PROPOSED STELLA HELPMEKAAR SOLAR ENERGY FACILITY, NEAR STELLA , NORTH WEST PROVINCE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the draft Basic Assessment Report

February 2014

Prepared for

Bluewave Capital SA (Pty) Ltd
PO Box 2914
Sunninghill West
2072
South Africa

BLUEWAVE CAPITAL

Prepared by

FIRST FLOOR UNIT, BLOCK 2
5 WOODLANDS DRIVE OFFICE PARK,
CORNER WOODLANDS DRIVE & WESTERN
SERVICE ROAD, WOODMEAD, GAUTENG
PO BOX 148, SUNNINGHILL, 2157
TEL: +27 (0)11 656 3237
FAX: +27 (0)86 684 0547
E-MAIL: INFO@SAVANNAHSA.COM
WWW.SAVANNAHSA.COM

Savannah ENVIRONMENTAL (PTY) LTD

PROJECT DETAILS

Title	:	Environmental Basic Assessment Process Proposed Stella Helpmekaar Solar Energy Facility, near Stella, North West Province
Authors	:	Savannah Environmental Steven Ingle Karen Jodas
Sub-consultants	:	Simon Todd Consulting Heritage Contracts and Archaeological Consulting Karen Hansen (Visual Impact Assessments) Johann Lanz (Soil scientist) Dr John Almond (Palaeontologist)
Client	:	Bluewave Capital SA (Pty) Ltd
Report Status	:	Draft Environmental Management Programme

When used as a reference this report should be cited as: Savannah Environmental (2013) Draft Environmental Management Programme: Proposed Stella Helpmekaar Solar Energy Facility, near Stella , North West Province

DEFINITIONS AND TERMINOLOGY

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

Archaeological material: Remains resulting from human activities which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts, human and hominid remains and artificial features and structures.

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

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

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

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

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

Environment: the surroundings within which humans exist and that 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 Basic Assessment 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 ongoing maintenance after implementation.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace fossil is the track or footprint of a fossil animal that is preserved in stone or consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

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.

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

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

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

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

TABLE OF CONTENTS

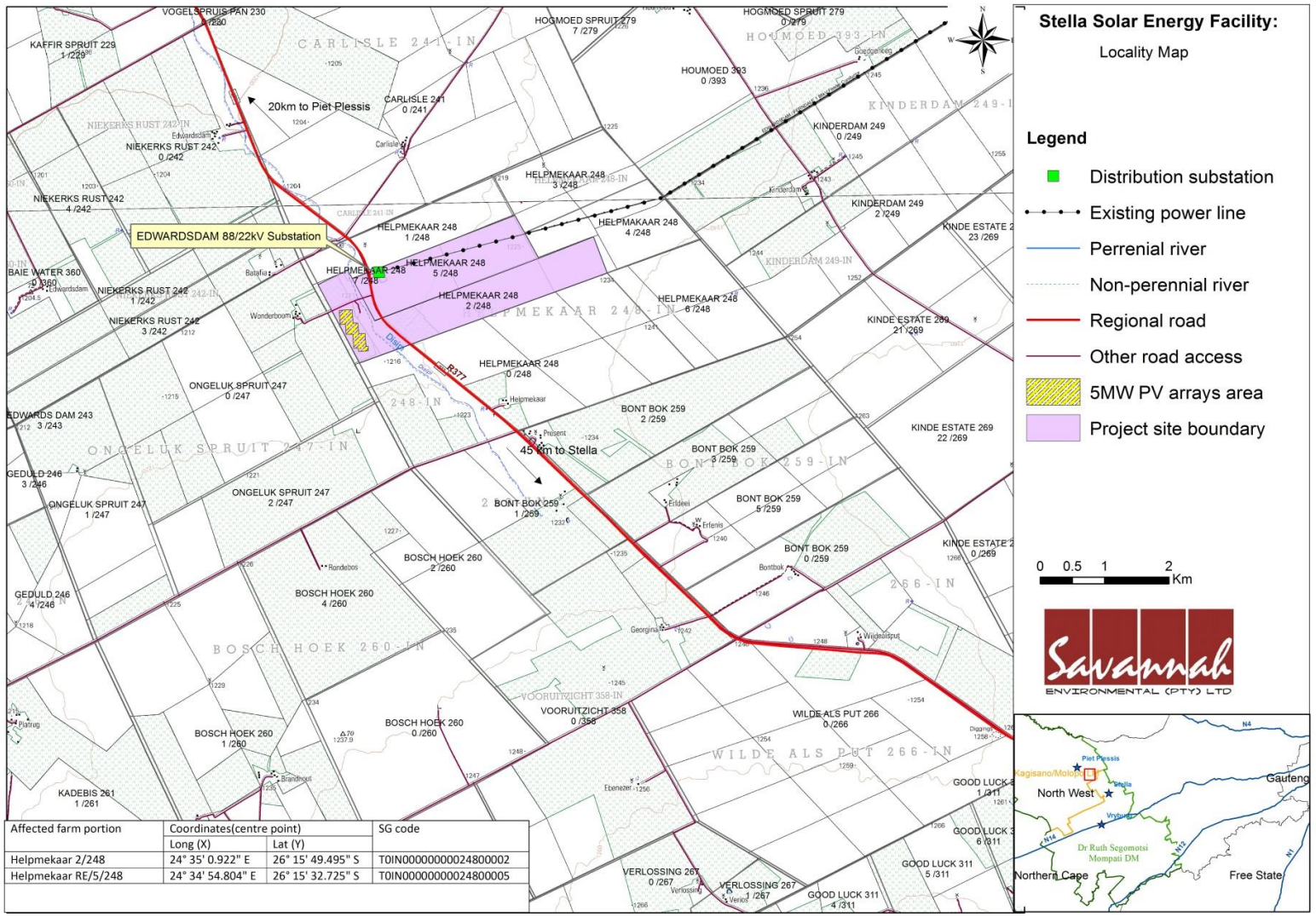
PROJECT DETAILS *CHAPTER 1*

Bluewave Capital, an Independent Power Producer (IPP), is proposing the establishment of a small-scale commercial solar energy facility (using photovoltaic technology) of approximately 5 MW in capacity. The facility is proposed to be located approximately 45km north-west of the town of Stella, on Portion 2 of the Farm Helpmekaar 248 IN, in the North West Province. The proposed project will be referred to as the **Stella Helpmekaar Solar Energy Facility.**

The purpose of the project is to generate electricity which will be fed-into the national electricity grid. The project will participate in the Department of Energy's Small Projects Renewable Energy Independent Power Producer Procurement Programme (REIPPP). The REIPPP Programme has been designed to contribute towards the South African government's renewable energy target of 17GW by 2030, and to stimulate the renewable industry in South Africa.

The facility development footprint will be less than 19.5 ha in extent within which the following infrastructure will be established:

» Photovoltaic (PV) panels up to 4m in height (fixed or tracking technology) with a capacity of up to 5MW.
» Mounting structures to be either rammed steel piles or piles with pre-manufactured concrete footing to support the PV panels.
» Cabling between the project components, to be lain in trenches ~ 1-2m deep.
» Power inverters between the PV arrays (±4.5m^2).
» Power lines to evacuate the power into the Eskom grid via the Edwardsdam 88/22kV Substation.
» Internal access roads (up to 7m wide).
» Water storage facilities/ reservoirs (1 000 m^3).
» Office, workshop area for maintenance and storage (50m^2).
» During construction (temporary infrastructure) such as temporary housing for workers and a laydown area (~1 hectare in extent) will also be required.
» Fencing.



Affected farm portion	Coordinates(centre point)		SG code
	Long (X)	Lat (Y)	
Helpmekaar 2/248	24° 35' 0.922" E	26° 15' 49.495" S	T0IN00000000024800002
Helpmekaar RE/5/248	24° 34' 54.804" E	26° 15' 32.725" S	T0IN00000000024800005

Figure 1.1: Locality map showing the development area for the proposed Stella Helpmekaar Solar Energy Facility

1.1. Activities and Components associated with the Construction Operation and Decommissioning Solar Energy Facility

Table 1.1: Activities associated with the construction of a PV facility

Main Activity/Project Component	Components of Activity	Details
	Planning	
Conduct technical surveys	» Geotechnical survey by geotechnical engineer. » Site survey and confirmation of the infrastructure micro-siting footprint.	» All surveys are to be undertaken prior to initiating construction.
	Construction	
Undertake site preparation	» Clearance of vegetation at the infrastructure footprints. » Where required, some levelling of the land may occur. » Excavation of trenches for underground cables.	» These activities will require the stripping of topsoil, which will need to be appropriately stockpiled for use in rehabilitation.
Construction of internal access roads	» Construct a 7 m wide gravel roads around the site.	» The proposed internal access roads will be comprised of gravel tracks or compacted rock-fill.
Construct infrastructure foundations	» Mounting structures will either be pile driven, screwed or pre-cast concrete footings	» Mounting structures will not involve the utilization of concrete, but would involve be pile driven, screwed or pre-cast concrete footings.
Transport of components and equipment to site	» Trucks will be used to transport all components to site: * The normal civil engineering construction equipment for the civil works (e.g. trucks, graders, compaction equipment, cement mixers, etc.).	» The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.
Establishment of PV panels	» PV panels are transported in containers. » The steel structures will be assembled on site.	» The steel mounting structures, manufactured in South Africa, are custom made for the site. They are assembled on site.

Main Activity/Project Component	Components of Activity	Details
Connection of PV panels to the substation	» The PV panels will be connected to the on-site substation via underground cabling (where practical).	» The installation of these underground cables will require the excavation of trenches of approximately 400 mm – 1000 mm deep within which they can then be laid.
Connect substation to the grid	» The PV facility could possibly connect into the existing Edwardsdam 88/22kV Substation.	» The electricity generated at the site will run through underground cables.
Undertake site rehabilitation	» Remove all construction equipment from the site. » Rehabilitation of temporarily disturbed areas where practical and reasonable.	» On full commissioning of the facility (or a phase thereof), any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.
Operation		
Operation	» PV panels. » Associated infrastructure.	» The operational phase is proposed to run for a period of approximately 20 years. » During this time, full time security, maintenance, supervision, and monitoring teams will be required on site. » The PV facility will be operational during daylight hours only but not under circumstances of mechanical breakdown, or maintenance activities. » No energy storage mechanisms (i.e. batteries) which would allow for continued generation at night or on cloudy days are proposed. » An estimated 50, 000 litres of water per annum would be required for cleaning of the panels and for offices and workshops and an estimated 3 million litres of water would be required for the construction of the plant.
Maintenance & Security	» Maintenance during the life cycle of the facility would include emergency repairs, routine panel	» The panels will be cleaned with water. » 24 hour on-site security, 2m – 5m high perimeter

Main Activity/Project Component	Components of Activity	Details
	maintenance, routine maintenance of medium voltage equipment and maintenance of the site.	fencing, and1-2security guards.
	Decommissioning	
Site preparation	» Preparation of the site. » Mobilisation of construction equipment.	» Depending on the economics of the development following the operational period, the plant will either be decommissioned or the operational phase will be extended. If it is deemed financially viable to continue, existing components may be disassembled and replaced with technology/ infrastructure available at that time. However, if the decision is made to decommission the facility the following activities will form part of the project scope.
Disassemble panels	» The panels will be disassembled and removed.	» The components of the plant will be disassembled and removed. Thereafter they will be reused and recycled (where possible) or disposed of in accordance with regulatory requirements.

1.2. Findings of the Basic Assessment Process

Through the environmental assessment of impacts associated with the Stella Helpmekaar Solar Energy Facility, both potentially positive and negative impacts have been identified. The most significant environmental impacts associated with the proposed project include:

Ecology

» The site for the proposed Bluewave Helpmekaar Solar Energy facility is not considered highly sensitive. The proposed development area has already been transformed and is currently used for cropping. As a result the current biodiversity value of the proposed development area is very low and is not likely to be a significant habitat for most fauna. Development within this area is not likely to generate significant ecological impact and residual and cumulative impacts are also likely to be very low. For many smaller fauna, the site currently represents unfavourable habitat and even the presence of a solar energy facility is likely to represent more favourable habitat than an active cropland. Although the site is within an area that is classified as a CBA, it is transformed and it is clear that the development area does not represent an area of significance for biodiversity pattern or process. Given the highly impacted nature of the site, it is considered a favourable location for the development of a solar energy facility and very little specific mitigation would be required to maintain the impact of the development at a low level. With standard environmental good practice, no significant ecological impacts can be expected to occur.

Soil and agriculture

» The proposed development will have low to medium negative impact on agricultural resources and productivity, but it will also deliver low to medium positive impacts on agriculture. Grazing which is the only current land use, will be able to continue unaffected on all other parts of the farm for the duration of and after the project. The significance of agricultural impacts is influenced by the fact that the solar panel site has limited agricultural potential, and that it is small in relation to other available land on the farm. The farm has a land capability classification of class 5, non-arable, moderate potential grazing land.

Heritage impact

» The impacts to heritage resources by the proposed development are considered to be low and no further mitigation is proposed. No archaeological sites were identified during the survey and desktop study, and no red flags were identified. The study area is located well outside of the known

distribution of Iron Age sites in the North West province and no Iron Age sites were recorded. No Stone Age material was recorded in the study area and this can be attributed to the lack of raw material suitable for knapping and also the lack of water sources (like pans) and landscape features like hills or rocky outcrops that would have attracted human activity in the past within the immediate study area. There are no buildings or other structures within the development footprint and therefore no impact on the built environment is expected. Furthermore the site has very low palaeontological potential, and exemption from a detailed palaeontological assessment was recommended. The duration, probability and significance of heritage and palaeontological impacts are regarded to be low to negligible.

Visual impact

» A solar energy is a semi-industrial land use and would be located in an agricultural area but there are semi-industrial uses nearby. It would be visible to users of the R377 and several farmsteads. The terrain and existing tree planting both contribute to shielding this proposed development from the farmsteads and the road. Most farmsteads are surrounded by shade trees; the road is not very busy, handling mainly local traffic..

Social

» The overall **social** and socio-economic impact in terms of positive and negative impacts is likely to be of a **medium to low significance** during both the construction and operational phases with the implementation of enhancement/mitigation measures. The potential negative impacts associated with the construction phase are typical of construction-related activities and are expected to respond to the mitigation measures proposed. Issues identified include the influx of outside workers, whether locals would be employable during the construction phase of the project as on-site skills development and training would be imperative to ensure that the benefits of employment could be maximised, the intrusion impacts associated with construction, and impacts on the daily living and movement patterns of neighbouring landowners and road users.

The possible job creation and skills development, although limited in extent, are regarded as a significant positive injection into the area. The project would result in significant positive economic spin-offs for the local area and region primarily because of the labour intensive operational practices that would be associated with it.

Based on the findings of the studies undertaken, in terms of environmental constraints and opportunities identified through the Environmental Basic Assessment process, no environmental fatal flaws were identified to be associated with the project.

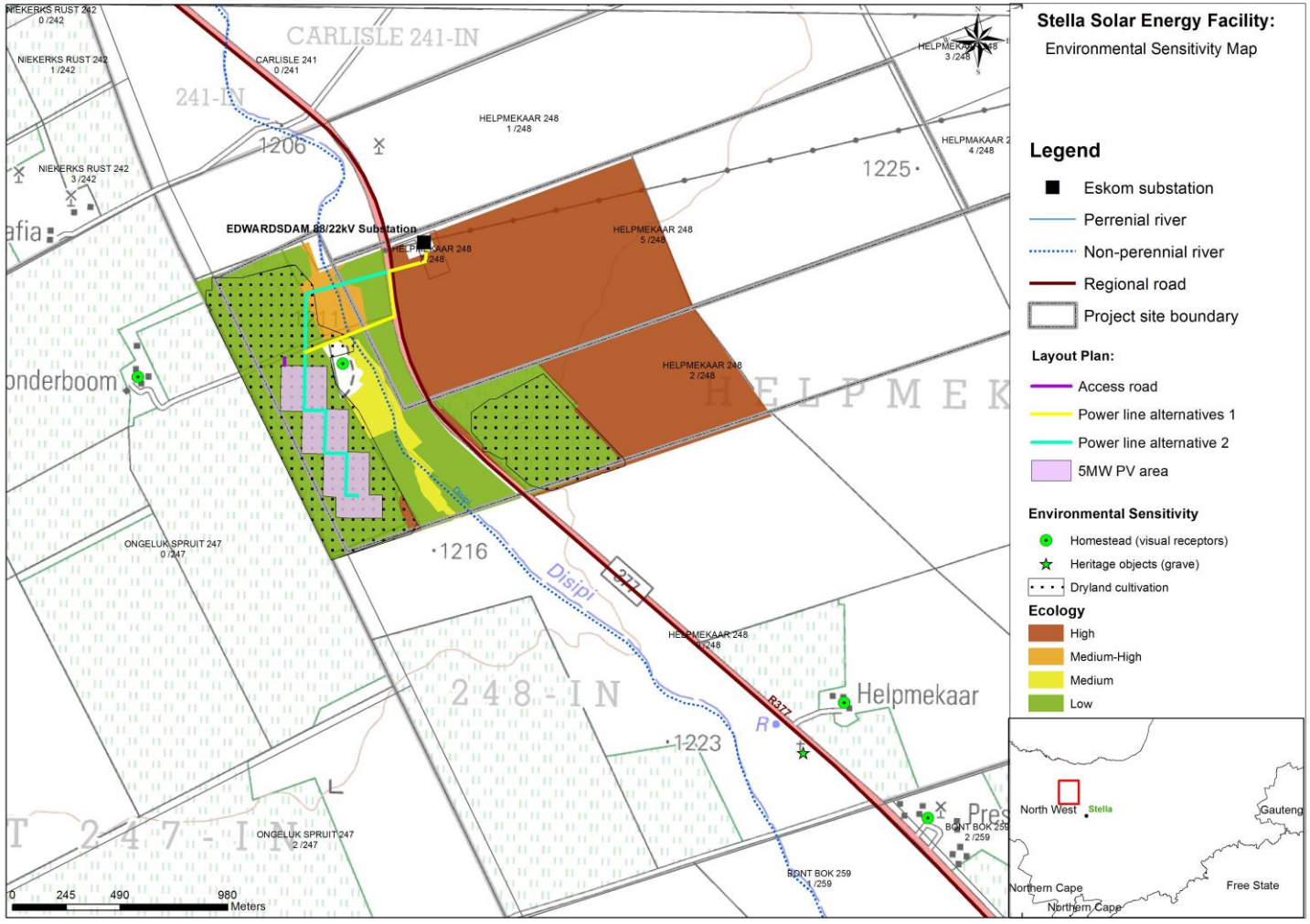


Figure 1.2: Sensitivity map for the Stella Helpmekaar Solar Energy Facility showing the development area in relation to identified environmentally sensitive areas

1.3. Benefits of the Proposed Project

Internationally there is increasing pressure on countries to increase their share of renewable energy generation due to concerns such as climate change and exploitation of resources. The South African Government has set a target for renewable energy of 17 GW all new installed generating capacity (new build) being derived from renewable energy forms, to be produced mainly from biomass, wind, solar and small-scale hydro.

Through pre-feasibility assessments and research, the viability of establishing a 5MW Solar energy facility in the North West Province has been established by **Bluewave Capital SA (Pty) Ltd** The positive implications of establishing a solar energy facility on the demarcated sites within the North West include:

» The project would assist the South African government in reaching their set targets for renewable energy.
» The potential to harness and utilise good solar energy resources would be realised.
» The consolidation of solar facility infrastructure within an area (specifically considering the proximity to the other solar facilities to be developed).
» The National electricity grid in the North West would benefit from the additional generated power.
» Promotion of clean, renewable energy in South Africa.
» Positive impacts on the tourism economy of the area.
» Creation of local employment and business opportunities for the area.

The proposed development represents an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole. The proposed project will not consume energy, but will instead provide a new source of clean, renewable electricity to the South African power grid. This generation of renewable power will aid in reducing the dependency on other power generation fuels and enhancing the reliability of the regional energy supply.

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 EMPr is to ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

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

This Construction and Operational Environmental Management Plan (CEMP and OEMP) has been compiled for the proposed Stella Helpmekaar Solar Facility. This EMPR is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the project. The document will be adhered to, updated as relevant throughout the project life cycle.

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

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

This EMPR has the following objectives:

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

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

Bluewave Capital SA (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 EMPR is part of the Basic Assessment process for the proposed Stella Helpmekaar Solar Energy Facility, it is important that this document be read in conjunction with the final Basic Assessment Report compiled for this project. This will contextualise the EMPR and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPR and the environmental authorisation, the stipulations in the environmental authorisation shall prevail over that of the EMPR, unless otherwise agreed by the authorities in writing. Similarly, any provisions in 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. The document must be adhered to, updated as relevant throughout the project life cycle.

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 Stella Helpmekaar Solar Energy Facility, as the project developer, 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 illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the Basic Assessment 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 EMPR.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods, and reporting.

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

» Planned activities change (i.e. in terms of the components and/or layout of the facility);
» Modification to or addition to environmental objectives and targets;
» Relevant legal or other requirements are changed or introduced; and
» 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 EMPR was compiled by:

	Name	**Company**
EMPR Compilers:	Steven Ingle Karen Jodas	Savannah Environmental Savannah Environmental
Specialists:	Simon Todd	Simon Todd Consulting
	John Almond	Naturaviva
	Jaco van der Walt	Heritage Contracts and Archaeological Consulting
	Karen Hansen	Karen Hansen Landscape Architect
	Johann Lanz	Johann Lanz Consulting

The Savannah Environmental team have extensive knowledge and experience in EIAs and environmental management, having been involved in Basic Assessment processes & EIAs over the past fifteen years. The team have managed and drafted EMPRs for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

KEY LEGISLATION APPLICABLE TO THE DEVELOPMENT CHAPTER 4

The following legislation and guidelines have informed the scope and content of this EMPR 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 Basic Assessment 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 Basic Assessment Process (DEA, 2010).
  - Integrated Environmental Management Information Series (published by DEA).
- International guidelines, including the Equator Principles.

Several other Acts, standards, or guidelines have also informed the project process and the scope of issues addressed and assessed in the Basic Assessment 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 establishment of the proposed Stella Helpmekaar Solar Energy Facility

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
National Legislation			
National Environmental Management Act (Act No 107 of 1998)	The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation. In terms of GNR 544 - 546 of June 2010 a Scoping and EIA Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority Free State Department of Economic Development, Tourism and Environmental Affairs (FS DEDTEA) – commenting authority	The listed activities triggered by the proposed solar energy facility have been identified and assessed in the EIA process being undertaken (i.e. Scoping and EIA). This Basic Assessment Report will be submitted to the competent and commenting authority in support of the application for authorisation.
National Environmental Management Act (Act No 107 of 1998)	In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a	Department of Environmental Affairs	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section has found application during the EIA Phase through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life cycle of the project.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	project holistically, and to consider the cumulative effect of a variety of impacts.		
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs Department of Environment and Nature Conservation Local Authorities	Noise impacts are expected to be associated with the construction phase of the project and are not likely to present a significant intrusion to the local community. Therefore is no requirement for a noise permit in terms of the legislation. On-site activities should be limited to 6:00am - 6:00pm, Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.
National Water Act (Act No 36 of 1998)	Water uses under S21 of the Act must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the general authorisation.	Department of Water Affairs Provincial Department of Water Affairs	A water use license (WUL) is required to be obtained if drainage lines are impacts on. The Disipi non-perennial river occurs on the site and could be indirectly impacted by the proposed layout of the facility. Should water be abstracted from the borehole on site or any other natural resource for use within the facility, a

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			water use license may be required.
National Water Act (Act No 36 of 1998)	In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.	Department of Water Affairs	This section of the Act will apply with respect to the potential impact on drainage lines, primarily during the construction phase (i.e. pollution from construction vehicles).
Minerals and Petroleum Resources Development Act (Act No 28 of 2002)	A mining permit or mining right may be required where a mineral in question is to be mined (e.g. materials from a borrow pit) in accordance with the provisions of the Act. Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act. S53 Department of Mineral Resources: Approval from the Department of Mineral Resources (DMR) may be required to use land surface contrary to the objects of the Act in terms of section 53 of the Mineral and Petroleum Resources Development Act, (Act No 28 of 2002): In terms of the Act approval from the Minister of Mineral Resources is required to ensure that proposed activities do not sterilise a mineral resources that might occur on site	Department of Mineral Resources	As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained. A Section 53 application will be submitted the Free State DMR office.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas."	Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.		The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.
National Heritage Resources Act (Act No 25 of 1999)	S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including: » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; and » Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent. Stand alone HIAs are not required where an EIA Process is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.	South African Heritage Resources Agency	A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development. A HIA has been undertaken as part of the Basic Assessment Process to identify heritage sites. No heritage sites are located within the study area. See Appendix D2.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the	Department of Environmental Affairs	As the applicant will not carry out any restricted activity, as is defined in S1 of the Act, no permit is required to be obtained in this regard.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007. In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase. The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need		Specialist flora and fauna studies have been undertaken as part of the basic Assessment process. As such the potential occurrence of critically endangered, endangered, vulnerable, and protected species, as well as critically endangered (CR), endangered (EN), vulnerable (VU) or protected ecosystems and the potential for them to be affected has been considered, this report is contained in Appendix D 1.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	of protection, (G 34809, GoN 1002), 9 December 2011).		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.	Department of Agriculture	This Act will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented. The permission of agricultural authorities will be required if the Project requires the draining of vleis, marshes or water sponges on land outside urban areas.
National Forests Act (Act No. 84 of 1998)	» In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated". » GN 1042 provides a list of protected tree species.	National Department of Forestry	A permit would need to be obtained for any protected trees that are affected by the development.
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S21 the applicant would be obliged to burn firebreaks to ensure that	Department of Water Affairs	While no permitting or licensing requirements arise from this

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	should a veldfire occur on the property, that it does not spread to adjoining land. In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.		legislation, and this Act will find application during the construction and operational phase of the project.
Hazardous Substances Act (Act No 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other	Department of Health	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health.

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	means, cause extreme risk of injury etc., can be declared as Group I or Group II substance Group IV: any electronic product; and Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of this Act (GN 718), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:	National Department of Water and Environmental Affairs Provincial Department of Environmental Affairs (general waste)	As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMPR (refer to Appendix G). The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license (provided these remain below the prescribed thresholds). » in excess of 100m^3 of general waste » in excess of 35m^3 of hazardous waste

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	» The containers in which any waste is stored, are intact and not corroded or in » any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.		
National Road Traffic Act (Act No 93 of 1996)	» The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. » Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts. » The general conditions, limitations, and escort requirements for abnormally	» South African National Roads Agency Limited (national roads) » Provincial Department of Transport	» An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
	dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		
Provincial Legislation			
The Nature Conservation Ordinance 8 of 1969 and amendments	Lists plant and animal species as protected	Free State Department of Economic Development, Tourism and Environmental Affairs	According to the SANBI SIBIS database, no listed plant species are known from the area. *Acacia erioloba* which is listed as Declining by the Red List of South African Plants and is also a nationally protected species was common at the site and any activities within the natural vegetation are likely to impact this species. Under the current layout, impact to this species is however likely to be very low. Apart from *Acacia erioloba*, no other listed or protected species were observed at the site and given the transformed nature of the

Legislation	Applicable Requirements	Relevant Authority	Compliance Requirements
			development area, it is unlikely that any other such species are present or likely to be affected by the development.

MANAGEMENT PROGRAMME: PLANNING AND DESIGN CHAPTER 5

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

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

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

5.1 Objectives

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

In order to minimise impacts associated with the construction and operation of the facility, the following is required to be undertaken during the final design phase:

» Geotechnical survey – this will investigate flood potential, foundation conditions, potential for excavations, and the availability of natural construction materials. This study will serve to inform the type of foundations required to be constructed (i.e. for the substation), and the extent of earthworks and compaction required in the establishment of the internal access roads.
» A storm-water management plan – this will detail how storm-water runoff (i.e. over engineered hard surfaces) can be managed to reduce velocities and volumes of water that could lead to erosion and potential sedimentation of drainage systems.

The implementation of the EMPR within this area will minimise and/or mitigate impacts on the environment, specifically on the ecology of the project area.

Project Component/s	» PV panels. » Substation. » Access roads. » Power line.
Potential Impact	» Impact on identified sensitive areas.
Activities/Risk Sources	» Positioning of all the facilities components.
Mitigation: Target/Objective	» The design of the facility responds to the identified environmental constraints and opportunities. » Site sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Undertake a detailed geotechnical survey prior to the commencement of construction.	Geotechnical specialist	Design
Avoid identified sensitive areas within the site within the final design of the facility.	Engineering design consultant and Bluewave Capital SA (Pty) Ltd and EPC	Design review
Consider and incorporate design level mitigation measures recommended by the specialists as detailed within the Basic Assessment Report and relevant appendices.	Engineering design consultant, solar component supplier, and Bluewave Capital SA (Pty) Ltd and EPC	Design review
External access point and internal access road to be carefully planned to maximise road user safety.	Bluewave Capital SA (Pty) Ltd Design engineer/ EPC Contractor and EPC	Design
Compile a comprehensive erosion and storm water management plan for hard surfaces as part of the final design of the project (refer to Appendix C for principles to be considered). This must include appropriate means for the handling of storm water within the site, e.g. separate clean and dirty water streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities (i.e. water used when washing the panels).	Bluewave Capital SA (Pty) Ltd design engineer and contractor and EPC	Design
Use bird-friendly power line towers and conductor designs.	Bluewave Capital SA (Pty) Ltd and EPC	Design

Mitigation: Action/Control	Responsibility	Timeframe
In designing the facility, use should be made of existing road infrastructure as far as possible. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or management measures must be implemented to ensure minimum damage is caused to natural habitats.	Bluewave Capital SA (Pty) Ltd/ Design engineer and EPC	Design phase
Roads must be designed so that changes to surface water runoff are avoided or minimised and erosion is not initiated.	Bluewave Capital SA (Pty) Ltd/ Design engineer and EPC	Design phase
The facility should be designed in such a manner to allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water.	Bluewave Capital SA (Pty) Ltd/ Design engineer and EPC	Design phase
Submit a final layout to the DEA prior to the commencement of construction	Bluewave Capital SA (Pty) Ltd and EPC	Pre-construction
A traffic management plan must be prepared for site access roads to ensure no hazards result from increased traffic and that traffic flow is not adversely affected.	Bluewave Capital SA (Pty) Ltd and EPC	Pre-Construction

Performance Indicator	» The design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the Basic Assessment Report.
Monitoring	» Review of the design by the Project Manager and the Environmental Control Officer (ECO) prior to the commencement of construction.

OBJECTIVE: Ensure the selection of the best environmental option for the alignment of the power line and access roads

» ***Access Road*** – The preferred site is accessible via a farm road branching off the R377 between Piet Plessis and Stella. Access to the site is within 500m from the R377.

» ***Power line*** – Due to the proposed size and location of the facility, an overhead power line (33kV) of approximately 700m in length will be required to feed into the existing Edwardsdam substation on site.

Project Component/s	» Power line. » Access roads.
Potential Impact	» Route that degrades the environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, and erosion.
Activities/Risk Sources	» Alignment of power line within corridor. » Alignment of access roads.
Mitigation: Target/Objective	» To ensure selection of best environmental option for alignment of linear infrastructure. » Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Locate power line and access roads within disturbed corridors, as far as possible.	Bluewave Capital SA (Pty) Ltd and EPC	Prior to submission of the final construction layout plan
Consider design level mitigation measures recommended by the specialists as detailed within the Basic Assessment report and relevant appendices.	Bluewave Capital SA (Pty) Ltd and EPC	Design
Plan any new access roads according to contour lines to minimise cutting and filling operations.	Bluewave Capital SA (Pty) Ltd and EPC	Design

Performance Indicator	» Power line and road alignments meet environmental objectives. » Selected linear alignments that minimise any negative environmental impacts and maximise any benefits.
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures in the Basic Assessment Report through review of the design by the Project Manager, and the ECO prior to the commencement of construction.

OBJECTIVE: Minimise storm water runoff (guideline for storm water management plan)

Management of storm water will be required during the construction phase of the facility. A detailed storm water management plan is required to be compiled as part of the final design to ensure compliance with applicable regulations and to

prevent off-site migration of contaminated storm water or increased soil erosion. The section below provides a guideline for the management of storm water on site and will need to be supplemented with the relevant method statements during the construction phase of the facility.

Project Component/s	» Storm water management components. » Any hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor storm water management and alteration of the hydrological regime (i.e. drainage lines).
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of storm water to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
A Method Statement for the management of storm water which also considers the recommendations below is to be submitted to the ECO prior to commencement of construction activities.	Bluewave Capital SA (Pty) Ltd and EPC	Pre-construction
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system as a result of increased sedimentation through the implementation of appropriate erosion management measures.	Bluewave Capital SA (Pty) Ltd and EPC	Planning and design
Appropriately plan hard-engineered bank erosion protection structures.	Bluewave Capital SA (Pty) Ltd and EPC	Planning and design
Ensure suitable handling of storm water within the site (i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities) through appropriate design of the facility.	Bluewave Capital SA (Pty) Ltd and EPC	Construction and operation
Design measures for storm water management need to allow for surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.	Bluewave Capital SA (Pty) Ltd and EPC	Planning and design

Performance Indicator	» Appropriate storm water management measures included within the facility design. » Sound water quality and quantity management during construction and operation.
Monitoring	» Devise a suitable surface water quality monitoring plan for implementation during construction and operation.

OBJECTIVE: Protection of avifauna

Due to the proposed size and location of the facility, an overhead power line (33kV) of approximately 700m in length will be required to feed into the existing Edwardsdam substation on site

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 mitigation measures. .
Mitigation: Target/Objective	» Maintain a low number of collision, and electrocution events. » Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions. Fit overhead power lines with appropriate flappers to increase the visibility thereof to avifauna.	Bluewave Capital SA (Pty) Ltd and EPC	Design and Construction
Notes of electrocution and collision events must be sent to a qualified Ornithologist for the recommendation of further mitigation measures if necessary.	ECO and avifauna specialist and EPC	Operation

Performance Indicator	» Minimal collision, or electrocution events.
Monitoring	» Observation of electrocution or collision events with the power line. » Monitor power line servitudes for mortalities.

OBJECTIVE: To ensure effective communication mechanisms

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

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

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (as outlined 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 parties, and the process that will be followed to address issues.	Bluewave Capital SA (Pty) Ltd and EPC	Pre-construction (construction procedure) Pre-operation (operation procedure)
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.	Bluewave Capital SA (Pty) Ltd/ Contractor and EPC	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.	Bluewave Capital SA (Pty) Ltd/ Contractor and EPC	Pre-construction

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

MANAGEMENT PROGRAMME: CONSTRUCTION CHAPTER 6

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

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

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

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

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

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 Bluewave Capital SA (Pty) Ltd 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 conversed with the Basic Assessment for the project, the EMPR, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.

Site Manager (Bluewave Capital SA (Pty) Ltd on-site Representative) will:

» Be fully knowledgeable with the contents of the Basic Assessment 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 Bluewave Capital SA (Pty) Ltd prior to the commencement of any authorised activities. The ECO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMP and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

» Be fully knowledgeable with the contents with the EIA.
» Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued).
» Be fully knowledgeable with the contents with the EMP.
» Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them.
» Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
» Ensure that the compliance of the EMP is monitored through regular and comprehensive inspection of the site and surrounding areas.

» Ensure that if the EMP conditions or specifications are not followed then appropriate measures are undertaken to address this.
» Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
» Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
» Ensure that activities on site comply with all relevant environmental legislation.
» Ensure that appropriate measures are undertaken to address any non-compliances recorded.
» Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMP.
» Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
» Ensure that there is communication with the Site Manager regarding the monitoring of the site.
» Ensure that any non-compliance or remedial measures that need to be applied are reported.
» Independently report to DEA in terms of compliance with the specifications of the EMP and conditions of the Environmental Authorisation (once issued).
» Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). Thereafter weekly site compliance inspections would probably be sufficient, provided that compliance with the requirements of the Environmental Authorisation, EMPR and environmental legislation is maintained. In the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPR. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and

properly trained in order to execute the works in a manner that will minimise environmental impacts. The 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 EMPR and the environmental specifications as they apply to the construction of the proposed facility.
» Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
» Staff will be informed of environmental issues as deemed necessary by the ECO.

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

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

Contractor's Safety, 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 EMPR, and for the compilation of regular 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 SHE 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: Minimise impacts related to inappropriate site establishment

'The movement of workers on site and layout of the construction camp needs to be well management in order to reduce the environmental impacts.

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

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner, as agreed with the ECO.	Contractor and EPC	Site establishment, and duration

Mitigation: Action/Control	Responsibility	Timeframe
		of construction
Where necessary to control access, fence, and secure area (especially relevant to no-go areas).	Contractor and EPC	Site establishment, and duration of construction
Contractors and construction workers must be adequately informed of any no-go areas identified on the site and in the surrounding areas.	Bluewave Capital SA (Pty) Ltd and EPC	Construction
Adequate measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor and EPC	Site establishment, and duration of construction
Fence and secure contractor's equipment camp.	Contractor and EPC	Site establishment
The construction camp used to house equipment should be located in a disturbed area and must be screened off as far as practical during the entire construction phase.	Contractor and EPC	Erection: during site establishment Maintenance: for duration of Contract
Establish appropriately bunded areas for storage of hazardous materials (i.e. fuel to be required during construction).	Contractor and EPC	Site establishment
All unattended open excavations shall be adequately demarcated and/or fenced.	Contractor and EPC	Site establishment, and duration of construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor and EPC	Site establishment, and duration of construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line (if any) including drainage lines.	Contractor and EPC	Site establishment, and duration of construction
Supply adequate waste collection bins at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor and EPC	Site establishment, and duration of construction
The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be	Contractor and EPC	Site establishment, and duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and any other relevant local languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced (fencing shall consists of a minimum of three strands of wire wrapped with danger tape. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.		

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	» An incident reporting system will be used to record non-conformances to the EMPR. » ECO to monitor all construction areas on a continuous basis until all construction is completed. Non-conformances will be immediately reported to the site manager.

OBJECTIVE: Appropriate management of the construction site and construction workers

The construction phase of the PV facility is expected to extend over a period of 8-10 months and create approximately 80 employment opportunities. Ideally low skilled and semi-skilled positions will be filled by locals living in and around the study area (from towns such as Stella). This will however be dependent on skills availability in the area.

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

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

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp/s must take cognisance of any sensitive areas identified by the Basic Assessment studies. The location of this construction equipment camp/s shall be approved by the project ECO.	Contractor and EPC	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor and EPC	Site establishment, and during construction
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor and EPC	Duration of Contract
Ensure waste removal facilities are maintained and emptied on a regular basis.	Contractor and EPC	Site establishment, and duration of construction
The terms of this EMPR and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors contracts	Bluewave Capital SA (Pty) Ltd and EPC	Tender process
Ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor and EPC	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas. These facilities must be regularly serviced by appropriate contractors. A minimum of one toilet shall be provided per 15 persons at each	Contractor and sub-contractor/s and EPC	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
working area such as the Contractor's camp.		
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s and EPC	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 and EPC	Duration of contract
No one other than the ECO or personnel authorised by the ECO may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s and EPC	Duration of contract
Fire fighting equipment and training must be provided before the construction phase commences.	Contractor and sub-contractor/s and EPC	Duration of contract
Draft and implement a Code of conduct for construction workers.	Contractor and sub-contractor/s and EPC	Pre-construction
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms.	Contractor and sub-contractor/s and EPC	Construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s and EPC	Construction
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.	Bluewave Capital SA (Pty) Ltd/ Contractor and EPC	Pre-construction

Performance Indicator	» The construction camps have avoided sensitive areas, as approved by the ECO. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not reported by the

	ECO. » No complaints regarding contractor behaviour or habits. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Code of Conduct drafted before commencement of construction phase.
Monitoring	» Regular audits of the construction camps and areas of construction on site by the ECO. » Proof of disposal of sewage at an appropriate wastewater treatment works. » An incident reporting system should be used to record non-conformances to the EMPR. » 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 EMPR.

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

Although limited, employment opportunities could be created during the construction phase (i.e. approximately 80), specifically for semi-skilled and unskilled workers.

Project Component/s	» Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/Risk Sources	» The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.
Mitigation: Target/Objective	» Bluewave Capital SA (Pty) Ltd, in discussions with the Ditsobotla Local Municipality, should aim to employ the majority of the low-skilled workers from the local area. This should also be made a requirement for all contractors. » Bluewave Capital SA (Pty) Ltd should also develop a database of local BEE service providers

Mitigation: Action/Control	Responsibility	Timeframe

Mitigation: Action/Control	Responsibility	Timeframe
Attempt to employ a majority of the low-skilled workers from the local area.	Bluewave Capital SA (Pty) Ltd & contractors and EPC	Employment and business policy document that sets out local employment targets to be in place before construction phase commences.
Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase to ensure that local employment target is met.	Bluewave Capital SA (Pty) Ltd and EPC	Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase
Skills audit to be undertaken to determine training and skills development requirements.	Bluewave Capital SA (Pty) Ltd and EPC	Skills audit to determine need for training and skills development programme undertaken within 1-month of commencement of construction phase commences.
Develop a database of local BEE service providers and ensure that they are informed of tenders and job opportunities.	Bluewave Capital SA (Pty) Ltd and EPC	Database of potential local BEE services providers to be completed before construction phase commences. Pre-construction
Identify potential opportunities for local businesses.	Bluewave Capital SA (Pty) Ltd and EPC	

Performance Indicator	» Employment and business policy document that sets out local employment and targets completed before construction phase commences; » Majority of semi and unskilled labour locally sourced. » Database of potential local BEE services providers in place before construction phase commences. » Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase.
Monitoring	» Bluewave Capital SA (Pty) Ltd and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Minimise impacts related to traffic management and transportation of equipment and materials to site (Traffic Management and Transportation Plan)

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. Potential impacts associated with transportation and access relate to works within the site boundary and external works outside the site boundary.

The components for the proposed facility will be transported to site by road. The preferred site is accessible via a farm road branching off the R377 between Piet Plessis and Stella. Access to the site is within 500m from the R377.

The section below provides a guideline for the Traffic Management and Transportation Plan on site and will need to be supplemented with the relevant final transport plan devised by the EPC partner during the final design phase of the facility.

Project Component/s	» Delivery of any component required within the construction phase.
Potential Impact	» Impact of heavy construction vehicles on road surfaces, and possible increased risk in accidents involving people and animals. » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.
Activities/Risk Sources	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix concrete from off-site batching plant to the site. » Mobile construction equipment movement on-site. » Power line and substation construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction

	» To ensure all vehicles are roadworthy and all materials/ equipment are transported appropriately and within any imposed permit/licence conditions

Mitigation: Action/Control	Responsibility	Timeframe
The contractor's plans, procedures and schedules should be communicated with affected parties prior to the commencement of construction activities on site.	Bluewave Capital SA (Pty) Ltd and Contractor and EPC	Pre-construction
Source general construction material and goods locally where available to limit transportation over long distances.	Bluewave Capital SA (Pty) Ltd and Contractor and EPC	Pre-construction and construction
Appropriate dust suppression techniques must be implemented to minimise dust from gravel roads.	Bluewave Capital SA (Pty) Ltd and EPC	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 and EPC	Construction
Strict vehicle safety standards should be implemented and monitored.	Bluewave Capital SA (Pty) Ltd, Contractor and ECO and EPC	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor) and EPC	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	Contractor and EPC	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor and EPC	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) and EPC	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor and EPC	Duration of contract
The movement of all vehicles within the site must be	Contractor and	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
on designated roadways.	EPC	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 and EPC	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor and EPC	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor and EPC	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor and EPC	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions and other standard traffic control information.	Contractor and EPC	Duration of contract

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

OBJECTIVE: To avoid and or minimise the potential impact on current and future farming activities during the construction phase.

Construction activities of the proposed facility could lead to the loss of productive farm land. The site proposed for development is not cultivated but is utilised for grazing.

Project component/s	» Construction phase activities associated with the establishment of the PV facility and associated infrastructure.
Potential Impact	» The footprint of the solar energy facility and associated infrastructure will result in a loss of land that will impact on farming activities on the site.
Activities/risk sources	» The footprint occupied by the solar energy facility and associated infrastructure.

Mitigation: Target/Objective	» To minimise the loss of land taken up by the PV facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/control	Responsibility	Timeframe
Minimise the footprint of the PV facility and the associated infrastructure as far as possible.	Contractor and Bluewave Capital SA (Pty) Ltd and EPC	Pre-construction
Rehabilitate disturbed areas on completion of the construction phase. Details of the rehabilitation programme are in Appendix E.	Contractors and EPC	Construction

Performance Indicator	» Footprint of PV facility included in the Construction Phase EMP. » Meeting/s held with farmers during construction phase. .
Monitoring	» ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: To avoid and or minimise the potential impacts of safety, noise and dust and damage to roads caused by construction vehicles during the construction phase

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

Project Component/s	» Construction and establishment activities associated with the establishment of the PV facility, including infrastructure etc.
Potential Impact	» Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads.
Activities/Risk Sources	» The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads.
Mitigation: Target/Objective	» To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and minimise damage to roads.

Mitigation: Action/Control	Responsibility	Timeframe
Implement appropriate dust suppression measures for heavy vehicles and ensure that vehicles used to transport building materials are fitted with tarpaulins or covers.	Contractors and EPC	Duration of Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues.	Contractors and EPC	Duration of Construction
Ensure that drivers adhere to speed limits. Vehicles should be fitted with recorders to record when vehicles exceed the speed limit.	Contractors and EPC	Duration of Construction
Ensure that damage to roads is repaired before completion of construction phase.	Contractors and EPC	Duration of Construction

Performance Indicator	» Dust suppression measures implemented for all areas 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. » Road worthy certificates in place for all heavy vehicles at outset of construction phase and up-dated on a monthly basis.
Monitoring	» Bluewave Capital SA (Pty) Ltd and/or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Minimisation of development footprint and disturbance to topsoil

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

Project Component/s	All constructional activities that disturb the soil below surface, such as levelling, excavations etc.
Potential Impact	Lack of topsoil, resulting in significant decrease in soil fertility.
Activity/Risk Source	All constructional activities that disturb the soil below surface, such as levelling, excavations etc.
Mitigation: Target/Objective	Ensure effective topsoil covering on all disturbed areas.

Mitigation: Action/Control	Responsibility	Timeframe
If an activity will mechanically disturb below surface in any way, then the upper 10-30 cm of topsoil (depending on the specific topsoil depth at the site of disturbance) should first be stripped from the entire disturbed surface and stockpiled for re-spreading during rehabilitation.	Construction managers / Environmental manager	Duration of the construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them.	Construction managers / Environmental manager	Duration of the construction phase
Dispose of all subsurface spoils from excavations where they will not impact on agricultural land (for example on road surfaces) or where they can be effectively covered with topsoil.	Construction managers / Environmental manager	Duration of the construction phase
The stockpiled topsoil must be evenly spread over the entire disturbed surface.	Construction managers / Environmental manager	During rehabilitation after construction / operation.

Performance Indicator	That no disturbed areas are left without an effective covering of topsoil, and potential for re-vegetation, after rehabilitation.
Monitoring	Establish an effective record keeping system for each area where soil is disturbed for constructional purposes. These records should be included in environmental performance reports, and should include all the records below. Record the GPS coordinates of each area. Record the date of topsoil stripping. Record the GPS coordinates of where the topsoil is stockpiled. Record the date of cessation of constructional (or operational) activities at the particular site. Photograph the area on cessation of constructional activities. Record date and depth of re-spreading of topsoil. Photograph the area on an annual basis to show vegetation establishment and evaluate progress of restoration over time.

OBJECTIVE: Minimise the impacts on and loss of indigenous vegetation and faunal habitat

According to the national vegetation map (Mucina & Rutherford 2006), the entire site falls within the Mafikeng Bushveld vegetation type. This vegetation type is restricted to the Northern Province and occupies 14 389 km^2 from west of Mafikeng and south of the Botswana border westwards to

around Vergelee and south to Piet Plessis and Setlagole. In general this vegetation type is characterised by a well-developed tree and shrub layer with dense stands of *Terminalia sericea*, *Acacia luederitzii* and *Acacia erioloba* in some areas. Other typical species include *Acacia karoo*, *Acacia hebeclada*, *Acacia mellifera*, *Dichrostachys cinerea*, *Grewia flava*, *Grewia retinervis*, and *Zizyphus mucronata*. In terms of geology and soils, Mafikeng Bushveld occurs on Aeolian Kalahari sand on flat sandy plains with relatively deep soils of the Clovelly and Hutton forms. Landtypes are Ah, Ai and Ae. No endemic species are known from this vegetation type. Approximately 75% of the Mafikeng Bushveld vegetation type is considered intact and according to the National List of Threatened Ecosystems (2011) it is considered Vulnerable. The main agent of transformation to date is from cropping and further loss of this vegetation type is considered undesirable.

Project Component/s	» All activities which require or result in the clearing of or impact to vegetation – such as site clearing, operation of heavy machinery, road construction etc
Potential Impact	» Loss of intact vegetation » Loss of individuals of listed plant species » Erosion » Alien plant invasion
Activity/Risk Source	Construction activities, especially for roads, PV arrays, substations and other hard infrastructure.
Mitigation: Target/Objective	» Minimum disturbance footprint at site » No loss of individuals of protected plant species » No alien plant invasion » Minimal soil erosion » Rehabilitation of disturbed areas

Mitigation: Action/Control	Responsibility	Timeframe
Demarcate important or sensitive areas as no-go areas.	Contractor/ECO	Construction
Ensure that rehabilitation plan is followed so that bare areas are not exposed for prolonged periods with likely erosion impacts	Contractor/ECO	Construction
Monitor the site for erosion problems and identify areas where additional intervention such as additional revegetation or erosion control such as silt traps may be necessary	Contractor/ECO	Construction
Monitor disturbed areas for the presence and establishment of larger alien species. Alien species present should be cleared on a regular	Contractor/ECO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
basis		

Performance Indicator	» No damage and siltation of local drainage systems » No damage and impingement on sensitive ecosystems adjacent to the site such as wetlands » Site is clear of alien species at the end of construction » An acceptable cover of perennial grass has been established across the majority of cleared and disturbed areas at the end of the construction period
Monitoring	» Monitor for erosion problems on a monthly basis during construction » Monitor for alien species presence at least once every 6 months during construction » Evaluate and record progress of rehabilitation and the establishment of an effective perennial plant cover within disturbed parts of the site » Keep a log of all incidents where the demarcated construction areas were breached and the remedial actions taken to rectify any damage done.

OBJECTIVE: Search and Rescue of All Translocatable Indigenous Plants

Prior to any earthworks (including road construction) within areas of natural vegetation, a plant Search and Rescue program should be developed and implemented. The section below provides a guideline for the Search & Rescue Plan on site and will need to be supplemented with the relevant methodology depending on the final placement of infrastructure.

According to the SANBI SIBIS database, no listed plant species are known from the area. However, this area does not appear to have been adequately sampled in the past, and the database is therefore considered unreliable and incomplete with regards to possible presence of listed species in the area. *Acacia erioloba* which is listed as Declining by the Red List of South African Plants and is also a nationally protected species was common at the site and any activities within the natural vegetation are likely to impact this species. Under the current layout, impact to this species is however likely to be very low. Apart from *Acacia erioloba*, no other listed or protected species were observed at the site and given the transformed nature of the development area, it is unlikely that any other such species are present or likely to be affected by the development.

Project	» Any infrastructure or activity that will result in disturbance to

Component/s	natural areas.
Potential Impact	» Substantially increased loss of natural vegetation at construction phase and waste of on-site plant resources, and lack of locally sourced material for rehabilitation of disturbed areas.
Activities/Risk Sources	» Construction related loss and damage to remaining natural vegetation via heavy machinery, etc.
Mitigation: Target/Objective	» Rescue, maintenance and subsequent replanting of at least 40% of the natural vegetation in all development footprints within any areas of natural vegetation on site

Mitigation: Action/Control	Responsibility	Timeframe
Search and Rescue (S&R) of certain translocatable, selected succulents, shrubs and bulbs occurring in long term & permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, laydown areas, and panel positions) should take place. All such development footprints must be surveyed and pegged out as soon as possible, and then a local horticulturist with Search and Rescue experience should be appointed to undertake the S&R. All rescued species should be bagged (and cuttings taken where appropriate) and kept in the horticulturist's or a designated on-site nursery, and should be returned to site once all construction is completed and rehabilitation of disturbed areas is required. Replanting should only occur in spring or early summer (November to November), once the first rains have fallen, in order to facilitate establishment.	ECO Contractor and EPC	Prior to construction
Plants that can be considered for rescue are all bulbs and succulents, and certain shrubs.	ECO Contractor and EPC	Prior to construction

Performance Indicator	» Horticulturist to submit list of target species to botanist for approval. » Rescue of material. » Replanting in rehabilitation areas to cover 40% of these areas within 3 months of replanting.
Monitoring	» ECO to monitor Search and Rescue. » Horticulturist to liaise with botanist. » Botanist to review rehabilitation success after 3 months of replanting of rehabilitation areas.

OBJECTIVE: Minimise the establishment and spread of alien invasive plants (Invasive Plant Management Plan) and manage indigenous invasive plants

On-going alien and invasive plant monitoring and removal should be undertaken on all areas of natural vegetation within the project lease area on an annual basis. The section below provides a guideline for the Invasive Plant Management Plan and should be implemented together with consideration of the principles contained in the Department of Water Affairs: Working for Water Programme (refer to Appendix B).

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

Mitigation: Action/Control	Responsibility	Timeframe
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants. » Remove all alien plants from areas adjacent to or on frequently traversed access routes to prevent dispersal of regenerative material onto site	Contractor and EPC	Construction and operation
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Biodiversity Act).	Contractor and EPC	Construction and operation
Immediately control any alien plants that become established using registered control methods.	Contractor and EPC	Construction
DWA approved methodology should be employed for all invasive clearing operations	Contractor and EPC	Construction

Performance Indicator	» For each invasive or alien species: number of plants and aerial cover of plants within project area and immediate surroundings is significantly reduced and alien species are absent from site.
Monitoring	» 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 and used in optimising the control programme. » The environmental manager should be responsible for driving this process. » Reporting frequency depends on legal compliance framework.

OBJECTIVE: Limit direct faunal impacts

Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna would move away from the area during the construction phase as a result of the noise and human activities present, while some slow-moving species would not be able to avoid the construction activities and might be killed. Some mammals or reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Project Component/s	» Operation of heavy machinery on site, construction activities and human presence
Potential Impact	» Loss of individuals of affected species due to operation of construction machinery as well as poaching and hunting risk from personnel.
Activity/Risk Source	» Habitat transformation & earth-moving during construction; presence of construction and operation personnel.
Mitigation: Target/Objective	» Low faunal impact, during construction and operation.

Mitigation: Action/Control	Responsibility	Timeframe
Environmental induction for all staff » All staff at the site should undergo regular environmental induction training	Management/ ECO	Construction & Operation
ECO to monitor and enforce ban on hunting, collecting etc of all plants and animals or their products. » No staff to be allowed to leave the construction area » Site access should be controlled and the	ECO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
appropriate health and safety boards displayed.		
Speed limits to apply to all construction vehicles to reduce likelihood of collisions with fauna. » 20-30km/h is the recommended maximum for all vehicles at the site	ECO	Construction
Dust suppression during construction. » Regular dust suppression should be applied within the development area as well as along any access roads as required.	ECO	Construction

Performance Indicator	» Low mortality of fauna due to construction machinery and activities » No poaching etc of fauna by construction personnel during construction » Removal to safety of fauna encountered during construction
Monitoring	» Monitoring for compliance during the construction phase

OBJECTIVE: Minimise soil degradation and erosion (Erosion management Plan)

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 in areas that are underlain by fine grained soil which can be mobilised when disturbed, even on relatively low slope gradients (accelerated erosion).
» Degradation of the natural soil profile due to excavation, removal of topsoil, stockpiling, wetting, compaction, pollution and other construction activities may affect soil forming processes and associated agricultural potential.

Management of erosion will be required during the construction phase of the facility. An erosion management plan is required to ensure compliance with applicable regulations and to prevent increased soil erosion and sedimentation of the downstream environment. The section below provides a guideline for the management of erosion on site and will need to be supplemented with the principles for erosion management contained in the Erosion Management plan included in Appendix C.

Project Component/s	» PV arrays and foundations to support them. » Substation. » Access roads. » Underground cabling. » Storage and maintenance facilities and foundations to support them. » Overhead power line and substation linking the facility to the electricity grid.
Potential Impact	» Soil degradation including erosion, dust and siltation. » Reduction in agricultural potential.
Activities/Risk Sources	» Earthworks & activity on site. » Rainfall and concentrated discharge causing water erosion of disturbed areas. » Wind - erosion of disturbed areas.
Mitigation: Target/Objective	» Minimise soil degradation (removal, excavation, mixing, wetting, compaction, pollution, etc.). » Minimise erosion. » Minimise sediment transport downstream (siltation). » Minimise dust pollution.

Mitigation: Action/Control	Responsibility	Timeframe
Identify areas of high erosion risk (drainage lines/watercourses, existing problem areas). Only special works to be undertaken in these areas to be authorised by ECO.	ECO/ and EPC	At design stage.
Identify construction areas for general construction work and restrict construction activity to these areas.	ECO/Contractor and EPC	At design stage and during construction
Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling)	ECO/Contractor and EPC	During construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary degradation of soil.	ECO/Contractor and EPC	At design stage and during construction
Dust control on site through implementation of appropriate measures (e.g. wetting or covering of cleared areas).	Contractor and EPC	Daily during construction
Minimise removal of vegetation which aids soil stability.	ECO/Contractor and EPC	Continuously during construction
Rehabilitate disturbance areas as soon as construction in an area is completed and the area is vacated.	Contractor and EPC	Continuously during and after construction

Mitigation: Action/Control	Responsibility	Timeframe
Soil conservation - stockpile topsoil for re-use in rehabilitation phase. Protect stockpile from erosion. Topsoil should be stockpiled below 2 m height and for as short a period as possible to ensure survival of the soil seed bank and other soil-borne organisms.	Contractor and EPC	Continuously during construction
Erosion control measures- run-off control and attenuation on slopes (sand bags, logs), silt fences, stormwater channels and catch-pits, shade nets, soil binding, geofabrics, hydroseeding or mulching over cleared areas.	Contractor/ECO and EPC	Erection: Before construction Maintenance: Duration of contract
Where access roads cross natural drainage lines, culverts must be designed to allow free flow. Regular maintenance must be carried out.	ECO/Contractor and EPC	Before construction and maintenance over duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	ECO/Contractor and EPC	Before construction and maintenance over duration of contract
Identify areas of high erosion risk (drainage lines/watercourses, existing problem areas). Only special works to be undertaken in these areas to be authorised by ECO.	ECO and EPC	At design stage.

Performance Indicator	» Only authorised activity outside construction areas. » No activity in no-go areas. » Acceptable level of activity within construction areas, as determined by ECO. » Acceptable level of soil erosion around site, as determined by ECO. » Acceptable level of sedimentation along drainage lines, as determined by ECO. » Acceptable level of soil degradation, as determined by ECO. » Acceptable state of excavations, as determined by ECO.
Monitoring	» Monthly inspections of the site by the ECO. » Monthly inspections of sediment control devices by the ECO. » Monthly inspections of surroundings, including drainage lines by the ECO. » Immediate reporting of ineffective sediment control systems by the ECO. » An incident reporting system will record non-conformances.

OBJECTIVE: Minimising the impact on archaeological sites

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

The impacts to heritage resources by the proposed development are considered to be low and no further mitigation is proposed. No archaeological sites were identified during the heritage study undertaken.

Project Component/s	» Solar Array » Roads » Power lines » Construction equipment camps
Potential Impact	» Destruction of archaeological sites » Impacts on palaeontology
Activity/Risk Source	» Solar array foundations, power lines and roads
Mitigation: Target/Objective	» Minimise impacts on archaeological sites

Mitigation: Action/control	Responsibility	Timeframe
Should archaeological sites or graves be exposed during construction work, work in the area must be stopped and the find must immediately be reported to a suitably qualified heritage practitioner such that an investigation and evaluation of the finds can be made.	Contractor, ECO and EPC	Duration of construction

Performance Indicator	» No destruction of archaeological sites » No impacts on graves
Monitoring	» Monitoring during construction to ensure no sites are unearthed and impacted on

OBJECTIVE: The mitigation and possible negation of the additional visual impacts associated with the construction of the solar energy facility.

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 proposed project is a semi-industrial land use and would be located in an agricultural area but there are semi-industrial uses nearby. It would be visible to users of the road R377, and several farmsteads.

The terrain and existing tree planting both contribute to shielding this development from the farmsteads and the road. Most farmsteads are surrounded by shade trees; the road is not very busy, handling mainly local traffic.

Project Component/s	» Construction site, various buildings, a generator, a substation, a power line, a fence and internal access roads. (Function of the project, Height of the proposed development above ground, Choice of technology and materials, Project association with similar developments locally, context , Numbers and degree of sensitive receptors, Shielding and exposure)
Potential Impact	» The numbers of receptors would increase » The project would be visually incompatible with its surrounds » The visual nature of the landscape would be altered to a negative and permanent degree
Activity/Risk Source	» Location of the installation » Association of the installation with installations of a similar function; using natural features as shielding where practicable » Incorporating measures during the design stage to ensure sustainability, and reduction in the impacts on natural processes
Mitigation: Target/Objective	» Description of the target; include quantitative measures and/or dates of completion » Ensure that at the design stage functions and processes with low scoring impacts are preferred

Mitigation: Action/Control	Responsibility	Timeframe
Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.	Bluewave Capital SA (Pty) Ltd/ contractors and EPC	Construction
Limit access to the construction site to existing access roads.	Bluewave Capital SA (Pty) Ltd/ contractors and EPC	Construction / operation
Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after construction is complete in an area.	Bluewave Capital SA (Pty) Ltd/ contractors and EPC	Construction / operation
Maintain the general appearance of the facility in an aesthetically pleasing way.	Bluewave Capital SA (Pty) Ltd/ operator	Operation

Mitigation: Action/Control	Responsibility	Timeframe
	and EPC	

Performance Indicator	» The key indicators would be the definition of the impacts predicted and the qualities of the receiving environment. Reference to the VIA indicates the limited nature of the anticipated impacts and in addition, the ability of the landscape to absorb the development.
Monitoring	» Baseline Monitoring: all plans to be reviewed timeously by bodies responsible for aesthetics. » Construction Phase Monitoring: an Environmental Control Officer to monitor the specified visual management actions.

OBJECTIVE: Appropriate handling and management of waste

The main wastes expected to be generated by the construction of the solar energy facility will include general construction waste, hazardous waste (i.e. fuel), and liquid waste (including grey water and sewage). The volumes of waste expected to be generated will not trigger the requirement for a waste management license. Wastes must however be managed effectively in order to ensure minimal impacts on the environment.

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. A guideline for integrated management of construction waste is included as Appendix D of this EMP.

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/Risk Source	» Packaging. » Other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks, and site preparation.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste.

	» To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifests should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/Control	Responsibility	Timeframe
Construction method and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities.	Contractor and EPC	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor and EPC	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 and EPC	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 and EPC	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor and EPC	Duration of contract
Uncontaminated waste will be removed at least weekly for disposal; other wastes will be removed for recycling/ disposal at an appropriate frequency.	Contractor and EPC	Duration of contract
Disposal of waste will be in accordance with relevant legislative requirements, including the use of licensed contractors.	Contractor and EPC	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor and EPC	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor and EPC	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 and EPC	Duration of contract
Regularly serviced chemical toilets facilities will be used	Contractor and	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
to ensure appropriate control of sewage.	EPC	contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor and EPC	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 and EPC	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 and EPC	Duration of construction

Performance Indicator	» No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams.
Monitoring	» Observation and supervision of waste management practices throughout construction phase. » Waste collection will be monitored on a regular basis. » Waste documentation completed. » A complaints register 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: Appropriate handling and storage of chemicals, hazardous substances

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents.

Project Component/s	» Storage and handling of chemicals, hazardous substances.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers.

Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » Vehicles and equipment must be serviced regularly and maintained in a good running condition. Vehicles must be fitted with spill skills. Storage of contaminants must be limited to low quantities and done under strict industry standards. There must be strict control over the safe usage of vehicles and equipment to minimise vehicle accidents and damage to vehicles by rocks and boulders which may cause spillages. Contingency plans must be in place to deal with spillages. The solar arrays should only be cleaned with water and soaps and detergents should not be allowed.

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an emergency preparedness plan during the construction phase.	Contractor and EPC	Pre-construction and implement for duration of Contract
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	Contractor and EPC	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor and EPC	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 and EPC	Duration of contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor and EPC	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor and EPC	Duration of contract
Routine servicing and maintenance of vehicles must not	Contractor and	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
to take place on-site (except for emergencies). If repairs of vehicles must take place, an appropriate drip tray must be used to contain any fuel or oils.	EPC	contract
All stored fuels to be maintained within a bund and on a sealed surface. The bunded area must be provided with a tap-off system through which spillages and leakages that might occur will be removed without any spillage outside the bunded area.	Contractor and EPC	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor and EPC	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor and EPC	Duration of contract
Oily water from bunds at the substations must be removed from site by licensed contractors.	Contractor and EPC	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 and EPC	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 and EPC	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations	Contractor and EPC	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 and EPC	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor and EPC	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» Implement an effective monitoring system to detect any leakage or spillage of all hazardous substances. » Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. » An incident reporting system will be used to record non-conformances to the EMPR.

OBJECTIVE: To avoid and or minimise the potential risk of increased veld fires during the construction phase

The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Construction and establishment activities associated with the establishment of PV facility, including infrastructure etc.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activities/Risk Sources	» The presence of construction workers and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.	Contractors	Duration of construction
Provide adequate fire fighting equipment onsite.	Contractors	Duration of construction
Provide fire-fighting training to selected construction staff.	Contractors	Duration of construction
Compensate farmers / community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc.	Contractors	Duration of construction
Join local Fire Protection Agency (if established).	Bluewave Capital SA (Pty) Ltd	Pre-construction

Performance Indicator	» Designated areas for fires identified on site at the outset of the construction phase. » Fire fighting equipment and training provided before the construction phase commences. » Compensation claims settled within 1 month of claim
Monitoring	» Bluewave Capital SA (Pty) Ltd and or appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

6.3 Detailing Method Statements

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

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPR will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

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

Very specific areas to be addressed in method statements before, during and post construction include:

» Site Establishment plan (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc. Including a site camp plan indicating all of these).

- Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure and processes.
- Stipulate norms and standards for water supply and usage (i.e.: comply strictly to licence and legislation requirements and restrictions as applicable).
- Stipulate the storm water management procedures recommended in the storm water management plan.
- Ablution facilities (placement, maintenance, management and servicing).
- Solid Waste Management:
    - Description of the waste storage facilities (on site and accumulative).
    - Placement of waste stored (on site and accumulative).
    - Management and collection of waste process.
    - Recycle, re-use and removal process and procedure.
- Liquid waste management:
    - The design, establish, maintain and operate suitable procedures for pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
    - Stipulate grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) that needs to be disposed of, link into an existing facilities where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no seepage into wetlands or natural watercourses.
- Dust and noise pollution:
    - Describe necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels (construction activities generating output levels of 85 dB(A) near human settlement, are to be confined to working hours (06h00 - 18h00) Mondays to Fridays).
    - Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.
- Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply).
    - List of all potentially hazardous substances to be used.
    - Appropriate handling, storage and disposal procedures.

    - Prevention plan of accidental contamination of soil at storage and handling areas.
    - All storage areas, (i.e.: for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
- Fire prevention and management measures on site.
- Fauna and flora protection process on and off site (i.e.: removal to reintroduction or replanting, if necessary).
- Rehabilitation and re-vegetation process.
- Traffic management.
- Incident and accident reporting protocol.
- General administration (and stipulating that all documentation and licences must be on site at all times).
- Designate access road and the protocol on while roads are in use.
- Requirements of gate control protocols.

Where relevant, these Method Statements must be prepared and submitted to Bluewave Capital SA (Pty) Ltd (Pty) Ltd Construction Manager (or may be delegated to the ECO) /Project Manager and the ECO. The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Bluewave Capital SA (Pty) Ltd (Pty) Ltd Construction Manager (or may be delegated to the ECO) /Project 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 of the Solar Energy Facility

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

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation

and the contents of this EMPR. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts.

The Contractors obligations in this regard include the following:

» Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
» Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document.
» Employees will be familiar with the requirements of the EMPR and the environmental specifications as they apply to the construction of the facility.
» Employees must undergo training for the operation and maintenance activities associated with a PV plant and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated.
» 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 environmental matters, which are deemed necessary by the ECO.
» Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.
» Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimisation of disturbance to sensitive areas, management of waste, and prevention of water pollution.
» Records must be kept of those that have completed the relevant training.
» Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
» Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental

controls and methodologies in terms of this EMPR. This training and awareness will be achieved in the following ways:

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.

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 EMPR 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.

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 the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Monitoring Programme: Construction Phase

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

A monitoring programme must be in place not only to ensure conformance with the EMPR, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPR that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, Bluewave Capital SA (Pty) Ltd (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

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

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

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

6.5.1 Non-Conformance Reports

All supervisory staff including Foremen, Resident 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.

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, 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 submitted to DEA upon completion of the construction and 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 EMPR.

MANAGEMENT PROGRAMME: REHABILITATION CHAPTER 7

Overall Goal: Undertake the rehabilitation measures in a way that ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed

7.1. Objectives

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

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

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

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

Mitigation: Action/Control	Responsibility	Timeframe
All temporary facilities, equipment, and waste materials must be removed from site.	Contractor and EPC	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	Contractor and EPC	Following completion of construction activities in an

Mitigation: Action/Control	Responsibility	Timeframe
		area
The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor and EPC	Following completion of construction activities in an area
All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor and EPC	Following completion of construction activities in an area
Temporary roads must be closed and access across these blocked. Compacted surfaces of temporary roads must be ripped to facilitate their rehabilitation.	Contractor and EPC	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 and EPC	Following completion of construction activities in an area
A rehabilitation plan that specifies the rehabilitation process should be compiled and should be approved by the ECO.	Contractor, Bluewave Capital SA (Pty) Ltd and ECO and EPC	Pre-construction
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by a botanist as applicable.	Contractor in consultation with rehabilitation specialist	Following completion of construction activities in an area
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	Bluewave Capital SA (Pty) Ltd in consultation with rehabilitation specialist	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as steep slopes, hills, and drainage lines as necessary.	Bluewave Capital SA (Pty) Ltd in consultation with rehabilitation	Post-rehabilitation

Mitigation: Action/Control	Responsibility	Timeframe
	specialist	
On-going invasive and alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	Bluewave Capital SA (Pty) Ltd in consultation with rehabilitation specialist	Post-rehabilitation

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

MANAGEMENT PROGRAMME: OPERATION CHAPTER 8

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

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

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

8.1. Objectives

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

OBJECTIVE: Limit the ecological footprint of the facility

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	» Areas requiring regular maintenance. » Route of the security team. » Areas disturbed during the construction phase and subsequent rehabilitation at its completion. » Areas where the natural microclimate and thus vegetation composition has changed due to structures such as PV panels erected. » Presence and operation of the facility
Potential Impact	» Impact on the surrounding landscape due to alien plant

	invasion, erosion or poor management with the facility.
Activity/Risk Source	» Alien plants within the facility » Erosion from within the facility » Human presence » Maintenance activities which may lead to negative impacts such as pollution, herbicide drift etc.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Access Control » Access to the site should be controlled, to the actual facility as well as the surrounding farmland.	Management	Operation
Vegetation control should be by manual clearing or the use of livestock. » Herbicides should not be used.	Management	Operation
Bi-annual monitoring for alien plant species - with follow up clearing	Management	Operation
Quarterly site inspection for erosion problems – with follow up remedial action where problems are identified	Management	Operation

Performance Indicator	» No complaints from the landowner as to trespassing on the farmland » No alien species within the site » No erosion problems within the site or from access roads » Maintenance of a ground cover of perennial grasses and forbs that resist erosion.
Monitoring	» Records of alien species presence and clearing actions » Records of erosion problems and mitigation actions taken with photographs » Management log detailing the management actions taken to maintain and control the vegetation within the facility.

OBJECTIVE: Minimise soil degradation and erosion (Erosion Management Plan)

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.

Management of erosion will be required during the operation phase of the facility. An erosion management plan is required to ensure compliance with applicable regulations and to prevent increased soil erosion and sedimentation of the downstream environment. The section below provides a guideline for the management of erosion on site and will need to be supplemented with the principles for erosion management contained in the Erosion Management plan included in Appendix C.

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Soil degradation. » Soil erosion. » Increased water run-off, soil degradation due to water erosion and sediment generation
Activities/Risk Sources	» Complete denudation of the soil, poor placement of the site and poor planning of storm water run-off control
Mitigation: Target/Objective	»

Mitigation: Action/Control	Responsibility	Timeframe
Maintain erosion control measures implemented during the construction phase (i.e. run-off attenuation on slopes (logs), silt fences, storm water catch-pits, and shade nets).	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Develop and implement an appropriate storm water management plan for the operational phase of the facility	Bluewave Capital SA (Pty) Ltd and EPC	Operation
» Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation. » Minimise soil erosion and deposition of soil into	Bluewave Capital SA (Pty) Ltd and EPC	

Mitigation: Action/Control	Responsibility	Timeframe
drainage lines. » Ensure continued stability of embankments/excavations. Prevention and control of water erosion on the site » Care must be taken with the ground cover during and after construction on the site. If it is not possible to retain a good plant cover during construction, technologies should be employed to keep the soil covered by other means, i.e. straw, mulch, erosion control mats, etc., until a healthy plant cover is established again. Care should also be taken to control and contain storm water run-off and not to concentrate its runoff, specifically under the solar arrays. It is also recommended that conservation practices similar to the conservation cultivation practiced in the area are employed with the arrangement of the PV arrays, i.e. in strips of land on the contour of the land, with buffer zones of grass between the development strips and the channelling of run-off water from the development strips into stable grass covered waterways or outlets. The development strips are not to be terraced (=levelled) as the soils are too shallow to allow for terracing. The width and length or the development strips and buffer strips, as well as the measurements and number of outlets are dependent upon the erodibility of the soils present, the slope and rainfall regime, and should be designed with the assistance of an agricultural engineer		

Performance Indicator	» 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	» Inspections of site on a bi-annual basis. » Water management plan » Monitor erosion rates and erosion sites on a weekly basis and after each storm water event.

OBJECTIVE: Minimise dust and air emissions

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

Project Component/s	» Hard engineered surfaces. » On-site vehicles.
Potential Impact	» Dust and particulates from vehicle movement to and on-site. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles
Activities/Risk Sources	» Re-entrainment of deposited dust by vehicle movements. » Wind erosion from unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	» To ensure emissions from all vehicles are minimised, where possible. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements.

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure that nuisance to the community from dust is not visibly excessive.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Appropriate dust suppression must be applied to the roads as required to minimise/control airborne dust.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Speed of vehicles must be restricted, as defined by the Environmental Manager.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Vehicles and equipment must be maintained in a road-worthy condition at all times.	Bluewave Capital SA (Pty) Ltd and EPC	Operation

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

	appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPR.

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

The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

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

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire fighting equipment on site.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Provide fire-fighting training to selected operation and maintenance staff.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.).	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Contact details of emergency services should be prominently displayed on site.	Bluewave Capital SA (Pty)	Operation

Mitigation: Action/Control	Responsibility	Timeframe
	Ltd and EPC	

Performance Indicator	» Fire fighting equipment and training provided before the operational phase commences. » Appropriate fire breaks in place and maintained.
Monitoring	» Bluewave Capital SA (Pty) Ltd must monitor indicators listed above to ensure that they have been met.

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

The facility is expected to be operational for more than 20 years during which time approximately 5 staff members are expected to be required on-site. Therefore, long-term direct job opportunities for locals could exist, although limited. However, in an area with such high unemployment figures, these limited opportunities should still be seen as a positive impact on the quality of life of those benefiting from the employment.

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

Project Component/s	» Day to day operational activities associated with the PV facility, including maintenance etc.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised
Activities/Risk Sources	» The operational phase of the PV facility will create approximately 5 full time employment opportunities.
Mitigation: Target/Objective	» In the medium to long term employ as many locals as possible to fill the full time employment opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
The workforce of 5 permanent staff is likely to be based in Stella or Piet Plessis. As part of the local content and support programs Bluewave Capital SA (Pty) Ltd should commit to implementing a training and skills development and training	Bluewave Capital SA (Pty) Ltd and EPC	during operations

Mitigation: Action/Control	Responsibility	Timeframe
programme to maximise employment for locals.		
Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	Bluewave Capital SA (Pty) Ltd and EPC	Prior to commencement of operation

Performance Indicator	» 5 year training and skills development programme developed and designed before construction phase completed. » Potential locals identified before construction phase completed.
Monitoring	» Bluewave Capital SA (Pty) Ltd must monitor indicators listed above to ensure that they have been met for the operational phase.

OBJECTIVE: Appropriate handling and management of waste including handling hazardous/dangerous substances

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

A guideline for integrated management of waste is included as Appendix D of this EMPR.

Project Component/s	» Substation. » Operation and maintenance staff. » Workshop.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Contamination of water or soil because of poor materials management.
Activity/Risk Source	» Transformers and switchgear for the substations. » Ancillary buildings.
Mitigation: Target/Objective	» Comply with waste management legislation. » Minimise production of waste. » Ensure appropriate waste disposal. » Avoid environmental harm from waste disposal. » Ensure appropriate storage of chemicals and hazardous substances.

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

Mitigation: Action/Control	Responsibility	Timeframe
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	Bluewave Capital SA (Pty) Ltd and EPC	Operation

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

OBJECTIVE: Mitigate the possible visual impact associated with the operational phase..

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

Project Component/s	Construction site, various buildings, a generator, a substation, a power line, a fence and internal access roads.
Potential Impact	(Function of the project, Height of the proposed development above ground, Choice of technology and materials, Project association with similar developments locally, context , Numbers and degree of sensitive receptors, Shielding and exposure)
Activity/Risk Source	The numbers of receptors would increase
Mitigation: Target/Objective	The project would be visually incompatible with its surrounds

Mitigation: Action/Control	Responsibility	Timeframe
No unsociable hours working; good traffic and site management and keeping local people informed	Bluewave Capital SA (Pty) Ltd/ operator and EPC	Throughout operational phase
Good traffic and site management and keeping local people informed	Bluewave Capital SA (Pty) Ltd/ operator and EPC	Throughout operational phase

Performance Indicator	The key indicators would be the definition of the impacts predicted and the qualities of the receiving environment. Reference to the VIA indicates the limited nature of the anticipated impacts and in addition, the ability of the landscape to absorb the development.
Monitoring	Baseline Monitoring: all plans to be reviewed timeously by bodies responsible for aesthetics. Operational Phase Monitoring: continued assessment of the aesthetic aspects, such as fencing and signage and controlling any expansion of the project.

OBJECTIVE: Minimise storm water runoff (guideline for storm water management plan)

Management of storm water will be required the operational phase of the facility. A detailed storm water management plan is required to be compiled as part of the final design to ensure compliance with applicable regulations and to prevent off-site migration of contaminated storm water or increased soil erosion. The section below provides a guideline for the management of storm water on site and will need to be supplemented with the relevant method statements during the operation phase of the facility.

Project Component/s	» Storm water management components. » Any hard engineered surfaces (i.e. access roads).
Potential Impact	» Poor storm water management and alteration of the hydrological regime (i.e. drainage lines).
Activities/Risk Sources	» Construction of the facility (i.e. placement of hard engineered surfaces).
Mitigation: Target/Objective	» Appropriate management of storm water to minimise impacts on the environment.

Mitigation: Action/Control	Responsibility	Timeframe
A Method Statement for the management of storm water which also considers the recommendations below	Bluewave Capital SA (Pty)	Operation

Mitigation: Action/Control	Responsibility	Timeframe
is to be submitted to the ECO prior to commencement of construction activities.	Ltd and EPC	
Reduce the potential increase in surface flow velocities and the resultant impact on the localised drainage system as a result of increased sedimentation through the implementation of appropriate erosion management measures.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Appropriately plan hard-engineered bank erosion protection structures.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Ensure suitable handling of storm water within the site (i.e. separate clean and dirty water streams around the plant and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities) through appropriate design of the facility.	Bluewave Capital SA (Pty) Ltd and EPC	Operation
Design measures for storm water management need to allow for surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows.	Bluewave Capital SA (Pty) Ltd and EPC	Operation

Performance Indicator	» Appropriate storm water management measures included within the facility design. » Sound water quality and quantity management during construction and operation.
Monitoring	» Devise a suitable surface water quality monitoring plan for implementation during construction and operation.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 9

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

The relevant mitigation measures contained under the construction and rehabilitation sections of this EMPr 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 EMPR to be revisited and amended.

Should the activity ever cease or become redundant, the applicant shall undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

9.1. Site Preparation

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

9.2 Disassemble and Replace Infrastructure

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

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

Project Component/s	» Decommissioning phase of the PV facility and associated infrastructure
Potential Impact	» Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as

	reduced quality of life, stress, depression etc. However, the number of people affected (5) is relatively small. Decommissioning is also similar to the construction phase in that it will also create temporary employment opportunities.
Activity/Risk Source	» Decommissioning of the PV facility
Mitigation: Target/Objective	» To avoid and or minimise the potential social impacts associated with decommissioning phase of the PV facility.

Mitigation: Action/control	**Responsibility**	**Timeframe**
Retrenchments should comply with South African Labour legislation	Bluewave Capital SA (Pty) Ltd and EPC	When PV facility is decommissioned

Performance Indicator	» South African Labour legislation relevant at the time
Monitoring	» Bluewave Capital SA (Pty) Ltd and Department of Labour

FINALISATION OF THE EMPR CHAPTER 10

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

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 (the renewable energy company) 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 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 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 summaries 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.

APPENDIX B:
DEPARTMENT OF WATER AFFAIRS: WORKING FOR WATER PROGRAMME PRINCIPLES FOR INVASIVE PLANT SPECIES

APPENDIX C:
EROSION MANAGEMENT PLAN

APPENDIX D:
GUIDELINES FOR INTEGRATED MANAGEMENT OF CONSTRUCTION WASTE