
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;
- » Modification to or addition to environmental objectives and targets;
- » Relevant legal or other requirements are changed or introduced; or
- » 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 and had input from:

	Name	Company
EMP Compilers:	Steven Ingle Azrah Essop Jo-Anne Thomas	Savannah Environmental
Specialist input:	Marianne Strohbach (Ecological i.e. flora & Fauna) Jaco van der Walt (Heritage)	Savannah Environmental Heritage Contracts & Archaeological Consulting

Jo-Anne Thomas, the principle Environmental Assessment Practitioner (EAP) for the project, is a registered Professional Natural Scientist (in the practice of environmental science) with the South African Council for Natural Scientific Professions. She has extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes over the past sixteen (16) years. She has managed and drafted EMPs for other power line projects throughout South Africa.

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 (GNR R545, GNR 546 in Government Gazette 33306 of 18 June 2010).
- » Guidelines published in terms of the NEMA EIA Regulations, in particular:
 - * Companion to the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations of 2010 (Draft Guideline; DEA, 2010).
 - * Public Participation in the EIA Process (DEA, 2010).
 - * Integrated Environmental Management Information Series (published by DEA)

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the BA Report. A review of legislative requirements applicable to the proposed project is provided in Table 4.1.

Table 4.1: Relevant legislative and permitting requirements applicable to the proposed power line

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
National Legislation			
National Environmental Management Act (Act No. 107 of 1998)	<p>The Basic Assessment 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.</p> <p>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.</p> <p>In terms of GN R543, R544 and R546 of 18 June 2010, a Basic Assessment Process is required to be undertaken for the proposed project.</p>	<p>Department of Environmental Affairs – competent authority</p> <p>Department of Environmental and Nature Conservation (DENC)- commenting authority</p>	The listed activities triggered by the proposed substation have been identified and assessed in the Basic Assessment Process undertaken.
National Environmental Management Act (Act No. 107 of 1998)	<ul style="list-style-type: none"> » A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts. » In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment 	National Department of Environmental Affairs	<ul style="list-style-type: none"> » While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the BA process. » The implementation of mitigation measures are included as part of the Draft EMP and will continue to apply throughout the life cycle

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>associated with a project is avoided, stopped or minimised.</p>		<p>of the project.</p>
<p>National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</p>	<ul style="list-style-type: none"> » Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S56 (1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National 	<ul style="list-style-type: none"> » National Department of Environmental Affairs » NC DENC 	<ul style="list-style-type: none"> » As the applicant will not carry on any restricted activity in terms of S57, no permit is required to be obtained in this regard. » Specialist flora and fauna studies were undertaken as part of the BA process as required by GNR 152. » Some protected plant species have been identified along the alignment. A permit will be required should any protected plant species on site be disturbed or destroyed as a result of the proposed development.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011).</p> <p>» This Act also regulates alien and invader species.</p>		
<p>National Forests Act (Act No. 84 of 1998)</p>	<p>» According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister'.</p> <p>» GN 1042 provides a list of protected tree species.</p>	<p>National Department of Agriculture, Forestry and Fisheries (DAFF)</p>	<p>No protected trees have been identified by the ecologist to occur along the power line alignment.</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>» Prohibition of the spreading of weeds (S5)</p> <p>» Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur.</p> <p>» Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).</p>	<p>Department of Agriculture, Forestry and Fisheries</p>	<p>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.</p>
<p>National Environmental Management: Waste Act,</p>	<p>» The Minister may by notice in the Gazette publish a list of waste</p>	<p>» National Department of Environmental Affairs</p>	<p>» In terms of GNR921, No waste license is required for the project</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
2008 (Act No. 59 of 2008)	<p>management activities that have, or are likely to have, a detrimental effect on the environment.</p> <ul style="list-style-type: none"> » In terms of the regulations published in terms of this Act (GN 921 of November 2013), a Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that <ul style="list-style-type: none"> (a) The containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; (b) Adequate measures are taken to prevent accidental spillage or leaking; (c) The waste cannot be blown away; (d) Nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) Pollution of the environment and harm to health are prevented. 	<ul style="list-style-type: none"> (hazardous waste) » NC DENC (general waste) 	<ul style="list-style-type: none"> » Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in this EMPr.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	<ul style="list-style-type: none"> » S18, S19 and S20 of the Act allow certain areas to be declared and managed as "priority areas" » Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards » The Act provides that an air quality 	<ul style="list-style-type: none"> » National Department of Environmental Affairs » Local authority 	<ul style="list-style-type: none"> » While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction phase of the project. » The Air Emissions Authority

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>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.</p> <ul style="list-style-type: none"> » Dust control regulations promulgated in November 2013 may require the implementation of a dust management plan 		<p>(AEL) may require the compilation of a dust management plan.</p>
National Water Act (Act No. 36 of 1998)	<ul style="list-style-type: none"> » Under S21 of the Act, water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation. » In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring. 	<ul style="list-style-type: none"> » National Department of Water Affairs » Northern Cape Department of Water Affairs 	<ul style="list-style-type: none"> » A single ephemeral wash is situated along the alignment near to the Aggeneys MTS Substation which must be avoided during construction. No water use license will be required provided that this wash is avoided during construction. » Requirements set by S19 will apply throughout the life cycle of the project.
Environment Conservation Act (Act No. 73 of 1989)	<ul style="list-style-type: none"> » National Noise Control Regulations (GN R154 dated 10 January 1992) 	<ul style="list-style-type: none"> » National Department of Environmental Affairs » Northern Cape Department of Environment and Nature Conservation » Local Authorities 	<p>There is no requirement for a noise permit in terms of the legislation.</p>
National Heritage Resources Act (Act No. 25 of 1999)	<ul style="list-style-type: none"> » S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including <ul style="list-style-type: none"> » The construction of a road, power line, pipeline, canal or other similar 	South African Heritage Resources Agency	<ul style="list-style-type: none"> » As per S38 an HIA has been undertaken as part of the EIA for the project. » A permit may be required should identified cultural/heritage sites

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>linear development or barrier exceeding 300 m in length;</p> <ul style="list-style-type: none"> » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent » The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m²; or the re-zoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided. » Stand-alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component. 		<p>on site be required to be disturbed or destroyed as a result of the proposed development.</p> <ul style="list-style-type: none"> » If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately. The find must be reported to a heritage specialist so that systematic and professional investigation/ excavation can be undertaken.
National Veld and Forest Fire Act (Act 101 of 1998)	<ul style="list-style-type: none"> » Provides requirements for veld fire prevention through firebreaks and required measures for fire-fighting. Chapter 4 places a duty on landowners to prepare and maintain firebreaks, and Chapter 5 places a duty on all 	Department of Agriculture, Forestry and Fisheries	While no permitting or licensing requirements arise from this legislation, this act will find application during the operational phase of the project in terms of fire prevention and management.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>landowners to acquire equipment and have available personnel to fight fires.</p> <ul style="list-style-type: none"> » In terms of S21 the applicant would be obliged to burn firebreaks to ensure that should a veld fire occur on the property, that it does not spread to adjoining land. » In terms of S12 the firebreak would need to be wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. » In terms of Section 17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires. 		
<p>Hazardous Substances Act (Act No. 15 of 1973)</p>	<ul style="list-style-type: none"> » 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. 	<p>Department of Health</p>	<ul style="list-style-type: none"> » It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled.

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<ul style="list-style-type: none"> » 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 to be Group I or Group II hazardous substance; » Group IV: any electronic product; » Group V: any radioactive material. » The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force. 		
Provincial Legislation			
Northern Cape Nature Conservation Act, No. 9 of 2009	<ul style="list-style-type: none"> » This Act provides for: <ul style="list-style-type: none"> * The sustainable utilisation of wild animals, aquatic biota and plants. * Offences and penalties for contravention of the Act. * The appointment of nature conservators to implement the provisions of the Act. » The Act provides lists of protected species for the Province. 	NC DENC	Some protected plant species and animal burrows potentially home to protected fauna occur within the power line corridor. A permit will be required should any protected plant or animal species on site be disturbed or destroyed as a result of the proposed development.

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

- » Ensures that the design responds to the identified environmental constraints and opportunities.
- » Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements
- » Ensures that adequate regard has been taken of any landowner and community concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the linear components, including the access roads and power line alignments.
- » Enables the 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 1: Ensure the design responds to identified environmental constraints and opportunities

The major impact associated with the construction of the power line is likely to result from vegetation clearing that may be required beneath the power line in order to comply with fire risk and safety requirements. As the amount of vegetation clearing is likely to be less where the line is constructed adjacent to the existing line, this option is likely to generate an overall lower impact than the alternative alignments where there is currently no power line.

A sensitivity map has been prepared from the findings of the Basic Assessment studies undertaken (refer to **Figure 1.2**). The study area is considered to have a high sensitivity based on the habitat traversed by the power line which is reduced to a low sensitivity provided that washes and dune ridges are avoided. Placement of infrastructure within these areas should be avoided as far as possible.

Component/s	» Access roads, where required
Potential Impact	<ul style="list-style-type: none"> » Soil erosion » Impacts on flora and fauna » Impacts on sensitive features including dune ridges and washes
Activities/Risk Sources	» Positioning of power line towers and new access roads
Mitigation: Target/Objective	» The design responds to the identified environmental constraints and opportunities

Mitigation: Action/Control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally acceptable manner	PV Africa Development	Pre-construction
Obtain any additional environmental permits required (biodiversity permits, etc.).	PV Africa Development	Project planning
Undertake negotiations with affected landowners and agree on landowner-specific conditions for construction and maintenance	PV Africa Development	Project planning
Undertake specialist walk-overs of the final power line route – ecology, heritage and avifauna	Specialists	Pre-construction
A rehabilitation plan should be drawn up that specifies the rehabilitation process	PV Africa in consultation with specialist	Pre-construction
Undertake a detailed geotechnical survey of the proposed tower positions in order to fully understand the soils in terms of founding conditions and erosion potential.	PV Africa Development	Design
Bird-friendly power line tower and conductor designs must be used. The tower designs used should be those which are poorly suited to serve as nesting substrates by most bird species and with perching areas situated in areas either off-set or well away from the conductors.	PV Africa Development	Design phase
Plan to install anti-collision devices such as bird flappers onto the power lines where these cross avifaunal sensitive areas.	PV Africa Development	Design phase
Ensure that, as far as possible, riparian areas are spanned/ pole structures are not placed within proximity to rivers, streams. Ensure placement of footprints outside 1:100 year floodlines.	PV Africa Development	Design phase
Site 8 & 9 (as defined in the Heritage Impact Assessment included within the BAR) should be preserved in situ through micro adjustments of the tower positions.	PV Africa Development in consultation with Specialist	Pre-construction
Placement of towers should avoid potential sites of high archaeological sensitivity such as pans, rocky	PV Africa Development in	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
ridges, and building structures.	consultation with Specialist	
The terms of this EMP and the Environmental Authorisation must be included in all tender documentation and Contractors contracts	PV Africa Development	Tender process

Performance Indicator	<ul style="list-style-type: none"> » The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the BA Report.
Monitoring	<ul style="list-style-type: none"> » Review of the design by the Project Manager prior to the commencement of construction. » Review of the alignment of the servitude by the Environmental Control Officer (ECO) prior to the commencement of construction.

OBJECTIVE 2: To ensure effective communication mechanisms

On-going communication with affected and surrounding landowners is important to maintain during the construction and operational phases of the power lines. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	» Impacts on affected and surrounding landowners and land uses
Activity/risk source	<ul style="list-style-type: none"> » Activities associated with power line construction » Activities associated with power line operation
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Effective communication with affected and surrounding landowners » Addressing of any issues and concerns raised as far as possible in as short a timeframe as possible

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (following the guidelines of the grievance mechanism in Appendix A) to be implemented during both the construction and operational phases of the facility. This procedure should include details of the contact person who will be receiving issues raised by interested and affected	PV Africa Development	Pre-construction (construction procedure) Pre-operation (operation procedure)

Mitigation: Action/control	Responsibility	Timeframe
parties, and the process that will be followed to address issues.		
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	PV Africa Development	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities. If possible, construction should be scheduled to take place within the post-harvest, pre-planting season when fields are lying fallow.	PV Africa Development	Pre-construction

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

MANAGEMENT PROGRAMME: CONSTRUCTION

CHAPTER 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.
- » Minimises impacts on fauna (including birds) in the study area.
- » Minimises the impact on heritage sites should they be uncovered.
- » 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, PV Africa Development (Pty) Ltd must ensure that the project 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. PV Africa Development (Pty) Ltd will retain various key roles and responsibilities during the construction phase.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to overall implementation of the EMP

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

Site Manager (PV Africa Development's on-site Representative) will:

- » Be fully knowledgeable with the contents of the BA 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 EMPr.
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- » Have overall responsibility of the EMPr and its implementation.
- » Conduct audits to ensure compliance to the EMPr.
- » Ensure there is communication with the 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.

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

- » Be fully knowledgeable with the contents with the BA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation.
- » Be fully knowledgeable with the contents with the EMPr.
- » Be fully knowledgeable of all the licences and permits issued to the site.
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.

- » Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- » Ensure that the compliance of the EMP, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- » Ensure that if the EMP, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- » 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.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Ensure that the compilation of progress reports for submission to the 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.
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- » Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMP, EA and other environmental permits.

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 power line.
- » Prior to commencing any site works, all employees and sub-contractors must attend an environmental awareness training course which must provide staff with knowledge 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).

Roles and responsibilities should be confirmed and updated throughout the construction phase in order to ensure effective environmental management and communication between parties.

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMP, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor.

The Contractor's Safety, Health and Environment Representative should:

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

6.2 Objectives

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

OBJECTIVE 2: Minimise impacts related to inappropriate site establishment

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

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Hazards to landowners and public. » Damage to indigenous natural vegetation, due largely to ignorance of where such areas are located. » Loss of threatened plant species
Activities/Risk Sources	<ul style="list-style-type: none"> » Excavations. » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents. » No loss of or damage to sensitive vegetation in areas outside the immediate development footprint.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the Site Manager and EO.	Contractor	Site establishment, and duration of construction
Where necessary control access, fence, and secure area.	Contractor	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Fence and secure contractor's equipment camp.	Contractor	Site establishment
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.	Contractor	Site establishment and duration of construction
All unattended open excavations shall be adequately demarcated and/or fenced. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor	Site establishment and duration of construction
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel/chemicals to be required during construction).	Contractor	Site establishment
All development footprints should be appropriately fenced off and 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 walking distance. Provide sanitary bins for female workers.	Contractor	Site establishment, and duration of construction
Ablution facilities must be cleaned on a regular basis	Contractor	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line including drainage lines.	Contractor	Site establishment, and duration of construction
Supply adequate (closable, tamper proof) waste collection bins at site where construction is being undertaken.	Contractor	Site establishment, and duration of construction
Separate bins should be provided for general and hazardous waste.	Contractor	Site establishment, and duration of construction
As far as possible, provision should be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 3: Appropriate management of the construction site and construction workers

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices. » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp/s must take cognisance of any sensitive areas reflected on the sensitivity map (Figure 1.2).	Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment, and during construction
Rehabilitate all disturbed areas as soon as construction is complete within an area. No exotic plants may be used in rehabilitation. Only indigenous plants of the area may be used.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure waste containers are maintained and emptied on a regular basis.	Contractor	Duration of construction
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor	Duration of construction
Contractors must use chemical toilets/ablution facilities provided on site; no ablution activities will be permitted outside the designated areas. A minimum of one toilet shall be provided per 15 persons or less at each working area such as the Contractor's camp	Contractor and sub-contractor/s	Duration of contract
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor	Duration of construction
Cooking and eating of meals must take place in a designated area.	Contractor and sub-contractor/s	Duration of contract
No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
No open fires are permitted on site and construction personnel must be made aware of the consequences of starting a fire on site to avoid damage to neighbouring farms.	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 plants may be collected from site for medicinal or any other purpose	Contractor	Duration of contract
No one may disturb flora or fauna in/outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Firefighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
A Code of conduct for construction workers should be implemented.	Contractor and sub-contractor/s	Construction
Contractors must ensure that all workers before	Contractor and	Construction

Mitigation: Action/Control	Responsibility	Timeframe
commencing work are informed of the conditions contained in the EMP, specifically consequences of stock theft and trespassing on adjacent farms.	sub-contractor/s	
On completion of the construction phase, all construction workers must leave the site.	Contractor and sub-contractor/s	Construction

<p>Performance Indicator</p>	<ul style="list-style-type: none"> » The construction equipment camps have avoided sensitive areas. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not undertaken. » 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.
<p>Monitoring</p>	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of disposal of sewage at an appropriate wastewater 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 4: Maximise local employment associated with the construction phase

Although limited, employment opportunities could be created during the construction phase, specifically for semi-skilled and unskilled workers, use should be made of local labour as far as possible.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » The opportunities and benefits associated with the creation of local employment and business.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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
Construction workers should be recruited, as far as possible, from the local area in and around the Aggeneys area.	Contractor	Duration of construction
Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses, and SMMEs from the local sector.	PV Africa Development	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » The involvement of local labour and previously disadvantaged individuals is promoted. » Labour, entrepreneurs, businesses, and SMMEs from the local sector are awarded jobs, where possible, based on requirements in the tender documentation.
Monitoring	<ul style="list-style-type: none"> » PV Africa Development and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 5: Minimise impacts related to traffic management and transportation of equipment and materials to site

The construction phase of the project will be the most significant in terms of generating traffic impacts; resulting from the transport of equipment and materials and construction crews to the site and the return of the vehicles after delivery of materials.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Impact of 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 increased traffic.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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. » Power line construction activities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimise impact of traffic on local traffic volume, existing infrastructure, property owners, animals, and road users. » 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
Appropriate dust suppression techniques must be implemented to minimise dust from gravel roads. These could include the use of water or other appropriate dust suppressants, as determined by the local site conditions.	Contractor	Construction
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	Contractor	Pre-construction
No deviation from approved transportation or construction 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 resulting from the presence 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
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. Signage must be appropriately maintained for the duration of the construction period.	Contractor	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor	Duration of contract
An appropriate speed limit as agreed with the ECO should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment and lessen environmental degradation	Contractor	Duration of contract
All construction vehicles and or machineries 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

Performance Indicator	<ul style="list-style-type: none"> » 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.
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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Developer and or appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 6: To avoid and or minimise the potential impact of the activities during the construction on the safety of local communities and the potential loss of stock and damage to farm infrastructure

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.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Impact on safety of farmers and communities (increased crime etc.) and potential loss of livestock due to stock theft by construction workers and also damage to farm infrastructure, such as gates and fences. » Impact on irrigated fields
Activities/Risk Sources	<ul style="list-style-type: none"> » The presence of construction workers on the site can pose a potential safety risk to local farmers and communities and may result in stock thefts. The activities of construction workers may also result in damage to farm infrastructure.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To avoid and or minimise the potential impact on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
The housing of construction workers on the site should be limited to security personnel.	Contractor	Construction
Ensure that all farm gates are locked and secure at all times.	Contractor	Construction and Operation
Inform the landowner of activity on their land at least 2 days in advance of planned activities.	Contractor	All phases of the project
The construction site should be fenced and access to the area controlled.	Contractor	All phases of project
Procedures and measures to prevent, and in worst cases, attend to fires should be developed in consultation with the surrounding property owners	PV Africa Development Contractor	Pre-construction and when required

Mitigation: Action/Control	Responsibility	Timeframe
Contact details of emergency services should be prominently displayed on site.	Contractor	Construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No criminal activities and theft of livestock are reported. » No fires or on-site accidents occur.
Monitoring	<ul style="list-style-type: none"> » PV Africa Development and appointed ECO must monitor indicators listed above to ensure that they have been implemented.

OBJECTIVE 7: 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	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » 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 NO₂, CO and SO₂) from vehicles and construction equipment
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 in a manner that will ensure that nuisance from dust emissions from road or vehicle sources are not visibly excessive.	Contractor	Construction
Ensure that any damage to roads attributed to construction activities is repaired before completion of the construction phase.	Contractor	Construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as required to minimise/control airborne dust. These could include the use of water or other appropriate dust suppressants, as determined by the local site conditions.	Contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins	Contractor	Duration of contract
An appropriate speed limit should be implemented for vehicles travelling on site in order to minimise dust generation and ensure safety of personnel and the environment.	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 excessive 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 in line with the progression of construction activities.	Contractor	Completion of construction
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Monitoring must be undertaken to ensure emissions are not

	<p>exceeding the prescribed levels via the following methods:</p> <ul style="list-style-type: none"> » 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.
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OBJECTIVE 8: 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 as far as possible.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Impacts on natural vegetation » Impacts on soil » Loss of topsoil
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Excavation of foundations » Construction of site access road » Site preparation (e.g. compaction) » Power line construction activities » Stockpiling of topsoil, subsoil and spoil material
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation, where possible » To minimise footprints of disturbance of vegetation/habitats » 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 and their habitats is restricted.	Contractor	Site establishment & duration of contract
No activities must take place out of demarcated	Contractor	Site

Mitigation: Action/Control	Responsibility	Timeframe
construction site		establishment & duration of contract
Any fill material required 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
Excavated topsoil must be stockpiled in designated areas separate from base material at a maximum height of 2m and covered (during windy conditions) until replaced during rehabilitation.	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

Performance Indicator	<ul style="list-style-type: none"> » Minimal disturbance outside of designated work areas. » Minimise clearing of existing vegetation. » Topsoil appropriately stored.
Monitoring	<ul style="list-style-type: none"> » 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 9: Minimise the impacts on and loss of indigenous vegetation and faunal habitat

Areas of high local ecological sensitivity have been identified within which the power line will be situated. Placement of non-essential infrastructure in these areas should be avoided as far as possible. Permits will be required to be obtained where Red Data or protected flora will be disturbed or relocated.

Project component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Clearing of natural vegetation » Construction activities » Traffic to and from site
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related traffic » Foundations or plant equipment installation » Mobile construction equipment

	<ul style="list-style-type: none"> » Power line construction activities » Dumping or damage by construction equipment outside of demarcated construction areas.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation in the high and moderate sensitive areas on the site » To minimise footprints of disturbance of vegetation/habitats on-site

Mitigation: Action/control	Responsibility	Timeframe
Areas to be cleared will be clearly marked in the field to eliminate unnecessary clearing.	Contractor in consultation with Specialist	Pre-construction
The extent of clearing and disturbance to the native vegetation will be kept to a minimum so that the impact on flora is restricted.	Contractor	Site establishment & duration of contract
Vegetation clearing along the power line corridor should only be conducted where necessary and should not be cleared using herbicides or with a bulldozer. Vegetation can be cleared manually with bush cutters to 0.5m height where necessary.	Contractor	Site establishment & duration of contract
A site rehabilitation programme must be implemented.	Contractor in consultation with Specialist	Duration of contract
Protected plants (<i>Hoodia gordonii</i>) identified within the power line route must not be disturbed or removed prior to permit being granted.	Contractor	Pre-construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation
Monitoring	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by ECO throughout construction phase » Supervision of all clearing and earthworks » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE 10: Limit impacts on drainage lines

No protected or species of special concern (fauna & flora) were observed within the aquatic areas adjacent to the existing stream crossings that will be used. Therefore based on the site visit the significance of the impacts assessed for the aquatic systems after mitigation would be LOW.

Project component/s	» Power line » Access roads
Potential Impact	» Damage to the watercourse (such as erosion, siltation, dumping of waste) that will impact on ecosystem functioning.
Activity/risk source	» Construction, environmental management
Mitigation: Target/Objective	Target: No damage to the drainage line within the project area.

Mitigation: Action/control	Responsibility	Timeframe
No power line towers should be placed within the regulated area (being 32m or within the 1:100 year floodline) of the identified washes (poorly defined drainage areas) identified on the site	Contractor, PV Africa Development	Duration of construction
Where drainage lines can't be avoided, a permit or General Authorisation from the Department of Water Affairs will need to be obtained.	Contractor, PV Africa Development	Design and construction
No towers/materials shall be placed/stored within 100m from the identified drainage lines	Contractor, PV Africa Development	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas » Minimised clearing of existing/natural vegetation » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation
Monitoring	<ul style="list-style-type: none"> » An Environmental control officer should monitor the habitat loss before and after construction » The drainage lines should be monitored for the presence and development of erosion features downstream of any construction on site.

OBJECTIVE 11: Minimise the establishment and spread of alien invasive plants

On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
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: <ul style="list-style-type: none"> » 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
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
Immediately control any alien plants that become established using registered control methods.	Contractor	Construction

Performance Indicator	» For each alien species identify the approximate number of plants and aerial cover of plants within project area and immediate surroundings.
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Monitoring	<ul style="list-style-type: none"> » On-going monitoring of area by ECO during construction. » 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.
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OBJECTIVE 12: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

- » Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere
- » Uncontrolled run-off relating to construction activity (excessive wetting, uncontrolled discharge, etc.) will also lead to accelerated erosion and possible sedimentation of the drainage lines.
- » Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Degradation of parent rock is considered low as there are no deep excavations envisaged.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Minimise extent of disturbance areas. » Minimise activity within disturbance areas. » Minimise soil degradation (mixing, wetting, compaction, etc). » Minimise soil erosion.

	<ul style="list-style-type: none"> » Minimise deposition of soil into drainage lines. » Minimise instability of embankments/excavations.
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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
Any new access roads required to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement, and compaction of soil.	Engineer Contractor	Design and construction
Where new access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out. Permit to disturb the drainage lines must be obtained from the Department of Water & Sanitation.	Contractor	Design, before and during construction
Minimise removal of vegetation which adds stability to soil.	Contractor	Construction
Soil conservation: Stockpile topsoil for re-use in rehabilitation phase, protect stockpile from erosion	Contractor	Before and during construction
Erosion control measures (i.e. 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, and ECO	Erection: Before construction Maintenance: Duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	Contractor	Duration of contract
Compile and implement an appropriate stormwater management plan.	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Monthly inspections of the site by the ECO. » Monthly inspections of sediment control devices.

	<ul style="list-style-type: none"> » Monthly inspections of surroundings, including drainage lines. » Immediate reporting of ineffective sediment control systems. » An incident reporting system will record non-conformances.
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OBJECTIVE 13: Protection of heritage resources

The main cause of impacts to archaeological sites is physical disturbance of the material itself and its context. In general the study area is of low cultural sensitivity and it would appear unlikely that any archaeological remains of significance will be found *in situ* or exposed during the development.

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	» Heritage objects/ artefacts/ Unidentified Sites/ Burial and Grave Sites (found on site are inappropriately managed or destroyed
Activity/Risk Source	<ul style="list-style-type: none"> » Site preparation and earthworks » Foundations or plant equipment installation » Mobile construction equipment movement on site » Construction activities associated with the power line and access roads
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.	Contractor in consultation with 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. Familiarise all staff and contractors with procedures for dealing with heritage objects/sites.	PV Africa Development / Contractor	Duration of contract
If a heritage object is found i.e. grave/ burial site, or archaeological site, 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.	PV Africa Development, and Contractor in consultation with Specialist	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » Zero disturbance outside of designated work areas. » All heritage items located are dealt with as per the legislative guidelines.
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Monitoring	<ul style="list-style-type: none"> » 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.
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OBJECTIVE 14: Minimisation of visual impacts associated with construction

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a cumulative 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 project. 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.

Project Component/s	<ul style="list-style-type: none"> » Power line » Laydown areas » Access roads
Potential Impact	<ul style="list-style-type: none"> » Visual impact of general construction activities » Potential scarring of the landscape due to vegetation clearing.
Activity/Risk Source	<ul style="list-style-type: none"> » The viewing of the above mentioned by observers on or near the site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Minimal visual intrusion by construction activities and construction accommodation and intact vegetation cover outside of immediate works areas.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that vegetation is not unnecessarily removed during the construction period.	PV Africa Development or contractor	Planning
Reduce the construction period through careful logistical planning and productive implementation of resources.	PV Africa Development or contractor	Planning
Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	PV Africa Development or contractor	Construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Construction
Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Contractor	Construction
Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts.	Contractor	Construction
Rehabilitate all disturbed areas immediately after the completion of construction works.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Monitoring of vegetation clearing during construction. » Monitoring of rehabilitated areas post construction.

OBJECTIVE 15: Protection of avifauna

During the operation, the threat of collision with the power line is the primary potential threat to avifauna, particularly sensitive, collision prone species that may occur in the study area such as Bustards. The threat of electrocution while perching on the power line and associated infrastructure serves as a threat to certain sensitive species, depending on the power line structures implemented.

Project	» Power line
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Component/s	
Potential Impact	» Collision and electrocution events with the overhead power line.
Activities/Risk Sources	» Operation of the power line without appropriate mitigation measures.
Mitigation: Target/Objective	» Maintain a low number of collision, and electrocution events.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions	Contractor	Construction
To reduce collision and electrocution of birds on the power line, insulating electrical components and bird flight diverters shall be installed.	Contractor	Construction
Insulate live components at support structures.	Contractor	Construction

Performance Indicator	» Power line design implemented in line with required mitigation measures. » Bird diverters implemented in appropriate areas
Monitoring	» Monitoring of power line construction activities by the ECO to ensure implemented structures are in line with the required design to minimise impacts on birds

OBJECTIVE 16: Appropriate handling and management of waste

The main wastes expected will include spoil from excavation activities, general construction waste, hazardous waste (i.e. fuel), and liquid waste (including grey water and sewage).

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.

Project Component/s	» Power line » 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.

	<ul style="list-style-type: none"> » Hydrocarbon use and storage. » Spoil material from excavation, earthworks, and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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 manifest should be developed for the ablutions showing proof of disposal of sewage at appropriate wastewater treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	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 wood, metals, general refuse etc.).	Contractor	Duration of contract
Bins and skips must be labelled for ease of waste management.	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
Untampered waste shall be removed at least weekly for disposal; other wastes can be removed for recycling/ disposal at an appropriate frequency or ECO's discretion.	Contractor	Duration of contract
Disposal of waste shall 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	Contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
transported by approved waste transporters to sites designated for their disposal.		contract
Spilled cement will be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	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. Waste from these toilets should be disposed of at a licensed wastewater treatment works.	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 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
Proof of appropriate disposal of all waste must be obtained from the waste contractors and kept on file.	Contractor	Duration of construction

Performance Indicator	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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 will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

OBJECTIVE 17: 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	» Power line
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 potential/actual leak or spill of a 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 can be stored onsite to a maximum of 90 days before removed from the site and 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 but on designated bunded areas at the camp (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils leaks.		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
Small construction machineries i.e. stumpers, generators etc. must be stored in an appropriately sealed area.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Drip trays shall be placed under stationery machineries at appropriate areas i.e. areas that pose threat of leakage	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
All small chemical substances used onsite must be accompanied by a portable drip tray to store them	Contractor	Duration of contract
Construction vehicles must be washed within designated area, agreed with the ECO and the site manager	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	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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.

OBJECTIVE 18: Noise control

Traffic movement to and from the site, particularly of heavy-duty vehicles during construction, could potentially result in a noise impact.

Project component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Nuisance noise from construction affecting the surrounding community
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks » Construction-related transport » Foundations or plant equipment installation » Power line construction activities
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise noise to any surrounding residences from the construction activities » To comply with Noise Control Regulations and SANS Guidelines » To ensure noise levels are acceptable at residences in close proximity to construction activities

Mitigation: Action/control	Responsibility	Timeframe
On-site construction activities should be limited to daylight hours as far as possible.	Contractor	Duration of contract
Construction noise shall be managed according to the Noise Control Regulations and SANS 10103.	Contractor	Duration of contract
All construction equipment, including vehicles, shall be properly and appropriately maintained in order to minimise noise generation.	Contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No complaints received concerning noise
Monitoring	<ul style="list-style-type: none"> » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMP.

6.3 Detailing Method Statements

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:

- » Responsible person/s;
- » Construction procedures;
- » Materials and equipment to be used;
- » Getting the equipment to and from site;
- » How the equipment/material will be moved while on-site;
- » How and where material will be stored;
- » The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- » Timing and location of activities;
- » Compliance/non-compliance with the Specifications; and
- » Any other information deemed necessary by the Site Manager.

Specific method statements required may include:

- » Site establishment
- » Preparation of the site
- » Soil management/stockpiling and erosion control.
- » Excavations and backfilling procedure.
- » Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions)
- » Storm water management procedures
- » Wash bay for the construction vehicles and or machineries
- » Ablution facilities (placement, maintenance, management and servicing)
- » Solid Waste Management:
- » Liquid waste management:
- » Dust and noise pollution
- » Hazardous substance storage (Ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants,

solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).

- » Fire prevention and management measures on site.
- » Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary).
- » Incident and accident reporting protocol.
- » General administration
- » Designate access road and the protocol on while roads are in use.
- » Requirements on gate control protocols.

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

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

6.4 Awareness and Competence: Construction Phase

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 employees are aware of the location and have access to the document.
- » Employees shall be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the power line.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course.

- » The course 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 relevant 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 annually to ensure the contractor staffs are aware of their environmental obligations as practically possible, detailed below.

6.4.1 Environmental Awareness Training

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

6.4.2 Induction Training

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

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

6.4.3 Toolbox Talks

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

6.5 Monitoring Programme: Construction Phase

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). The Project Manager will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to 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.

6.5.1. Non-Conformance Reports

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

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the

remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

6.5.2. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis and must be submitted to DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded if any, corrective action required, and details of those non-conformances or incidents which have been closed out.

6.5.3. Final Audit Report

A final environmental audit report must be compiled by an independent auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase (i.e.: within 30 days of site handover)) and within 30 days of completion of rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMP.

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

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

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » Temporary construction areas » Temporary access roads/tracks » Power line servitudes » Other disturbed areas/footprints
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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.	Contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor	Following completion of construction

Mitigation: Action/Control	Responsibility	Timeframe
		activities in an area
The area that previously housed the construction equipment camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor	Following completion of construction activities in an area
All hardened surfaces within the construction equipment 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
Where disturbed areas are not to be used during the construction of the proposed power line, these 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.	PV Africa Development in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as areas with steep slopes.	PV Africa Development in consultation with rehabilitation specialist (if required)	Post-rehabilitation
On-going plant monitoring and removal must be undertaken on all areas of natural Vegetation on	PV Africa Development	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
an annual basis		

Performance Indicator	<ul style="list-style-type: none"> » All portions of site, including construction equipment camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised where practicable or required after construction and temporally utilised areas. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Complete site free of erosion alien invasive plants. 	
Monitoring	<ul style="list-style-type: none"> » On-going inspection of rehabilitated areas in order to determine effectiveness of rehabilitation measures implemented. » On-going alien plant monitoring and removal should be undertaken on an annual basis. 	

MANAGEMENT PROGRAMME: OPERATION

CHAPTER 8

Overall Goal: To ensure that the operation of the proposed 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 facility in a way that:

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the proposed 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.

An environmental manager must 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 1: Protection of Indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and fauna during operation could result from maintenance activities and the movement of people and vehicles on site and in the surrounding area. 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	<ul style="list-style-type: none"> » Service road utilised during regular maintenance. » Areas disturbed during the construction phase and subsequently rehabilitated.
Potential Impact	<ul style="list-style-type: none"> » Disturbance to or loss of vegetation and/or habitat.
Activity/Risk Source	<ul style="list-style-type: none"> » Movement of employee vehicles within and around site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Maintain minimised footprints of disturbance of vegetation/habitats on-site.

	» Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.
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Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	PV Africa Development	Operation
No disturbance of vegetation outside of the project site must occur.	PV Africa Development	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	PV Africa Development	Operation
An on-going alien plant monitoring and eradication programme must be implemented, where necessary.	PV Africa Development	Operation

Performance Indicator	<ul style="list-style-type: none"> » No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts. » No disturbance of vegetation outside of project site.
Monitoring	» Regular inspection to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas

OBJECTIVE 2: Protection of avifauna

During operation, the threat of collision with the power line is the biggest potential threat to avifauna, particularly sensitive, collision prone species that may occur in the study area. The threat of electrocution while perching on the power line and associated infrastructure serves as a threat to certain sensitive species, depending on the power line structures implemented.

Project Component/s	» Power line
Potential Impact	» Collision and electrocution events with the overhead power line.
Activities/Risk Sources	» Operation of the power line without appropriate mitigation measures.
Mitigation: Target/Objective	» Maintain a low number of collision, and electrocution events.

Mitigation: Action/Control	Responsibility	Timeframe
Maintain bird flappers to new lines in identified sensitive Areas	PV Africa Development	Operation
Maintain insulation of live components at support structures.	PV Africa Development	Operation

Performance Indicator	» Minimal collision or electrocution events.
Monitoring	<ul style="list-style-type: none"> » Observation of electrocution or collision events with the power line. » Monitor power line servitude for mortalities.

OBJECTIVE 3: Minimise soil degradation and erosion

The soil on site may be impacted in terms of:

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

Project Component/s	<ul style="list-style-type: none"> » Power line » Access roads
Potential Impact	<ul style="list-style-type: none"> » Soil degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	<ul style="list-style-type: none"> » 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	<ul style="list-style-type: none"> » 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.	PV Africa Development	Operation
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (sand bags, logs), silt fences, storm water catch-pits, and shade nets).	PV Africa Development	Operation

Performance Indicator	<ul style="list-style-type: none"> » Acceptable level of soil erosion around site, as determined by the site manager. » Acceptable level of increased siltation in drainage lines, as determined by the site manager.
Monitoring	<ul style="list-style-type: none"> » Inspections of site on a bi-annual basis. » Water management plan

MANAGEMENT PROGRAMME: DECOMMISSIONING

CHAPTER 9

It is most likely that decommissioning activities of the infrastructure would comprise the disassembly and removal of the power line from the site.

The EMP for Rehabilitation (chapter 7) is also relevant to the decommissioning of sections of the proposed distribution line and must be adhered to.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore is not repeated in this section. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMP to be revisited and amended.

9.1. Objectives

The overall objective of the decommissioning phase is to leave the project area in a condition that minimises adverse impacts on the socio-economic and biophysical environment, with a legacy that contributes to sustainable development.

The objectives of the decommissioning phase of the proposed project are to:

- » Follow a process of decommissioning that is progressive and integrated into the short- and long-term project plans that will assess the closure impacts proactively at regular intervals throughout project life.
- » Implement progressive rehabilitation measures, beginning during the construction phase.
- » Leave a safe and stable environment for both humans and animals and make their condition sustainable.
- » Return rehabilitated land-use to a standard that can be useful to the post-project land user.
- » Where applicable, prevent any further soil and surface water contamination by maintaining suitable storm water management systems.
- » Maintain and monitor all rehabilitated areas following re-vegetation, and if monitoring shows that the objectives have been met, apply for closure.

9.2. Approach to the decommissioning phase

It is recommended that planning of the decommissioning of the project and rehabilitation of the site take place well in advance (at least two years) of the

planned decommissioning activities. Important factors that need to be taken into consideration are detailed below.

9.2.1. Identification of structures for post-closure use

Access roads should be assessed in conjunction with the ultimate land users to determine if these could be used in future. Where not required, these access roads should be decommissioned and rehabilitated.

9.2.2. Removal of infrastructure

All infrastructure must be dismantled and removed. Inert material must be removed from site and disposed of at a registered landfill site. All foundations must be removed to a depth of 1 m. Hard surfaced must be ripped to a depth of 1 m and vegetated.

9.2.3. Soil amelioration

The steps that should be taken during the amelioration of soils are as follows:

- » The deposited soils must be ripped to ensure reduced compaction;
- » An acceptable seed bed should be produced by surface tillage;
- » Restore soil fertility;
- » Incorporate the immobile fertilisers in to the plant rooting zone before ripping; and
- » Apply maintenance dressing of fertilisers on an annual basis until the soil fertility cycle has been restored.

9.2.4. Establishment of vegetation

The objective is to restore the project site to a self-sustaining cycle, i.e. to realise the re-establishment of the natural nutrient cycle with ecological succession initiated.

The objectives for the re-vegetation of reshaped and top-soiled land are to:

- » Prevent erosion;
- » Restore the land to the agreed land capability;
- » Re-establish eco-system processes to ensure that a sustainable land use can be established without requiring fertilizer additions; and
- » Restore the biodiversity of the area as far as possible.

9.2.5. Maintenance

Established vegetation requires regular maintenance. If the growth medium consists of low-fertility soils, then regular maintenance will be required until the natural fertility cycle has been restored.

9.2.6. Monitoring

The purpose of monitoring is to ensure that the objectives of rehabilitation are met and that the rehabilitation process is followed. The physical aspects of rehabilitation should be carefully monitored during the progress of establishment of desired final ecosystems.

The following items should be monitored continuously:

- » Erosion status;
- » Surface drainage systems and surface water quality;
- » Vegetation species diversity; and
- » Faunal re-colonisation.

**APPENDIX A:
GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS
AND ISSUES**

GRIEVANCE MECHANISM / PROCESS

AIM

The aim of the grievance mechanism is to ensure that grievances / concerns raised by local landowners and or communities are addressed in a manner that is:

- » Fair and equitable;
- » Open and transparent;
- » Accountable and efficient.

1 It should be noted that the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. However, the aim should be to address grievances in a manner that does not require a potentially costly and time consuming legal process.

Proposed generic grievance process

- » Local landowners, communities and authorities will be informed in writing by the proponent (PV Africa Development (Pty) Ltd of the grievance mechanism and the process by which grievances can be brought to the attention of the proponent.
- » A company representative will be appointed as the contact person for grievances to be addressed to. The name and contact details of the contact person will be provided to local landowners, communities and authorities.
- » Project related grievances relating to the construction, operational and or decommissioning phase must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances.
- » The grievance will be registered with the contact person who, within 2 working days of receipt of the grievance, will contact the Complainant to discuss the grievance and agree on suitable date and venue for a meeting. Unless otherwise agreed, the meeting will be held within 2 weeks of receipt of the grievance.
- » The contact person will draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting.
- » Prior to the meeting being held the contact person will contact the Complainant to discuss and agree on who should attend the meeting. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or proponent are entitled to invite their legal representatives to attend the meeting/s, it should be made clear that to all the parties involved in the process that the grievance

mechanism process is not a legal process. It is therefore recommended that the involvement of legal representatives be limited.

- » The meeting will be chaired by the company representative appointed to address grievances. The proponent will provide a person to take minutes of and record the meeting/s. The costs associated with hiring venues will be covered by the proponent. The proponent will also cover travel costs incurred by the Complainant, specifically in the case of local, resource poor communities.
- » Draft copies of the minutes will be made available to the Complainant and the proponent within 4 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days of receipt of the draft minutes.
- » In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome will be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of a dispute between the Complainant and the proponent regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s will note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned;
- » In the event that the parties agree to appoint a mediator, the proponent will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the proponent, will identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator will be borne by the proponent. The proponent will provide a person to take minutes of and record the meeting/s.
- » In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome will be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- » In the event of the dispute not being resolved, the mediator will prepare a draft report that summarizes the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.

- » The draft report will be made available to the Complainant and the proponent for comment before being finalised and signed by all parties. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 4 working days.

The way forward will be informed by the recommendations of the mediator and the nature of the grievance. As indicated above, the grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the proponent, either party may be of the opinion that legal action may be the most appropriate option.