PROPOSED PPC SLURRY SOLAR ENERGY FACILITY, NORTH WEST PROVINCE

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

Submitted as part of the Final Basic Assessment Report
May 2014

Prepared for
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PROJECT DETAILS

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DEFINITIONS AND TERMINOLOGY

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

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 on - going 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.

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PROJECT DETAILS *CHAPTER 1*

PPC Limited is proposing to establish a 10 MW photovoltaic solar energy facility and associated infrastructure on a site located in the Mahikeng Local Municipality approximately 20 km east of Mahikeng (i.e. outside an urban area), in the North West Province (refer to Figure 1). The area comprises flat to gently undulating landscape with broadly incised valleys. The proposed development site falls within the authorised mining area of PPC Cement Slurry. The majority of the site is of a transformed nature due to it being located on mining land that was previously disturbed. The following farms within the PPC mining area are being investigated for the siting of the PV facility:

» Portion 8 of the Farm Rietvallei 102;
» Portion 3 of the Farm Slurry 96;
» Portion 2, 3 and 4 of the Farm Benadeplaats 93; and
» Portion 4 of the Farm Bultfontein 92.

The 10 MW PV Solar plant is proposed to accommodate the following infrastructure on the project development site:

» Arrays of photovoltaic (PV) panels, to be established on vacant land of more than 1 ha but less than 20ha.
» Mounting structures to support the PV panels.
» Cabling between project components, to be lain underground where practical, where the installation will require the excavation of soil.
» A new on-site substation to evacuate the power from the facility into the proposed power line.
» A new overhead power line to evacuate the power to an existing 66kV substation on the PPC site, with a capacity of more than 33 kV but less than 275kV.
» Internal access roads and fencing where the installation will require the excavation of soil and may impact on drainage lines.
» Workshop area for maintenance, storage, and offices.

A layout of the proposed PV facility is shown in Figure 2.

The proposed PV facility will have an export capacity of up to 10 MW and will be known as the **PPC Slurry Solar Energy Facility**. The proposed project will be developed in two phases. The first phase will have an export capacity of 1 MW; with the second phase will be up to 9 MW. Based on a pre-feasibility analysis undertaken by PPC Limited, four technically feasible areas have been identified as alternative sites (refer to figure 1 below) for consideration and evaluation through a Basic Assessment Process i.e.:

» Slurry SPV Site 1: The site has been previously mined and rehabilitated according to PPC standard.
» Slurry SPV Site 2 & 4: The sites have not previously been mined and are still in a natural state.
» Slurry SPV Site 3: The site has been mined out but has not been rehabilitated.

This EMPr has been developed based on the findings of the BA, and must be implemented to protect sensitive on-site and off-site features through controlling construction and operation activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. The development site for the Proposed PPC Slurry Solar Energy Facility has areas of predominantly low ecological, paleontological, heritage and visual sensitivity because the area has been utilised an industrial area which was rehabilitated.

This section provides a summary of the environmental assessment and conclusions drawn for the proposed solar energy facility. In doing so, it draws on the information gathered as part of the Basic Assessment process and the knowledge gained by the environmental consultants during the course of the process and presents an informed opinion of the environmental impacts associated with the proposed project.

The following conclusions can be drawn from the studies undertaken within this Basic Assessment:

» The overall ecology impact will be **low**. Regarding past disturbance levels (i.e. mining activities), it is not expected that any Red Data or nationally protected plant species will be present on the site. However, due to natural veld in the close proximity of the site, it can be expected that several provincially protected plant species may have re-established. It is also expected that several Baboon spiders, which are protected, have re-established on the site. To avoid undue damage and loss of these species of conservation concern, it is imperative that a detailed walkthrough be undertaken. This will have to be done during the growing season for the area, preferably between January and April.
» The overall Heritage impact will be **low.** Past mining disturbance would have destroyed all the heritage and archaeological structures.
» the overall Social impact will be **high positive** based on the mining activities and environment surrounding the proposed facility.

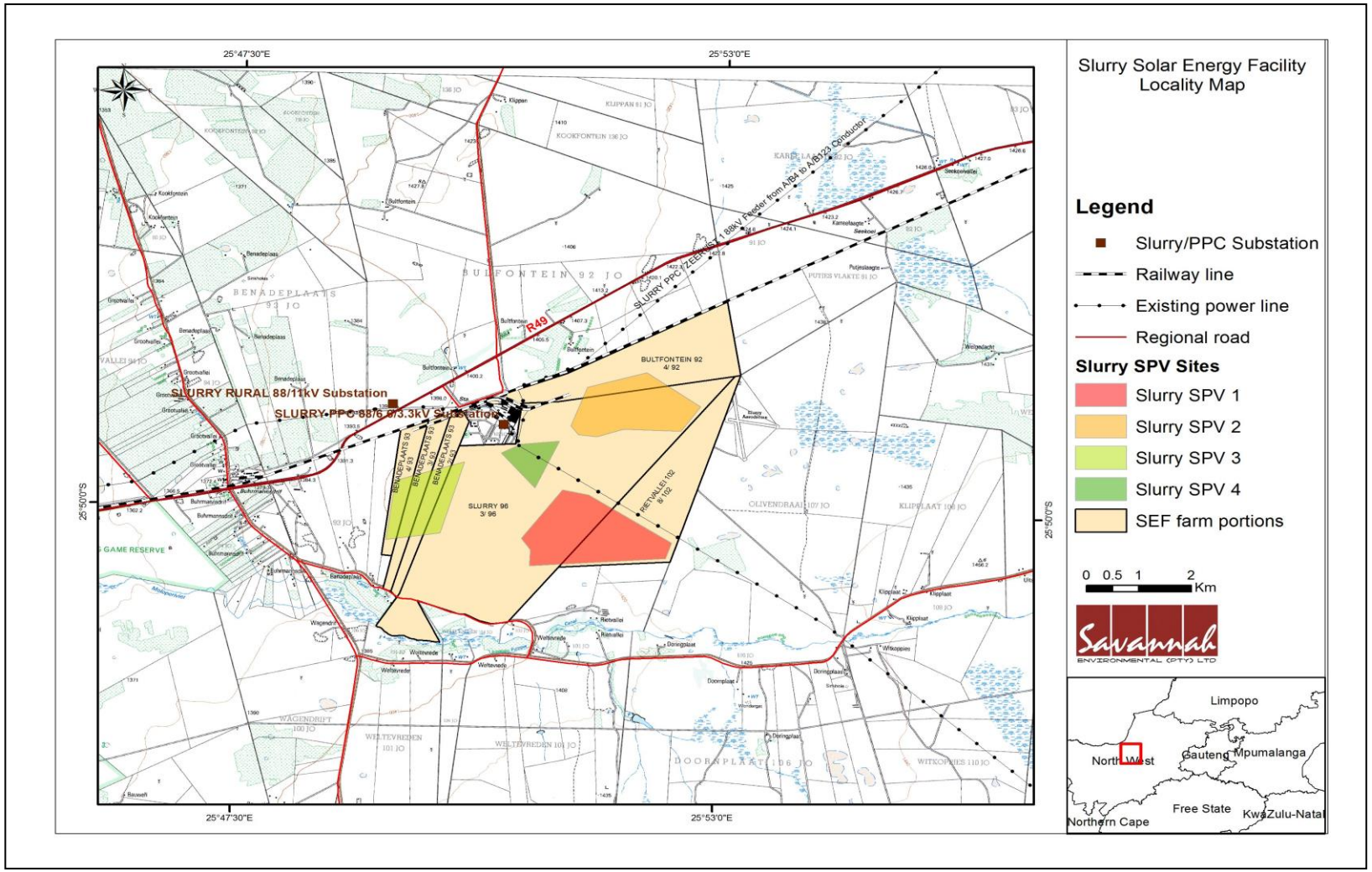

Figure 1: Map indicating the four site alternatives (the preferred alternative being Slurry SPV Site 1 in red) for the proposed PPC Slurry Solar Energy Facility, located within the PPC Slurry mining area, near Mahikeng

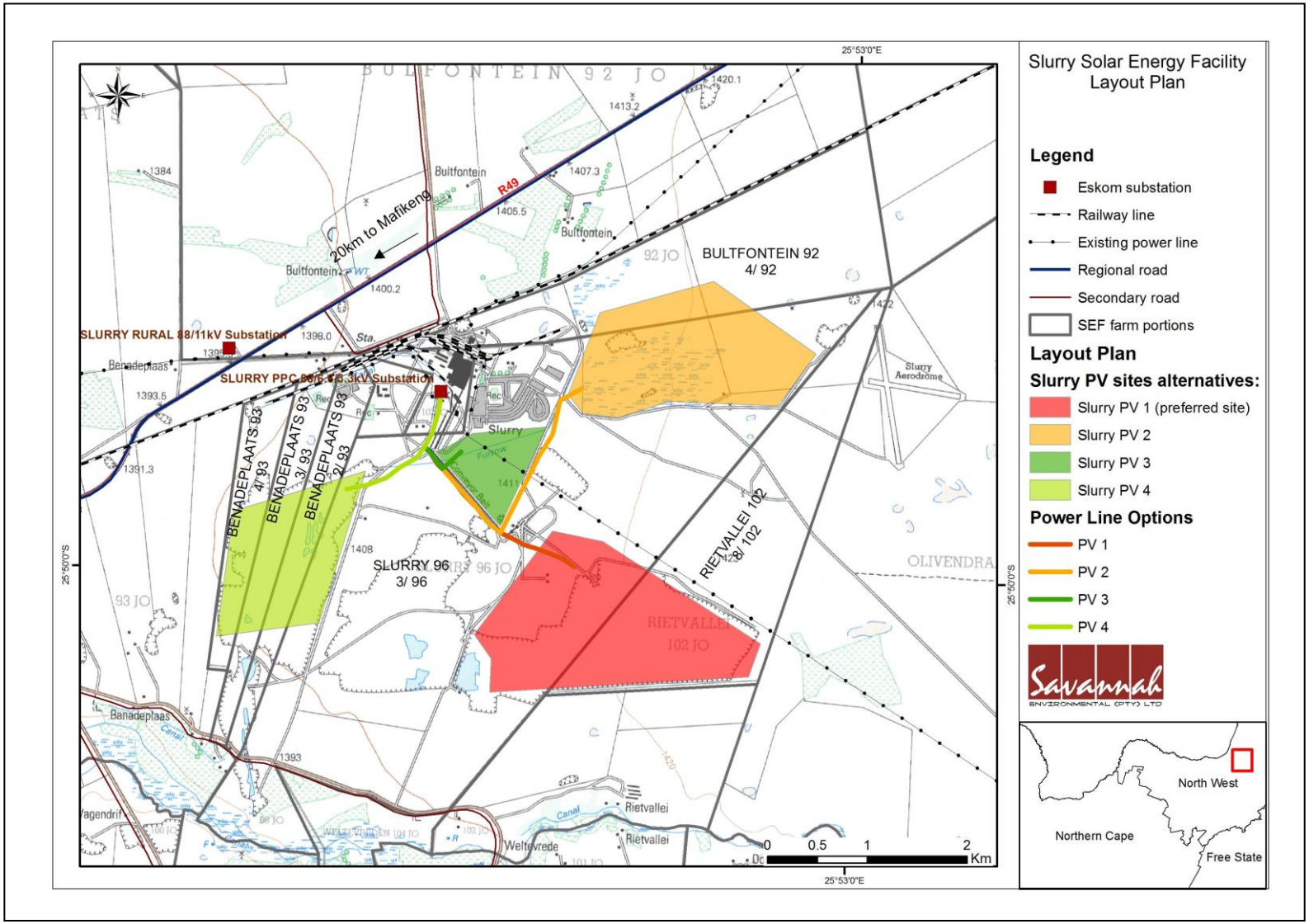

Figure 2: Layout Map for the proposed PPC Slurry Solar Energy Facility showing the four site and power line alternatives considered through the Basic Assessment

LEGISLATIVE REQUIREMENTS *CHAPTER 2*

Table 2.1 provides an outline of the relevant environmental legislation and permitting requirements associated with the proposed project. This list of legislation is applicable at this time and should be updated on a continuous basis as the environmental legislation within South Africa changes.

Table 2.1: Relevant legislative and permitting requirements applicable to the establishment of the proposed PPC Slurry PV Solar Energy Facility

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	National Legislation		
National Environmental Management Act (Act No 107 of 1998)	The Environmental Assessment Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations. 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 GN R543, R544, R545 and R546 of 18 June 2010, a Basic Assessment Process is required to be undertaken for the proposed project.	Department of Environmental Affairs – competent authority North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	The listed activities triggered by the proposed solar energy facility have been identified and assessed in the Basic Assessment Process being undertaken. 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 project holistically, and to consider the cumulative effect of a variety of impacts.	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 Basic Assessment Process through the consideration of potential impacts (cumulative, direct, and indirect). It will continue to apply throughout the life

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
			cycle of the project.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations (GN R154 dated 10 January 1992)	Department of Environmental Affairs North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT) 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 and every day running of the PPC Slurry Cement Factory. 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 (and then registration of the	Department of Water Affairs	The water required for this project will be sourced from Mahikeng Local

Legislation	*Applicable Requirements*	*Relevant Authority*	*Compliance Requirements*
	water use is required). Consumptive water uses may include the taking of water from a water resource - Sections 21a and b. Non-consumptive water uses may include impeding or diverting of flow in a water course - Section 21c; and altering of bed, banks or characteristics of a watercourse - Section 21i.	Provincial Department of Water Affairs	Municipality
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	The proposed facility will be taking place in an area zoned for mining purposes. A section 53 is not required as the area proposed for development has been mined out and is owned by the developer.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Measures in respect of dust control (S32) – no regulations promulgated yet. Measures to control noise (S34) - no regulations promulgated yet.	Department of Environmental Affairs	No permitting or licensing requirements arise from this legislation. The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
			the person has failed to comply with the Act.
National Heritage Resources Act (Act No 25 of 1999)	» Stipulates assessment criteria and categories of heritage resources according to their significance (S7). » Provides for the protection of all archaeological and paleontological sites, and meteorites (S35). » Provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority (S36). » Lists activities which require developers any person who intends to undertake to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development (S38). » Requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction (S44).	South African Heritage Resources Agency	A notification letter was submitted to SARHA informing them about the project and request for comments. A Basic Assessment Report will also be submitted to SAHRA for review.
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	» Provides for the MEC/Minister to identify any process or activity in such a listed ecosystem as a threatening process (S53) » A list of threatened and protected species has been published in terms of S 56(1) - Government Gazette 29657. » Three government notices have been published, i.e. GN R 150 (Commencement of Threatened and Protected Species Regulations, 2007), GN R 151 (Lists of critically endangered, vulnerable and protected species) and GN R 152 (Threatened or Protected Species Regulations). » Provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together	Department of Environmental Affairs	A destruction permit will be applied for should there be any species which are protected or endangered.

Legislation	*Applicable Requirements*	*Relevant Authority*	*Compliance Requirements*
	with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011). » This Act also regulates alien and invader species. » Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species.		
Conservation of Agricultural Resources Act (Act No 43 of 1983)	» Prohibition of the spreading of weeds (S5) » Classification of categories of weeds & invader plants (Regulation 15 of GN R1048) & restrictions in terms of where these species may occur. » Requirement & methods to implement control measures for alien and invasive plant species (Regulation 15E of GN R1048).	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.
National Forests Act (Act No. 84 of 1998)	According to this act, the Minister has declared a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that 'no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister'.	National Department of Forestry	A destruction permit will be applied for should there be any species which are protected or endangered.

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
National Veld and Forest Fire Act (Act 101 of 1998)	In terms of S12 the applicant must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.	Department of Agriculture, Forestry and Fisheries (DAFF)	While no permitting or licensing requirements arise from this legislation, 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 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.	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.
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.	National Department of Water and	As no waste disposal site is to be associated with the proposed project, no

Legislation	*Applicable Requirements*	*Relevant Authority*	*Compliance Requirements*
	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: » 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.	Environmental Affairs Provincial Department of Environmental Affairs (general waste)	permit is required in this regard. Waste handling, storage and disposal during construction and operation are required to be undertaken in accordance with the requirements of the Act. 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).
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	» South African National Roads Agency Limited (national roads) » Provincial Department of	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
	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 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.	Transport	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).
Promotion of Access to Information Act (Act No 2 of 2000)	All requests for access to information held by state or private body are provided for in the Act under S11.	Department of Environmental Affairs	No permitting or licensing requirements.
Promotion of Administrative Justice Act (Act No 3 of 2000)	In terms of S3 the government is required to act lawfully and take procedurally fair, reasonable, and rational decisions. Interested and affected parties have a right to be heard.	Department of Environmental Affairs	No permitting or licensing requirements.
	Provincial Plans		
North West province Spatial Development Framework (2008)	Provides a spatial interpretation of the Provincial Growth and Development Strategy to guide future land use and development	North West Department of Economic Development, Environment,	No permitting or licensing requirements.

Legislation	***Applicable Requirements***	***Relevant Authority***	***Compliance Requirements***
		Conservation and Tourism (DEDECT)	
North West Province Growth and Development Strategy (2004-2014)	Provides a framework for integrated and sustainable growth and economic development for the Province and its people over the next ten years. It addresses the formulation of a common vision, goals and objectives of what should be achieved and how the provincial government and its social partners should achieve its objectives	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	No permitting or licensing requirements.
North West Biodiversity Conservation Assessment Plan (2009)	Inform the development of the Provincial Biodiversity Sector plans, bioregional plans, and also be used to inform Spatial Development Frameworks (SDFs), Environmental Management Frameworks (EMFs), Strategic Environmental Assessments (SEAs) and in the Environmental Impact Assessment (EIA) process in the province.	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	No permitting or licensing requirements.
North West Renewable Energy Strategy (2012)	The renewable energy strategy aims to improve the North West Province's environment, reduce the North West Province's contribution to climate change, and alleviate energy poverty, whilst promoting economic development and job creation in the province whilst developing its green economy.	North West Department of Economic Development, Environment, Conservation and Tourism (DEDECT)	No permitting or licensing requirements.
	Local Plans		
Ngaka Modiri Molema District Municipality IDP (2011-2016)	» Ensure the provision of services to communities in a sustainable manner » Promote safe and healthy environment	Local Authorities	No permitting or licensing requirements.

PURPOSE & OBJECTIVES OF THE EMPr *CHAPTER 3*

PPC Limited is proposing the construction of a solar energy facility near Mahikeng, North West Province. The purpose of the facility is to generate electricity from a renewable resource (i.e. sun) to provide power to the Slurry Cement Factory. The proposed development site is located within the Mahikeng Local Municipality, approximately 20 km east of Mahikeng town, North West Province. This Environmental Management Programme (EMPr) has been compiled for the proposed **PPC Slurry solar energy facility.**

Through the Basic Assessment Process conducted in application for Environmental Authorisation, various site alternatives were considered for the siting of the PV facility and the most environmentally and technically desirable option selected.

This EMPr is applicable to all the employees and contractors of the proposed PPC Slurry solar energy facility working on the pre-construction, construction, operation and maintenance phases of the facility. The document will be adhered to, and updated as relevant throughout the project life cycle. Any changes to the EMPr, which are environmentally defendable, will be submitted to the Department of Environmental Affairs (DEA) for acceptance before such changes are effected.

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced".
The EMPr has the following objectives:

» To outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation, and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the solar energy facility
» To ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
» To propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation.
» To facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the Basic Assessment (BA) process.

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

PPC Limited must ensure that the implementation of the project complies with the requirements of Environmental Authorisation (EA) (once issued) and obligations emanating from other relevant environmental legislation.

This obligation is partly met through the development and the implementation of the EMPr through its integration into the contract documentation. Since this EMPr is part of the BA process undertaken for the proposed PPC Slurry Solar Energy Facility, it is important that this document be read in conjunction with the BA Report. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMPr for construction and operation activities has been compiled in accordance with Section 33 of the EIA Regulations and will be further developed in terms of specific requirements listed in an EA (once issued).

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 EMPr is a dynamic document, which must be updated when required. It is considered critical that this draft EMPr be updated to include site-specific information and specifications as required throughout the life-cycle of the facility. All revisions made to the EMPr should be submitted to DEA for approval before such revisions are implemented. This will ensure that the project activities are planned and implemented taking sensitive environmental features into account.

STRUCTURE OF THIS EMPr *CHAPTER 4*

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 PPC Slurry 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, i.e. » PV panels » Access roads » Ancillary infrastructure
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.

4.1 Project Team

This draft EMPr was compiled by and had input from:

	Name	Company
EMPr Compilers:	Lusani Rathanya Karen Jodas	Savannah Environmental
Specialist input from existing reports:	Tony De Castro Warren McCleland Duncan McKenzie	Brits Ecological Consultants
	Francois Coetzee	UNISA: Department of Anthropology & Archaeology

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

(MPPD 1) 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 design phase:

» Develop a guideline for stormwater management for the PV facility. This should be in line with the stormwater management plan already in place for Slurry and should detail how stormwater runoff (i.e. over engineered hard surfaces for PV facility) should 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 Arrays » Grid connection and associated servitudes » Access roads
Potential Impact	» Development that degrades the environment unnecessarily, particularly with respect to habitat destruction, loss of indigenous

	flora, and erosion. » Poor stormwater management and alteration of the hydrological regime (i.e. drainage lines).
Activities/Risk Sources	» Positioning of solar components and internal access routes » Alignment of power lines and access road servitudes » Alignment of access roads to developments
Mitigation: Target/Objective	» To ensure selection of best environmental option for positioning alignment of proposed infrastructure » Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts » Appropriate management of stormwater to minimise impacts on the environment

Mitigation: Action/Control	Responsibility	Timeframe
Conduct vegetation survey in order to obtain permits for protected plant, removal and relocation prior to commencement of activity in an area	PPC Limited	Pre-construction
Use design-level mitigation measures recommended in respect of habitat and ecosystem intactness and prevention of species loss as detailed within the BA Report. This includes positioning developments as close as possible together with other existing or planned developments in the area	PPC Limited	Prior to submission of final construction layout plan
Access roads should be planned to follow existing tracks as far as possible, minimise the impacted area, avoid the initiation of accelerated soil erosion and prevent unnecessary compaction and disturbance of topsoils	PPC Limited	Design phase
Develop a guideline for stormwater management and erosion control for hard surfaces as part of the design of the PV facility.	PPC Limited	Design phase
Ensure suitable handling of storm water within the site (e.g. 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, where appropriate) through appropriate design of the facility.	PPC Limited	Design phase

Performance Indicator	» Grid connection and road alignments meet environmental objectives. » Solar components and access road alignments meet environmental objectives » Ecosystem fragmentation is kept to a minimum » Appropriate stormwater management measures included within the facility design
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures in the BA Report through review of the design by the Project Manager, and the environmental manager prior to the

	commencement of construction.

(MPPD 2) 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
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
Utilise a grievance mechanism procedure (for both the public and labour) and stakeholder forum for addressing any complaints during both the construction and operational phases of the facility.	PPC Limited	Pre-construction (construction procedure) Pre-operation (operation procedure)

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 properly managed in respect of environmental aspects and impacts.
» Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, traffic and road use, and effects on local residents.
» Minimises the impact on any remaining indigenous natural vegetation and habitats of ecological value.
» Minimises the impact on heritage site should they be uncovered.

6.1 Institutional Arrangements: Roles and Responsibilities for the Construction Phase

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

(MPC 1) 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; 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 PPC Limited and its Contractor(s) are made aware of all stipulations within the EMPr.
» Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.

» Be fully knowledgeable with the Basic Assessment for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.

Site Manager (PPC Limited's 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.
» 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 EO, 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 **Environmental Officer** (EO) must be assigned to the project by PPC Limited prior to the commencement of any authorised activities. The EO will be responsible for monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation (once issued). Accordingly, the EO will:

» Be fully knowledgeable with the contents within the BA.
» Be fully knowledgeable with the contents within the conditions of the Environmental Authorisation.
» Be fully knowledgeable with the contents within the EMPr.
» Be fully knowledgeable with the contents within all relevant environmental legislation, and ensure compliance with them.
» Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
» Ensure that the compliance of the EMPr is monitored through regular and comprehensive inspection of the site and surrounding areas.
» Ensure that if the EMPr 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 EMPr.
» Ensure that the compilation of progress reports for submission to the Project Manager, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
» Ensure that there is communication with the Site Manager regarding the monitoring of the site.
» Ensure that any non-compliance or remedial measures that need to be applied are reported.
» Keep record of all activities on site, problems identified and transgressions noted.

An independent audit and report in terms of compliance with the specifications of the EMPr and conditions of the Environmental Authorisation should be undertaken by suitably qualified party where required by the DEA (or in line with the Environmental Authorisation).

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 EMPr 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 environmental awareness induction training that 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 EO.

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 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 EO 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 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).

6.2 Objectives

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

(MPC 2) OBJECTIVE: Environmentally sensitive location of construction equipment camps on site

It is expected that all construction workers will be accommodated within existing accommodation within nearby townships as far as possible. No construction workers will be accommodated on site. In addition, construction equipment may need to be stored at an appropriate location on the site for the duration of the construction period.

Project Component/s	Project components affecting the objective: » Construction equipment camps; and » Access roads
Potential Impact	» Damage to indigenous natural vegetation; » Damage to and/or loss of topsoil; » Compacting of ground; and » Pollution of the surrounding environment due to inadequate facilities.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s; and » Access to and from the equipment storage area/s.
Mitigation: Target/Objective	» To minimise impacts on the social and biophysical environment; and » To limit equipment storage within the demarcated site.

Mitigation: Action/Control	Responsibility	Timeframe
The location of the construction equipment camp will take cognisance of any sensitive areas identified by the BA studies. The location of this construction equipment camp shall be approved by the project EO.	Contractor	Pre-construction
No temporary site camps will be allowed outside the	Contractor	Contract duration

Mitigation: Action/Control	Responsibility	Timeframe
footprint of the development area.		
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Erection: Site establishment Maintenance: contract duration
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract

Performance Indicator	» No visible erosion scars once construction in an area is completed. » No claims regarding damage due to unauthorised removal of vegetation. » All damaged areas successfully rehabilitated one year after completion. » No damage to drainage lines and/or riverine areas. » Appropriate waste management.
Monitoring	» Regular audits of the construction camps and areas of construction on site. » A photographic record must be established before, during and after mitigation. » An incident reporting system should be used to record non-conformances to the EMPr.

(MPC 3) OBJECTIVE: Minimisation of 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	Project components affecting the objective: » PV Array » Grid connection and associated servitudes » Access roads
Potential Impact	» Impacts on natural vegetation. » Impacts on soil. » Loss of topsoil.
Activity/Risk Source	» Site preparation and earthworks. » Excavation of foundations. » Construction of site access road. » Site preparation (e.g. compaction). » Power line construction activities. » PV array construction activities » Stockpiling of topsoil, subsoil and spoil material.
Mitigation:	» To retain natural vegetation, where possible.

Target/Objective	» To minimise footprints of disturbance of vegetation/habitats. » Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas. » Minimise spoil material.

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked on-site to eliminate the potential for unnecessary clearing.	Contractor	Pre-construction
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on flora and fauna and their habitats is restricted.	Contractor	Site establishment & duration of contract
Construction activities must be restricted to demarcated areas so that impact on flora and fauna is restricted.	Contractor	Site establishment & duration of contract
Any fill material required must be sourced from a commercial suitable/permitted source, quarry or borrow pit. Where possible, material from foundation excavations must be used as fill on-site.	Contractor	Duration of contract
Excavated topsoil must be stockpiled in designated areas separate from base material and covered until replaced during rehabilitation. As far as possible, topsoil must not be stored for longer than 3 months.	Contractor	Site establishment & duration of contract
Topsoil must not be stripped or stockpiled when it is raining or when the soil is wet as compaction will occur.	Contractor	Site establishment Maintenance: for duration of contract
As far as possible, the maximum topsoil stockpile height must not exceed 2 m in order to preserve micro-organisms within the topsoil, which can be lost due to compaction and lack of oxygen.	Contractor	Duration of contract

Performance Indicator	» Minimal disturbance outside of designated work areas. » Minimise clearing of existing vegetation. » Topsoil appropriately stored.
Monitoring	» Observation of vegetation clearing and soil management activities by EO throughout construction phase. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr.

(MPC 4) OBJECTIVE: Manage and reduce the impact of alien invasive vegetation

Throughout the project area alien invasive species occur, which all have a potential of reproducing to such an extent that the ecosystem within and beyond the project area could be impaired. Additional alien species grow along major transport routes to the area and thus could be potentially spread there as well.

Project Component/s	» Transport of construction materials. » PV Array » Grid connection and associated servitudes » Access roads
Potential Impact	» Impacts on natural vegetation. » Impacts on soil. » Impact on faunal habitats.
Activity/Risk Source	» Transport of construction materials. » Movement of construction machinery and personnel. » Site preparation and earthworks causing disturbance to indigenous vegetation. » Construction of site access road. » Stockpiling of topsoil, subsoil and spoil material.
Mitigation: Target/Objective	» To avoid the introduction of additional alien invasive plants to the project control area. » To avoid further distribution and thickening of existing alien plants on the project area. » To complement existing alien plant eradication programs in gradually causing a significant reduction of alien plant species throughout the project control area.

Mitigation: Action/Control	Responsibility	Timeframe
Comply with the alien invasive management and monitoring programme as contained in the PPC Slurry approved EMPr.	PPC Limited	Pre-construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum. » Rehabilitate disturbed areas as quickly as possible. » Do not import soil from areas with alien plants.	Contractor	Construction phase Operational phase
» Eradicate all alien plants that occur within the development's temporary and permanent footprint areas. » Ensure that material from alien invasive plants that can regenerate – seeds, suckers, plant parts are adequately destroyed and not further distributed.	Contractor	Construction phase Operational phase

Mitigation: Action/Control	Responsibility	Timeframe
» Immediately control any alien plants that become newly established using registered control measures.	Contractor	Construction phase Operational phase

Performance Indicator	» Visible reduction of number and cover of alien invasive plants within the project area. » No establishment of additional alien invasive species.
Monitoring	» On-going monitoring of area by EO during construction. » If new infestations are noted these must be recorded. A comprehensive eradication programme with the assistance of the WFW Programme is advisable.

(MPC 5) OBJECTIVE: Limit water erosion of soil and siltation of watercourses downstream

Project Component/s	» PV arrays and foundations to support them. » Access roads. » Underground cabling. » Storage and maintenance facilities and foundations to support them. » Overhead power lines
Potential Impact	» Soil erosion and siltation.
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).

Mitigation: Action/control	Responsibility	Timeframe
Plan and implement adequate soil cover measures and stormwater drainage mechanisms.	Engineer and construction personnel	Duration of the construction phase.

Performance Indicator	» Minimum soil surface erosion. » Immediate action should be taken when negative impacts are experienced.
Monitoring	» Monitor erosion rates and erosion sites on a weekly basis and after each storm water event.

(MPC 6) OBJECTIVE: Limit construction and vehicle impact leading to erosion

Project component/s	» All access and construction routes » Control of water run-off from road surfaces » Proper placement of new roads
Potential Impact	» Soil degradation due to increased wind erosion and dust production. » Soil degradation due to water erosion caused by poor water run-off control from roads .
Activity/risk source	» Poor road construction and maintenance.
Mitigation: Target/Objective	» Proper road construction and maintenance. » Care should be taken to prepare road surfaces to protect the soil against wind erosion. » Apply other dust control measures, i.e. water spraying.

Mitigation: Action/control	Responsibility	Timeframe
Plan and implement proper soil cover measures and storm water drainage mechanisms.	Engineer and construction personnel	Duration of the project.

Performance Indicator	Minimum dust formation and water erosion along roadsides and construction sites. Immediate action should be taken when negative impacts are experienced.
Monitoring	Monitor roads and construction sites on a regular basis.

(MPC 7) OBJECTIVE: Prevent contamination of the soil, vegetation and underground water by oil, diesel, petrol and other contaminants use by vehicles and construction equipment

Project component/s	Construction of: » PV panels » Access roads » Grid connection and associated infrastructure
Potential Impact	» Contamination of soil, vegetation and underground water.
Activity/risk source	» Vehicles and construction equipment on the site.
Mitigation: Target/Objective	» Vehicles and equipment must be serviced regularly and maintained in a good running condition. 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.

Mitigation: Action/control	Responsibility	Timeframe
Plan and implement proper usage and maintenance of vehicle and construction equipment. Plan and document contingency plans and train personal to contain spillages when and where they take place. Keep quantity of contaminants stored on the site to a minimum.	Engineer and construction personnel	Duration of the construction phase.

Performance Indicator	» Zero spillages of contaminants.
Monitoring	» Monitor contaminants storage facilities and the condition and maintenance of vehicles/equipment on a regular basis.

(MPC 8) OBJECTIVE: Mitigate the possible visual impact associated with the construction phase.

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. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts.

Project component/s	» Construction site » Power line » Fence » Internal access roads
Potential Impact	» Visual impact of general construction activities and associated impacts.
Activity/risk source	» Potential impact on sensitive receptors.
Mitigation: Target/Objective	» Minimal visual intrusion by construction activities and general acceptance and compliance with Environmental Specifications.

Mitigation: Action/control	Responsibility	Timeframe
Contractor to sign and undertake to comply with Environmental Specifications.	Contractor	Pre-construction
Demarcate sensitive areas and no-go	Contractor	Pre-construction

areas with danger tape to prevent disturbance during construction.		
Keep disturbed areas to a minimum.	Contractor	Throughout construction
Identify suitable areas within the construction site for fuel storage, temporary workshops, eating areas, ablution facilities and washing areas.	Contractor	Throughout construction
Integrate the solid waste management into the existing solid waste management programme at PPC Slurry.	Contractor	Throughout construction
Reduce and control dust through the use of approved dust suspension techniques as and when required.	Contractor	Throughout construction
Rehabilitate all disturbed areas in accordance with the development plan.	Contractor	Construction

Performance Indicator	Construction site is confined to the demarcated areas identified on a Development Plan. No transgression of the Environmental Specifications visible and natural processes occurring freely outside boundaries of the construction site.
Monitoring	Monitoring to be undertaken by an Environmental Officer who will ensure compliance with the Environmental Specifications.

(MPC 9) OBJECTIVE: Minimise impacts related to inappropriate site establishment

The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in appropriate local languages, all to the approval of the Site Manager.

Project Component/s	» Area infrastructure (i.e. PV panels). » 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 EO.	Contractor	Site establishment, and duration of construction.
Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	Contractor	Site establishment, and duration of construction.
Demarcate area as designated contractor's equipment camp.	Contractor	Site establishment
The construction camp used to house equipment must be located in a disturbed area.	Contractor	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	Site establishment
All development footprints should be appropriately fenced off and clearly demarcated.	Contractor	Site establishment, and duration of construction.
All unattended open excavations shall be adequately demarcated and/or fenced as per mine's safety standards for barricading.	Contractor	Site establishment, and duration of construction.
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	Contractor	Site establishment, and duration of construction.
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line including drainage lines.	Contractor	Site establishment, and duration of construction.
Supply adequate waste collection bins at site where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	Contractor	Site establishment, and duration of construction.

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

(MPC 10) 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 10 months. Approximately 50 people are expected to be required during the construction phase. Ideally low skilled and semi-skilled positions will be filled by locals living in and around Mahikeng. This will however be dependent on the skills availability in the area. Workers not living in the area, including those required for skilled positions will be transported to site on a daily basis and will not be housed on site. However, the security team will be required on site at all times.

Project Component/s	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
Potential Impact	» Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	» Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the 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 EO.	Contractor	Pre-construction
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	Contractor	Site establishment, and during construction.
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	Contractor	Duration of Contract
Ensure waste removal facilities are maintained and emptied on a regular basis.	Contractor	Site establishment, and duration of construction.

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMPr and the Environmental Authorisation (once issued) must be included in all tender documentation and Contractors contracts.	PPC Limited	Tender process
Ensure that all personnel have received the appropriate level of environmental awareness training to ensure continued environmental due diligence and on-going minimisation of environmental harm. This can be achieved through the provision of appropriate environmental awareness training to all personnel. Records of all training undertaken must be kept.	Contractor	Duration of construction
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated areas. These facilities must be regularly serviced by appropriate contractors. A minimum of one toilet shall be provided per 15 persons at each working area such as the Contractor's camp.	Contractor and sub-contractor/s	Duration of contract
Cooking 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	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
No one other than the EO or personnel authorised by the EO may disturb flora or fauna outside of the demarcated construction area/s.	Contractor and sub-contractor/s	Duration of contract
Fire - fighting equipment must be available on the site and training must be provided to the relevant safety officers before the construction phase commences.	Contractor and sub-contractor/s	Duration of contract
Draft and implement a Code of Conduct for construction workers.	Contractor and sub-contractor/s	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	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	Construction
Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors,	PPC Limited Contractor	Pre-construction

Mitigation: Action/Control	Responsibility	Timeframe
subcontractors and site personnel. This procedure should be in line with the South African Labour Law.		

Performance Indicator	» The construction camps have avoided sensitive areas. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not reported. » 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 EO. » 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 EO. » Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

(MPC 11) OBJECTIVE: Maximise local employment and business opportunities associated with the construction phase

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

Project Component/s	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
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	» PPC Limited should aim to employ a minimum of 80% of the low-skilled workers from the local area. This should also be made a requirement for all contractors. PPC Limited should also develop a database of local BEE service providers

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Attempt to employ a majority of the low-skilled workers from the local area.	PPC Limited & contractors	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.	PPC Limited	Where required, training and skills development programmes to be initiated prior to the initiation of the construction phase

Performance Indicator	» Majority of semi and unskilled labour locally sourced.
Monitoring	» Project EO must monitor indicators listed above to ensure that they have been met for the construction phase.

(MPC 12)OBJECTIVE: Avoid the potential impacts on family structures and social networks associated with presence of construction workers from outside the area

Even though the inflow of jobseekers is likely to occur, the probability of this issue becoming problematic and resulting in severe negative social impacts is seen to be improbable.

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

Project Component/s	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
Potential Impact	» The presence of construction workers who live outside the area and who are housed in local towns can affect family structures and social networks.

Activities/Risk Sources	» The presence of construction workers can affect negatively on family structures and social networks, especially in small, rural communities.
Mitigation: Target/Objective	» To avoid and or minimise the potential impact of construction workers on the local community. This can be achieved by maximising the number of locals employed during the construction phase and minimising the number of workers housed on the site.

Mitigation: Action/Control	Responsibility	Timeframe
Where appropriate, attempt to ensure that the majority of the low-skilled workers are sourced from the local area. This should be included in the tender documents. Construction workers should be recruited from the local area in and around the Mafikeng.	PPC Limited and contractors	Construction phase.
Identify local contractors who are qualified to undertaken the required work.	The Contractor	Pre-construction
Develop and implement a Code of Conduct to cover the activities of the construction workers housed on the site.	The Contractor	Pre-construction
Ensure that construction workers attend a brief session before they commence activities. The aim of the briefing session is to inform them of the rules and regulations governing activities on the site as set out in the Code of Conduct.	The Contractor	Pre-construction
Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	The Contractor	Pre-construction

Performance Indicator	» Employment policy and tender documents that sets out local employment and targets completed before construction phase commences. » Majority of semi and unskilled labour locally sourced. » Local construction workers employed have proof that they have lived in the area for five years or longer. » Tender documents for contractors include recommendations for construction camp. » Code of Conduct drafted before commencement of construction phase. » Briefing session with construction workers held at outset of construction phase.
Monitoring	» Project EO must monitor indicators listed above to ensure that they have been met for the construction phase.

(MPC 13)OBJECTIVE: Minimise impacts related to traffic management and transportation of equipment and materials to site

The construction phase of the project will be the most significant in terms of generating traffic impacts; resulting from the transport of equipment (including panels components) 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.

Project Component/s	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
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 construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the facility on local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise potential for negative interaction between pedestrians or sensitive users and traffic associated with the facility construction. » To ensure all vehicles are roadworthy and all materials/ equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
The contractor's plans, procedures and schedules, as well as the anticipated intrusion impacts should be clarified with affected parties prior to the commencement of construction activities on site.	Project EO	Pre-construction
Source general construction material and goods locally where available to limit transportation over long distances.	PPC Limited and Contractor	Pre-construction and construction
Appropriate dust suppression techniques must be	Project EO	Construction

Mitigation: Action/Control	Responsibility	Timeframe
implemented to minimise dust from gravel roads.		
Construction vehicles and those transporting materials and goods should be inspected by the contractor or a sub-contractor to ensure that these are in good working order and not overloaded.	Contractor	Construction
Strict vehicle safety standards should be implemented and monitored.	Project EO	Construction
All relevant permits for abnormal loads must be applied for from the relevant authority.	Contractor (or appointed transportation contractor)	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	Contractor	Pre-construction
No deviation from approved transportation routes must be allowed, unless roads are closed for whatever reason outside the control of the contractor.	Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor (or appointed transportation contractor)	Pre-construction
Any traffic delays because of construction traffic must be co-ordinated with the appropriate authorities.	Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards).	Contractor	Duration of contract
Appropriate maintenance of all vehicles of the contractor must be ensured.	Contractor	Duration of contract
All vehicles of the contractor travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions and other standard traffic control information.	Contractor	Duration of contract

Performance Indicator	» Vehicles keeping to the speed limits. » Vehicles are in good working order and safety standards are implemented. » Local residents and road users are aware of vehicle movements and schedules.

	» No construction traffic related accidents are experienced. » Local road conditions and road surfaces are up to standard. » Complaints of residents are not received (e.g. concerning the speeding of heavy vehicles).
Monitoring	» Project EO must monitor indicators listed above to ensure that they have been implemented.

(MPC 14) 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	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
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	Duration of Construction
Ensure that all vehicles are road-worthy; drivers are qualified and are made aware of the potential noise, dust and safety issues.	Contractors	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	» Project EO must monitor indicators listed above to ensure that they have been met for the construction phase.

(MPC 15) OBJECTIVE: Minimise the impacts on and loss of indigenous vegetation and faunal habitat

All development footprints within areas of natural vegetation (for roads, buildings, underground cables, laydown areas and panel foundations) should be surveyed and appropriately fenced off. Only once this has been done can any construction activity proceed. It should be made very clear to all contractors that there is to be no disturbance outside these demarcated areas.

Project Component/s	» Area infrastructure (i.e. PV panels). » Linear infrastructure (i.e. power line, and access roads).
Potential Impact	» Loss of indigenous natural vegetation due to construction activities, or poor behaviour on the part of the construction team.
Activity/Risk Source	» Vegetation clearing. » Introduction of alien invasive plant species » Construction of access roads. » Placement of power line towers. » Chemical contamination of the soil by vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction.
Mitigation: Target/Objective	» Minimise footprints of disturbance of vegetation/habitats. » Minimise loss of indigenous vegetation. » Minimise loss of species of conservation concern.

Mitigation: Action/Control	Responsibility	Timeframe
Areas to be cleared must be clearly marked in the field to eliminate unnecessary clearing.	Contractor	Construction
Limit unnecessary impacts on surrounding natural vegetation, e.g. driving around in the veld, use access roads only.	Contractor	Construction
A site rehabilitation programme must be developed and implemented.	Contractor	Duration of contract Pre-construction
If animals, that cannot flee from the affected areas by themselves, are encountered during construction (e.g. tortoises, amphibians, small mammals) they must be removed from the affected areas.	EO	Pre-construction

Performance Indicator	» Minimal disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and faunal habitats. » Limited impacts on areas of identified and demarcated sensitive habitats/vegetation.
Monitoring	» Observation of vegetation clearing activities by EO throughout construction phase. » Monitoring of vegetation clearing activities in terms of permit

	conditions. » Supervision of all clearing and earthworks. » An incident reporting system will be used to record non-conformances to the EMPr.

(MPC 16) 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).
» Uncontrolled run-off relating to the construction activity (excessive wetting, uncontrolled discharge, etc) will also lead to accelerated erosion and possible sedimentation along natural drainage lines or catchment areas.
» 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.

Project Component/s	» PV arrays and foundations to support them. » Access roads. » Underground cabling. » Storage and maintenance facilities and foundations to support them. » Overhead power lines
Potential Impact	» Soil degradation including erosion, dust and siltation.
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

Mitigation: Action/Control	Responsibility	Timeframe
Identify areas of high erosion risk (existing problem areas). Only special works to be undertaken in these areas to be authorised by EO and Engineer's representative (ER).	EO/ER	At design stage.
Identify construction areas for general construction work and restrict construction activity to these areas.	Contractor	At design stage and during construction .
Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling).	Contractor	During construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary degradation of soil.	Contractor	At design stage and during construction.
Dust control on construction site through wetting or covering of cleared areas.	Contractor	Daily during construction.
Minimise removal of vegetation which aids soil stability.	Contractor	Continuously during construction.
Rehabilitate disturbance areas as soon as an area is vacated.	Contractor	Continuously during and after construction.
Soil conservation - stockpile topsoil for re-use in rehabilitation phase. Protect stockpile from erosion. Topsoil should be stockpiled below 2m height and for as short a period as possible to ensure survival of the soil seed bank and other soil-borne organisms.	Contractor	Continuously during construction.
Erosion control measures to be implemented where required on site (e.g. use of run-off control and attenuation on slopes (sand bags, logs), silt fences, stormwater channels and catch-pits, shade nets, soil binding, geo-fabrics, hydro-seeding or mulching over cleared areas.)	Contractor	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.	Contractor	Before construction and maintenance over duration of contract.
Control depth of excavations and stability of cut faces/sidewalls.	Contractor	Before construction and maintenance over duration of contract.

Performance Indicator	» Only authorised activity outside construction areas. » No activity in no-go areas. » Acceptable level of activity within construction areas, as determined by EO. » Acceptable level of soil erosion around site, as determined by EO. » Acceptable level of sedimentation along drainage lines, as determined

	by EO. » Acceptable level of soil degradation, as determined by EO. » Acceptable state of excavations, as determined by ER & EO.
Monitoring	» Inspections of the site by the EO. » Immediate reporting of ineffective sediment control systems by the EO. » An incident reporting system will record non-conformances.

(MPC 17) OBJECTIVE: To prevent any possible impact on the two graveyards sites during the construction phase of the project.

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.

Although a total of 13 sites were recorded during the 2008 survey (Coetzee 2008) only two, namely Site 1 and Site 2 are located on or near the proposed areas for the PV Solar stations. However both sites are large graveyards containing approximately 23 and 800 graves respectively. Since the 2008 study these sites have been fenced of and clearly demarcated as recommended in the report. As most of the graves are unmarked they are by default regarded as being older than 60 years and are therefore protected by the NHRA (Act no. 25 of 1999).

Project Component/s	All activities associated with the construction of the SPV sites.
Potential Impact	Direct physical damage or blasting (vibrational) impacts.
Activity/Risk Source	Construction equipment
Mitigation: Target/Objective	Both sites have already been fenced of and a minimum buffer zone of 50 metres around the fence should be observed.

Mitigation: Action/control	Responsibility	Timeframe
Monitoring the graveyards throughout the construction phase of the project (weekly basis).	Environmental Manager at PPC	Duration of the construction phase.

Performance Indicator	» No destruction of archaeological site.
Monitoring	» None

(MPC 18) 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 including spoil, hazardous waste (i.e. hydrocarbons), and liquid waste (including grey water and sewage)

In order to manage the wastes effectively, guidelines for the assessment, classification, and management of wastes, along with industry principles for minimising construction wastes must be implemented.

Project Component/s	» 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	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap), and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
vermin control.		
Where practically possible, construction and general wastes on-site must be reused or recycled. Bins and skips must be available on-site for collection, separation, and storage of waste streams (such as wood, metals, general refuse etc.).	Contractor	Duration of contract
Disposal of waste must be in accordance with relevant legislative requirements.	Contractor	Duration of contract
Waste will be removed for recycling/ disposal at an appropriate frequency determined by the factory.	PPC	Duration of contract
Disposal of waste will be in accordance with relevant legislative requirements.	Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	Contractor	Duration of contract
Waste must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	Contractor	Duration of contract
Regularly serviced chemical toilets facilities will be used to ensure appropriate control of sewage.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction
Dispose of all solid waste collected at an appropriately registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site.	Contractor	Duration of construction

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.

(MPC 19) 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	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers.
Activity/Risk Source	» Vehicles associated with site preparation and earthworks. » Construction activities of area and linear infrastructure. » Hydrocarbon use and storage.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons.

Mitigation: Action/Control	Responsibility	Timeframe
Develop and implement an emergency preparedness plan during the construction phase.	Contractor	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	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	Contractor	Duration of contract
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	Contractor	Duration of contract
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	Contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	Contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Routine servicing and maintenance of vehicles must not 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.	Contractor	Duration of 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	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	Contractor	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	Contractor	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	Contractor	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in an operational state at all times.	Contractor	Duration of contract
Upon the completion of construction, the area must be cleared of potentially polluting materials.	Contractor	Completion of construction

Performance Indicator	» No chemical spills outside of designated storage areas. » No unattended water or soil contamination by spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring	» 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.

(MPC 20) 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 communities.
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.	PPC Limited and contractors	Duration of construction
Provide adequate fire fighting equipment onsite.	PPC Limited and contractors	Duration of construction
Provide fire-fighting training to selected construction staff.	Contractors	Duration of construction

Performance Indicator	» Conditions contained in the Construction EMPr. » 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.
Monitoring	» Project EO must monitor indicators listed above to ensure that they have been met for the construction phase.

6.3 Detailing Method Statements

(MPC 21) 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.

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". Where appropriate, these method statements should use, complement and extend the method statements developed as part of the project SHE requirements.

The Method Statement must cover applicable details with regards 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.

Method Statements for pre-construction and post-construction should, where appropriate, inter alia:

» 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 with 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.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the PPC Limited Construction Manager/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 Project EO 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

(MPC 22)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 EMPr 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 EO.
» Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness induction training) are erected at prominent locations throughout the site.
» Ensure that relevant construction workers have received basic awareness 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, during toolbox talks, 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 EO 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 Contractor 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

(MPC 23) 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, PPC Limited 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.

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

(MPR 1) 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	» PV panels. » Power line. » Ancillary buildings. » Access roads.
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	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been	Contractor	Following completion of construction activities in

Mitigation: Action/Control	Responsibility	Timeframe
completed.		an area
The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these should be cleaned up.	Contractor	Following completion of construction activities in an area.
All hardened surfaces within the construction camp area should be ripped, all imported materials removed, and the area shall be top soiled and re-vegetated.	Contractor	Following completion of construction activities in an area.
Temporary roads must be closed and access across these blocked. Compacted surfaces of temporary roads must be ripped to facilitate their rehabilitation.	Contractor	Following completion of construction activities in an area.
Necessary anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	Contractor	Following completion of construction activities in an area.
A rehabilitation plan that specifies the rehabilitation process should be compiled.	Contractor, PPC Limited	Pre-construction
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix.	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.	PPC Limited in consultation with rehabilitation specialist	Post-rehabilitation
On-going invasive and alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	PPC Limited	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 properly managed in respect of environmental aspects and impacts.
» Enables the solar energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to mining activities, traffic and road use, and effects on local residents.
» Minimises impacts on fauna using the site.

PPC Limited has an environmental manager who will be ensuring 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.

(MPO 1) OBJECTIVE: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

Several plants thus far encountered on the study site are protected. The Conservation Authorities of the North West Province need to be contacted regarding any permit regulations that need to be followed regarding the above species. It is preferable that whenever any of the species need to be removed, they be replanted whenever feasible (succulents and geophytes) to sites nearby in the same type of habitat, but remaining on the same land portion.

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.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» Movement of Employee vehicles within and around site. » Excessive shading by PV panels. » Altered rainfall interception and resultant runoff patterns by infrastructure.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/habitats on-site. » Ensure and encourage plant re-growth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	PPC Limited	Operation
No disturbance of vegetation outside of the project site must occur.	PPC Limited	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	PPC Limited	Operation
An on-going invasive and alien plant monitoring and eradication programme must be implemented, where necessary	PPC Limited	Operation

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » Continued improvement of rehabilitation efforts. » No disturbance of vegetation outside of project site. » No further thickening of invasive shrubs on site. » Gradual disappearance of all alien plant species on site.
Monitoring	» Observation of vegetation on-site by facility manager and environmental manager. » Regular inspections to monitor plant re-growth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas.

(MPO 2) OBJECTIVE: Protection of avifauna

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

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

Mitigation: Action/Control	Responsibility	Timeframe
Ensure bird-friendly tower designs are implemented to minimise the risk of electrocutions.	PPC Limited	Design and Construction
Notes of electrocution and collision events must be sent to the EWT-EIWG for the recommendation of further mitigation measures if necessary.	EO	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.

(MPO 3) OBJECTIVE: The mitigation and possible negation of the potential visual impact of lighting at the solar energy facility

The visual analysis and assessment from all of these observation points found that the proposed activity is unrecognisable from the relevant Observation Points because it will be located within mining infrastructures. The results of the Visual Impact Assessment for the proposed PPC Slurry Solar Energy Facility therefore found that the proposed activity will have a **low** impact from all key observation points.

Project Component/s	Solar energy facility lighting fixtures.
Potential Impact	The potential night time visual impact of lighting fixtures on observers in

	proximity to the site.
Activity/Risk Source	The effects of glare and light trespass on motorists and observers.
Mitigation: Target/Objective	The containment of light emitted in order to eliminate the risk of additional night time visual impacts. Minimal usage of security and other lighting.

Mitigation: Action/Control	**Responsibility**	**Timeframe**
Ensure that proper planning is undertaken regarding the placement of lighting structures.	PPC Limited/ lighting engineer	Planning / construction
Undertake regular maintenance of light fixtures.	PPC Limited/ operator	Operation

Performance Indicator	» The effective containment of the light on the site and no complaints from observers.
Monitoring	» The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.

(MPO 4) OBJECTIVE: Minimise soil degradation and soil erosion

The soil on site may be impacted in terms of:

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

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.

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
Potential Impact	» Soil degradation. » Soil erosion. » Increased deposition of soil into drainage systems.

	» Increased run-off over the site.
Activities/Risk Sources	» Poor rehabilitation and/or re-vegetation of cleared areas. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	» Ensure rehabilitation of disturbed areas is maintained. » Minimise soil degradation (i.e. wetting). » Minimise soil erosion and deposition of soil into drainage lines. » Ensure continued stability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbance areas should the previous attempt be unsuccessful.	PPC Limited	Operation
Maintain erosion control measures implemented during the construction phase (e.g. un-off attenuation on slopes (bags, logs), silt fences, storm water catch-pits, and shade nets).	PPC Limited	Operation
Develop and implement an appropriate stormwater management plan for the operational phase of the facility.	PPC Limited	Operation

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.

(MPO 5)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 communities, and their homes and mining 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.	PPC Limited	Operation
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	PPC Limited	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.).	PPC Limited	Operation
Upon completion of the construction phase, an emergency evacuation plan must be integrated into the emergency preparedness and response plan of the PPC Slurry Facility.	PPC Limited	Operation
Contact details of emergency services should be prominently displayed on site.	PPC Limited	Operation

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

(MPO 6) OBJECTIVE: Appropriate handling and management of waste

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 includes general solid waste, and liquid waste.

Project Component/s	» 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.	PPC Limited	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	PPC Limited	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.	PPC Limited	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.	PPC Limited	Operation and maintenance
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	PPC Limited	Operation and maintenance
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	PPC Limited/ waste management contractor	Operation
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	PPC Limited/ waste management contractor	Operation
Used oils and chemicals: » Appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations.	PPC Limited	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	PPC Limited	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	PPC Limited	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	PPC Limited	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. » All appropriate waste disposal certificates accompany the monthly reports.

MANAGEMENT PROGRAMME: DECOMMISSIONING CHAPTER 9

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of 20 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 section should be applied during decommissioning and therefore is not repeated in this section. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the 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.

(MPD 1) OBJECTIVE: To avoid and or minimise the potential impacts associated with the decommissioning phase

Project Component/s	» PV panels. » Power line. » Ancillary buildings. » Access roads.
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 (50) 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.	PPC Limited	When PV facility is decommissioned

Performance Indicator	» South African Labour legislation relevant at the time.
Monitoring	» PPC Limited and Department of Labour.