
PROPOSED POFADDER SOLAR THERMAL PLANT NORTHERN CAPE PROVINCE

CONSTRUCTION & OPERATION DRAFT ENVIRONMENTAL MANAGEMENT PLAN POFADDER SOLAR THERMAL PLANT

Updated in terms of the requirements of the Environmental Authorisation
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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.

Concentrating solar power: Solar generating facilities use the energy from the sun to generate electricity. Concentrating Solar Power facilities collect the incoming solar radiation and concentrate it (by focusing or combining it) onto a single point, thereby increasing the potential electricity generation.

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

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

'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, as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

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

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

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

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

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

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

Power tower: A Power Tower forms part of the central receiver type solar electricity generating technology. The purpose of the tower, which may be up to 200 m high, is to structurally support the receiver. The receiver, consisting of metal tubes which transfer the heat from the solar radiation reflected on it by mirror fields, is used for generating the steam.

Natural properties of an ecosystem (*sensu* convention on wetlands): Defined in Handbook 1 as the "...physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them." (Ramsar Convention Secretariat 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition. Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (See <http://www.ramsar.org/>).

Ramsar convention on wetlands: "The Convention on Wetlands (Ramsar, Iran, 1971) is an intergovernmental treaty whose mission is "the conservation and wise use of all wetlands through local, regional, and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world." As of March 2004, 138 nations have joined the Convention as Contracting Parties, and more than 1300 wetlands around the world, covering almost 120 million hectares, have been designated for inclusion in the Ramsar List of Wetlands of International Importance." (Ramsar Convention Secretariat. 2004. Ramsar handbooks for the wise use of wetlands. 2nd Edition, Handbook 1. Ramsar Convention Secretariat, Gland, Switzerland.) (Refer <http://www.ramsar.org/>). South Africa is a Contracting Party to the Convention.

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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INTRODUCTION

CHAPTER 1

This Construction and Operational Environmental Management Plan (CEMP and OEMP) has been compiled for the Pofadder Solar Thermal Plant, being planned by !KaXu CSP South Africa (Pty) Ltd. The facility is proposed to be comprised of Concentrating Solar Power (CSP) and Concentrating/Tracking Photovoltaic Power (CPV) components with an overall maximum generating capacity of 310 MW. The facility will be comprised of a combination of the following technologies (in any combination):

- » Trough plant (CSP system consisting of several rows of parabolic troughs).
- » Power tower plant (CSP system consisting of a field of heliostats/ mirrors positioned around a central receiver/power tower).
- » Photovoltaic (CPV system consisting of several rows of photovoltaic (PV)) panels.

This project received Environmental Authorisation on 18 April 2011. Following a competitive bidding process under the Independent Power Producer (IPP) Procurement Programme being conducted by the Department of Energy, the project was awarded preferred bidder status in December 2011. Construction is due to commence in May 2012.

This Environmental Management Programme (EMP) is an update of the draft EMP submitted with the Environmental Impact Assessment (EIA) for the project (in accordance with the requirement of Condition 3.1 of the Environmental Authorisation), and includes the conditions of the Environmental Authorisation of April 2011.

This EMP is applicable to all !KaXu CSP South Africa employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Pofadder Solar Thermal Plant. The document will be adhered to, updated as relevant throughout the project life cycle. Changes to the EMP, which are environmentally defensible, shall be submitted to the Department of Environmental Affairs (DEA) for acceptance before such changes are effected.

PROJECT DETAILS**CHAPTER 2**

!KaXu CSP is proposing the establishment of a commercial solar energy facility on Portion 4 of the Farm Skuit-Klip 92, which lies approximately 30 km north-east of the town of Pofadder in the Northern Cape (Refer to Figure 2.1). Following an extensive site identification process undertaken by !KaXu CSP, a 33 km² site which falls within the Khai !Ma Local Municipality was identified for consideration within an EIA process.

A sensitivity analysis was undertaken during the Scoping Phase which identified potentially sensitive areas which should be avoided within the broader 33 km² site. These sensitive areas included natural drainage lines, areas of increased gradient/slope, and areas containing vegetation of conservation importance. As a result, the southern portion of the triangular shaped site was identified as a preferred area for development of the solar thermal plant, based on the following characteristics:

- » **Relief profile:** the high relief areas within the north-western and the north-eastern corners of the site should be avoided as the former includes the Konkonsieskop hill and the latter includes the Ysterberg mountain range.
- » **Centre of Endemism:** the north-western portion of the site falls within the core vegetation type of the Gariep Centre of Floristic Endemism.
- » **Proximity to the grid connection point:** being in close proximity to the point of connection to the grid will minimise the length of the power line that is required between the proposed facility and the Paulputs Substation. In turn, this would reduce the potential for the linear disturbance associated with the power line including the potential for impacts on avifauna species.

The proposed facility, which will be primarily contained within this identified portion, will have a developmental footprint of approximately 11 km². The facility is proposed to be comprised of Concentrating Solar Power (CSP) and Concentrating/Tracking Photovoltaic Power (CPV) components with an overall maximum generating capacity of 310 MW. The facility will be comprised of a combination of the following technologies (in any combination) (refer to final layout in Appendix B):

- » Trough plant (CSP system consisting of several rows of parabolic troughs).
- » Power tower plant (CSP system consisting of a field of heliostats/ mirrors positioned around a central receiver/power tower).
- » Photovoltaic (CPV system consisting of several rows of photovoltaic (PV)) panels.

The following associated infrastructural requirements will also be established within the developmental footprint of the proposed facility:

- » **Power islands** which will include:

- » A **steam turbine** and **generator** typically housed within a 2-storey building
- » A generator **transformer** and a small **substation** located outside and adjacent to the 2-storey building
- » An **auxiliary steam generator** and associated energy storage vessels containing saturated steam, oil or salt (i.e. fossil fuel steam boiler/ generator), proposed to be fired by either diesel fuel or liquid petroleum gas (LPG).
- » An **overhead power line** feeding into the Eskom electricity network at the Paulputs Substation, which is situated adjacent to the site
- » An **abstraction point** on the Orange River and an associated water **supply pipeline** to the facility of approximately 30 km in length
- » A **suspension reservoir** located approximately 3-6 km south of the raw water abstraction point (i.e. outside the boundaries of the identified site) to rid the raw water of particles in suspension (silt)
- » A **storage reservoir** located within the boundaries of the identified site. The water stored within the reservoir will be used during the steam generation process (boiler makeup), for washing of the heliostats/mirrors, troughs and PV panels, potable water supply and fire protection supply.
- » Lined **evaporation ponds** to allow for the evaporation of process waste water not to be re-used within the facility
- » **External access road** leading to the site from the R358 which branches off the N14 towards Onseepkans
- » **Internal access roads** for construction and maintenance purposes
- » Workshop, office and storage areas

In terms of the findings of the EIA Report, various planning, construction, and operation-related environmental impacts were identified, including:

- » Disturbance of the ecological environment (i.e. flora and fauna)
- » Impacts on avifauna (i.e. particularly on Red Data Species)
- » Impacts on water resources (i.e. in terms of quantity and quality)
- » Impacts on the visual aesthetics and sensitive receptors
- » Impacts on the underlying geology (i.e. in terms soil disturbance and erosion)
- » Impacts on heritage resources
- » Socio-economic impacts

The specialist studies undertaken in the EIA Phase did not identify any absolute no go areas for the proposed facility. However, the following potentially sensitive areas within the preferred south-eastern portion of the project area were identified:

- » Areas of **ecological** sensitivity (i.e. drainage lines, areas with remaining natural vegetation and protected tree species, potential habitat for various red data species, and activities which lead to the proliferation of alien invasive plants)

- » Sensitivity in terms of **water resources** (i.e. in terms of drainage lines and riverine areas along the Orange River at the abstraction point)
- » Issues regarding **avifaunal** sensitivity (i.e. potential impacts on red data species through collision or electrocution events with the overhead power line and the solar infrastructure)
- » Areas of **geological** sensitivity (i.e. drainage lines on-site which may be more susceptible to erosion)
- » **Visual** sensitivity (i.e. the visibility of sensitive receptors along major routes, arterial, and secondary roads in the area, built-up centres or populated places and on individual/isolated landowners/homesteads identified within the study area)

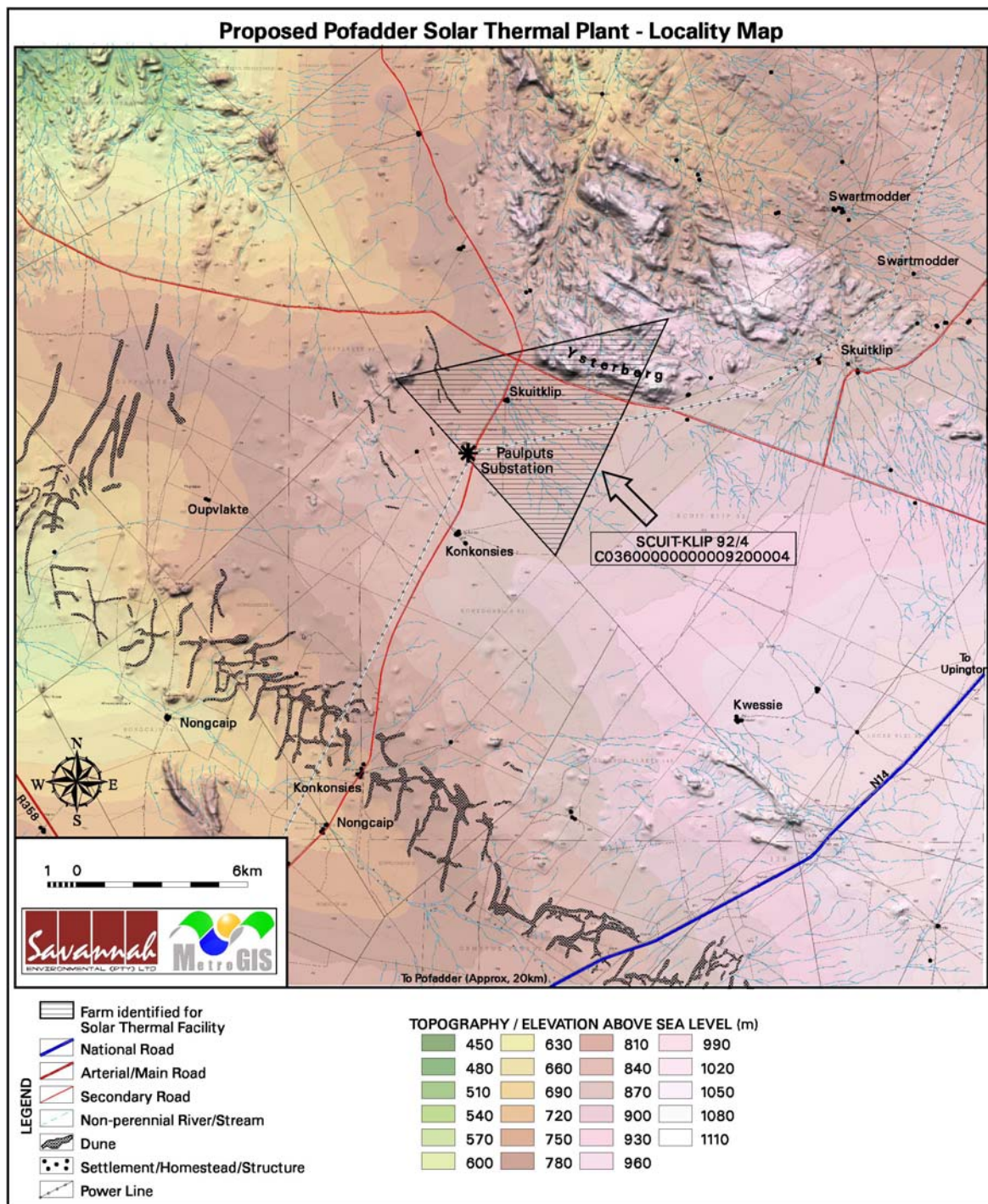


Figure 2.1: Map indicating the farm portion identified for the proposed facility near Pofadder, Northern Cape

Generalised recommendations, in terms of the layout and/or technical characteristics of the proposed facility as made by the specialists are described below.

In order to reduce/avoid impacts on **ecology** the following has been suggested:

- » For any new construction, cross drainage lines perpendicularly to minimise disturbance footprints

In order to reduce/avoid impacts on **avifauna** the following has been suggested:

- » Development in the north eastern area of the site should be minimal given the possibility of Lanner Falcons utilising these mountainous areas as possible breeding sites.
- » Contractors need to minimise the amount of disturbance during the construction phase by staying within the boundaries of the 11 km² construction area
- » The diversity and abundance of bird species was far greater in the drainage channels as opposed to the open plains. Where possible as much of this habitat should be kept intact.
- » If possible the servitude of the power line existing on the site should be followed, alternatively existing roads should be followed and sand tracks utilised where possible rather than cut across habitat.
- » The new power line should be kept as low as possible taking into account engineering and legal requirements
- » The span lengths should be kept as short as possible taking into account engineering and legal requirements
- » Placement of a sufficiently large form of line marker which will increase the visibility of the earth wire, where deemed necessary. There remains considerable uncertainty about the best performing marking device. Bird marking devices have proved to be extremely effective in preventing bird collisions by making the line more visible to birds.
- » The marker should be placed with sufficient regularity where deemed necessary.
- » The design of the power line towers needs to incorporate perch deterrents in the area directly above the insulator strings to ensure that bird species are not given the opportunity to defecate on the string.

In order to reduce/avoid impacts on **geology** the EMP specifications for earthworks within the geology specialist report should be consulted (refer to Appendix H of the EIA Report).

In order to reduce/avoid impacts the **visual** impacts the following has been suggested:

- » The visual impact of off-site ancillary structures such as the pipeline can be successfully mitigated by placing the pipe underground, and rehabilitating the

vegetation within the pipeline servitude where practically possible. This has the further advantage of negating possible visual impacts associated with vegetation clearing and potential unsightly erosion scarring.

- » The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility.
- » The placement of light fixtures should be planned in order to reduce visual impacts associated with glare and light trespass.

In order to reduce/avoid impacts on **water resources** the following has been suggested:

- » A reduction in terms of proposed water use can be undertaken through a range of design optimisations (i.e. dry cooling and hybrid forms of cooling rather than wet cooling only).

This EMP has been developed based on the findings of the EIA Phase, and must be implemented to protect sensitive features (i.e. both on and off-site) through controlling construction and operation activities that could have a detrimental effect on the environment, and avoiding or minimising potential impacts.

2.1 Activities and Components associated with the Pofadder Solar Energy Facility

The main activities/components associated with the Pofadder Solar Thermal Plant are detailed below in Table 2.1. A project management plan is included in Appendix C and a final layout in Appendix B.

Table 2.1: Activities associated with Planning, Construction, Operation, and Decommissioning of the facility

Main Activity/Project Component	Components of Activity	Details
<i>Planning</i>		
Conduct technical surveys	<ul style="list-style-type: none"> » Geotechnical survey by geotechnical engineering company. » Site survey and confirmation of the micro-siting footprint for the solar arrays and associated infrastructure by professional surveyor. » Survey of power line, internal access road and water supply pipeline servitudes by professional surveyor. 	All surveys are to be undertaken prior to initiating construction.
<i>Construction</i>		
Establishment of access roads	Establish internal access road (i.e. one internal asphalt access road of approximately 6 m wide which will lead directly to the power islands for use during construction and operation phase).	<ul style="list-style-type: none"> » Access roads will be constructed in advance of any components being delivered to site, and will remain in place after completion for future access. » Existing access roads to the site will be utilised, and upgraded where required. » Special haul roads may need to be constructed to and within the site to accommodate abnormally loaded vehicle access and circulation. » The internal service road alignment will be informed by the final micro-siting/positioning of the solar array and the power islands.
Undertake site preparation	<ul style="list-style-type: none"> » Site establishment of offices/workshop with ablutions, storage 	<ul style="list-style-type: none"> » These activities will require the stripping of topsoil, which will need to be appropriately stockpiled for use in rehabilitation.

Main Activity/Project Component	Components of Activity	Details
	areas, and a contractors yards. » Clearance of vegetation at the footprint of the power block, storage areas, power tower, and parabolic troughs.	A temporary construction area is needed for containers, toilets, and equipment. » Requires the clearing of vegetation and levelling of the development site. » A lay down area for building materials and equipment associated with these buildings will also be required.
Construct foundations for the power tower, power islands and workshops, offices, and storage areas	Excavations for foundations (final dimensions to be defined by final design and EPC contractor).	» Foundations will be excavated as required. » Shoring and safety barriers will be erected. » Aggregate and cement to be transported from the closest centre to the development, with the establishment of a small concrete batching plant close to the activities (i.e. this would most likely be a movable plant).
Transport of components and equipment to site	» Flatbed and other trucks will be used to transport all components to site. » The normal civil engineering construction equipment for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement mixers, etc.). » The components required for the establishment of the substation (including transformers). » Components required for the establishment of the power line (including monopole towers and cabling). » Ready-mix cement trucks for power tower, power block and workshop/storage area foundations.	» The solar arrays will be brought to site by the supplier in sections to be assembled on-site in a designated assembly building. » Individual components <i>may</i> be defined as abnormal loads in terms of the Road Traffic Act (Act No 29 of 1989) by virtue of the dimensional limitations. » The dimensional requirements of the load during the construction phase (length/height) may require alterations to the existing road infrastructure (widening on corners, removal of traffic islands), accommodation of street furniture (electricity, street lighting, traffic signals, telephone lines etc.), and protection of road-related structures (bridges, culverts, portal culverts, retaining walls etc) as a result of abnormal loading. » The equipment will be transported to the site using appropriate National and Provincial routes, and the dedicated access/haul road to the site itself.
Construct power islands and ancillary infrastructure	» Steam turbine and generator. » Generator transformer.	» The substation will be constructed with a high-voltage (HV) yard footprint of up to 20 m x 30 m.

Main Activity/Project Component	Components of Activity	Details
	<ul style="list-style-type: none"> » Small substation. » An auxiliary steam boiler and associated vessels (i.e. fossil fuel boiler/ generator), proposed to be fired by either diesel fuel or liquid petroleum gas (LPG). » Substation and associated components. » Security fencing around high-voltage (HV) yard. 	<ul style="list-style-type: none"> » The substation would be constructed in the following simplified sequence: <ul style="list-style-type: none"> * <u>Step 1</u>: Survey of the site * <u>Step 2</u>: Site clearing and levelling and construction of access road to substation site * <u>Step 3</u>: Construction of terraces and foundations * <u>Step 4</u>: Assembly, erection and installation of equipment (including transformers) * <u>Step 5</u>: Connection of conductors to equipment * <u>Step 6</u>: Rehabilitation of any disturbed areas and protection of erosion sensitive areas
Connection of the PV panels and the steam turbine and generator to the substation	<ul style="list-style-type: none"> » CSP infrastructure. » 11/22 kV underground electrical cabling connecting the steam turbine and generator to the substation. 	<ul style="list-style-type: none"> » The installation of these cables will require the excavation of trenches, approximately 1 m in depth within which these cables can then be laid. The underground cables would follow the internal access roads as far as reasonably possible.
Connect substation to the power grid	<ul style="list-style-type: none"> » One overhead 132 kV power line connecting the substation to the Paulputs Transmission Substation. 	<ul style="list-style-type: none"> » The nominated preferred route for the power line will be assessed, surveyed, and pegged prior to construction. » Servitude of approximately 32 m will be required for the power line.
Commissioning of the facility	Solar energy facility commissioning.	<ul style="list-style-type: none"> » Prior to the start-up of solar component, a series of checks and tests will be carried out, including both static and dynamic tests to make sure it is working within appropriate limits. » Grid interconnection and unit synchronisation.
Undertake site remediation	<ul style="list-style-type: none"> » Remove all construction equipment from the site. » Rehabilitation of temporarily disturbed areas where practical and reasonable. 	<ul style="list-style-type: none"> » On full commissioning of the facility, any access points to the site which are not required during the operation phase will be closed and prepared for rehabilitation.

Main Activity/Project Component	Components of Activity	Details
<i>Operation</i>		
Operation	Operation of power tower and heliostat field; parabolic troughs; and PV panels within the solar energy facility.	<ul style="list-style-type: none"> » Once operational, the solar energy facility will be monitored and maintained by a staff complement of approximately 30 - 80 full time employees. » All solar components will be operational, except during mechanical breakdown, extreme weather conditions or maintenance activities.
Maintenance	<ul style="list-style-type: none"> » Oil and grease – moving components of the solar arrays. » Oil (i.e. heat transfer fluid) for the parabolic troughs. » Diesel or LPG for the auxiliary boiler. Transformer oil – substation. <ul style="list-style-type: none"> » Waste product disposal. 	<ul style="list-style-type: none"> » The solar components will be subject to periodic maintenance and inspection. » Any waste products (e.g. used oil and grease etc.) will be disposed of in accordance with relevant waste management legislation (OHS Act). » The solar infrastructure is expected to have a lifespan of approximately 30 years, with proper maintenance and refurbishment expandable to 50.
<i>Decommissioning</i>		
Site preparation	<ul style="list-style-type: none"> » Confirming the integrity of the access to the site to accommodate required equipment. » Preparation of the site. Mobilisation of construction equipment.	<ul style="list-style-type: none"> » 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.
Disassemble and replace existing solar components	General construction equipment will be required to replace components of the solar facility.	<ul style="list-style-type: none"> » Components would be reused, recycled, or disposed of in accordance with regulatory requirements. » The hours of operation for noisy construction activities are guided by the Environment Conservation Act (noise control regulations). » If the project requires construction work outside of the designated hours, regulatory authorities will be consulted and affected stakeholders informed.

LEGISLATIVE REQUIREMENTS

CHAPTER 3

Table 3.1 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 3.1: Relevant legislative permitting requirements applicable to the solar energy facility

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
<i>National Legislation</i>			
<p><u>National Environmental Management Act (Act No. 107 of 1998)</u></p>	<ul style="list-style-type: none"> » <u>NEMA requires, inter alia, that:</u> <ul style="list-style-type: none"> o <u>Development must be socially, environmentally, and economically sustainable."</u> o <u>Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied."</u> o <u>A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions."</u> » <u>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.</u> » <u>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</u> » <u>In terms of GNR 543 of 18 June 2010, a full Scoping and EIA Process is required</u> 	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs</u> » <u>Northern Cape Department of Environment and Nature Conservation (DENC)</u> 	<ul style="list-style-type: none"> » <u>An Environmental authorisation has been issues for the project.</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<u>to be undertaken for the proposed project.</u>		
<u>National Environmental Management Act (Act No. 107 of 1998)</u>	<ul style="list-style-type: none"> » <u>A project proponent is required to consider a project holistically and to consider the cumulative effect of potential impacts.</u> » <u>In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with a project is avoided, stopped or minimised.</u> 	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs</u> 	<ul style="list-style-type: none"> » <u>While no permitting or licensing requirements arise directly, the holistic consideration of the potential impacts of the proposed project has found application in the EIA Phase.</u> » <u>The implementation of mitigation measures are included as part of the Draft EMP and will continue to apply throughout the life cycle of the project.</u>
<u>Environment Conservation Act (Act No 73 of 1989)</u>	<ul style="list-style-type: none"> » <u>National Noise Control Regulations (GN R154 dated 10 January 1992).</u> 	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs</u> » <u>NC DENC - commenting authority</u> » <u>Local Authorities</u> » <u>District & Local Municipality</u> 	<ul style="list-style-type: none"> » <u>There is no requirement for a noise permit in terms of the legislation.</u> » <u>There are noise level limits which must be adhered to, as detailed in SANS 10103. It provides the maximum average background ambient sound levels, $L_{Req,d}$ and $L_{Req,n}$ during the day and night respectively to which different types of developments may be exposed.</u>
<u>National Water Act (Act No 36 of 1998)</u>	<ul style="list-style-type: none"> » <u>Water uses must be licensed unless such water use falls into one of the categories listed in S22 of the Act or falls under the</u> 	<ul style="list-style-type: none"> » <u>Department of Water Affairs</u> 	<ul style="list-style-type: none"> » <u>The abstraction of water is regarded as a water use (as defined in terms of S21 of the</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<u>general authorisation.</u>		<u>NWA).</u> » <u>A water use license has been applied for in parallel with the EIA process.</u>
<u>National Water Act (Act No 36 of 1998)</u>	» <u>In terms of S19, the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing, or recurring.</u>	» <u>Department of Water Affairs (as regulator of NWA)</u>	» <u>This section will apply throughout the life cycle of the project.</u>
<u>Minerals and Petroleum Resources Development Act (Act No 28 of 2002)</u>	» <u>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.</u> » <u>Requirements for Environmental Management Programmes and Environmental Management Plans are set out in S39 of the Act.</u>	» <u>Department of Minerals and Energy</u>	» <u>As no borrow pits are expected to be required for the construction of the facility, no mining permit or right is required to be obtained.</u>
<u>National Environmental Management: Air Quality Act (Act No 39 of 2004)</u>	<u>Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as "priority areas"</u> » <u>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</u>	<u>National Department of Environmental Affairs</u>	<u>While no permitting or licensing requirements arise from this legislation, this Act will find application during the operational phase of the project.</u> » <u>The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
			<p><u>person has failed to comply with the Act.</u></p> <p>» <u>Best practice means should be used to prevent dust generation from the roads and excavations during construction</u></p>
<p><u>National Heritage Resources Act (Act No 25 of 1999)</u></p>	<p>» <u>S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</u></p> <p>» <u>The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length.</u></p> <p>» <u>Any development or other activity which will change the character of a site exceeding 5 000 m² in extent.</u></p> <p>» <u>The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m²; or the re-zoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.</u></p>	<p>» <u>South African Heritage Resources Agency (SAHRA) – National heritage sites (grade 1 sites) as well as all historic graves and human remains</u></p>	<p>» <u>A permit would be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development.</u></p>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<ul style="list-style-type: none"> » <u>Stand alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</u> 		
<u>Nature Conservation Ordinance (Act 19 of 1974)</u>	<ul style="list-style-type: none"> » <u>Article 63 prohibits the picking of certain fauna (including cutting, chopping, taking, and gathering, uprooting, damaging, or destroying).</u> » <u>Schedule 3 lists endangered flora and Schedule 4 lists protected flora.</u> » <u>Articles 26 to 47 regulate the use of wild animals.</u> 	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs</u> 	<ul style="list-style-type: none"> » <u>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application throughout the life cycle of the project.</u>
<u>National Environmental Management: Biodiversity Act (Act No. 10 of 2004)</u>	<p><u>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</u></p> <p><u>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions</u></p>	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs</u> 	<ul style="list-style-type: none"> » <u>As the applicant will not carry on any restricted activity in terms of S57, no permit is required to be obtained in this regard.</u> » <u>In terms of GNR 152 specialist flora and fauna studies have been undertaken as part of the EIA process.</u> » <u>A permit would be required should any protected plant species on site be disturbed or destroyed because of the proposed development.</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<p><u>as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</u></p> <p>» <u>The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GoN 1002), 9 December 2011).</u></p>		
<p><u>Conservation of Agricultural Resources Act (Act No 43 of 1983)</u></p>	<p>» <u>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category</u></p>	<p>» <u>Department of Agriculture</u></p>	<p>» <u>While no permitting or licensing requirements arise from this legislation, this Act will find application during the EIA phase and will continue to apply throughout the life cycle of the</u></p>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<p><u>3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</u></p>		<p><u>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.</u></p>
<p><u>National Forests Act (Act No. 84 of 1998)</u></p>	<p>» <u>In terms of S5 (1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated".</u></p> <p>» <u>GN 1042 provides a list of protected tree species.</u></p>	<p>» <u>National Department of Forestry</u></p>	<p>» <u>This Act has found application during the EIA Phase. In this regard, a permit would need to be obtained for any protected trees that are affected.</u></p>
<p><u>National Veld and Forest Fire Act (Act 101 of 1998)</u></p>	<p>» <u>Provides requirements for veldfire prevention through firebreaks and required measures for fire-fighting. Chapter 4 places a duty on landowners to prepare and maintain firebreaks, and Chapter 5 places a duty on all landowners to acquire equipment and have available personnel to fight fires.</u></p> <p>» <u>In terms of S21 the applicant would be obliged to burn firebreaks to ensure that</u></p>	<p>» <u>National Department of Forestry</u></p>	<p>» <u>While no permitting or licensing requirements arise from this legislation, this act will find application during the operational phase of the project in terms of fire prevention and management.</u></p>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<p><u>should a veldfire occur on the property, that it does not spread to adjoining land.</u></p> <ul style="list-style-type: none"> » <u>In terms of S12 the firebreak would need to be wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material.</u> » <u>In terms of sS17ection 17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</u> 		
<p><u>Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997</u></p>	<ul style="list-style-type: none"> » <u>Any structure exceeding 45 m above ground level or structures where the top of the structure exceeds 150 m above the mean ground level, the mean ground level considered the lowest point in a 3km radius around such structure.</u> » <u>Structures lower than 45 m, which are considered as a danger to aviation shall be marked as such when specified.</u> 	<ul style="list-style-type: none"> » <u>Civil Aviation Authority (CAA)</u> 	<ul style="list-style-type: none"> » <u>This act will find application during the operational phase of the project. Appropriate marking is required to meet the specifications as detailed in the CAR Part 139.01.33.</u>
<p><u>Hazardous Substances Act (Act No 15 of 1973)</u></p>	<ul style="list-style-type: none"> » <u>This Act regulates the control of substances that may cause injury, or ill health, or death because of 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</u> 	<ul style="list-style-type: none"> » <u>Department of Health</u> 	<ul style="list-style-type: none"> » <u>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.</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<p><u>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.</u></p> <p>» <u>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates _____ pressure _____ through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance;</u></p> <p>» <u>Group IV: any electronic product;</u></p> <p>» <u>Group V: any radioactive material.</u></p> <p><u>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</u></p>		
<p><u>National Road Traffic Act (Act No 93 of 1996)</u></p>	<p>» <u>The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</u></p>	<p><u>Provincial Department of Transport (provincial roads)</u></p> <p>» <u>South African National Roads Agency Limited (national roads)</u></p>	<p>» <u>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads.</u></p> <p>» <u>Transport vehicles exceeding the dimensional limitations (length) of 22m.</u></p>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<ul style="list-style-type: none"> » <u>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.</u> » <u>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.</u> 		<ul style="list-style-type: none"> » <u>Depending on the trailer configuration and height when loaded, some of the power station components may not meet specified dimensional limitations (height and width).</u>
<u>Development Facilitation Act (Act No 67 of 1995)</u>	<ul style="list-style-type: none"> » <u>Provides for the overall framework and administrative structures for planning throughout the Republic</u> » <u>Sections 2- 4 provide general principles for land development and conflict resolution.</u> 	<ul style="list-style-type: none"> » <u>Local Municipality, District Municipality</u> 	<ul style="list-style-type: none"> » <u>The applicant submitted a land development application in the prescribed manner and form as provided for in the Act.</u> » <u>The property has been rezoned.</u>
<u>Subdivision of Agricultural Land Act (Act No 70 of 1970)</u>	<ul style="list-style-type: none"> » <u>Details land subdivision requirements and procedures. Applies for subdivision of all agricultural land in the province.</u> 	<ul style="list-style-type: none"> » <u>Local Municipality, District Municipality</u> 	<ul style="list-style-type: none"> » <u>Subdivision of the property is not required.</u>
<u>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</u>	<ul style="list-style-type: none"> » <u>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have,</u> 	<u>National Department of Water and Environmental Affairs (hazardous waste and effluent)</u>	<u>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard.</u>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
	<p><u>a detrimental effect on the environment.</u></p> <p>» <u>The Minister may amend the list by—</u> <u>(a) Adding other waste management activities to the list;</u> <u>(b) Removing waste management activities from the list; or</u> <u>(c) Making other changes to the particulars on the list.</u></p> <p>» <u>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.</u></p> <p>» <u>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that</u> <u>(a) the containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste;</u> <u>(b) adequate measures are taken to prevent accidental spillage or leaking;</u> <u>(c) the waste cannot be blown away;</u> <u>(d) nuisances such as odour, visual impacts and breeding of vectors do not arise; and</u> <u>(e) Pollution of the environment and harm to health are prevented.</u></p>	<p><u>Provincial Department of Environmental Affairs (general waste)</u></p>	<p><u>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in the EMP.</u></p>
<p><u>Promotion of Access to Information Act (Act No 2</u></p>	<p>» <u>All requests for access to information held by state or private body are</u></p>	<p>» <u>National Department of Environmental Affairs (DEA)</u></p>	<p>» <u>No permitting or licensing requirements</u></p>

<u>Legislation</u>	<u>Applicable Requirements</u>	<u>Relevant Authority</u>	<u>Compliance requirements</u>
<u>of 2000)</u>	<u>provided for in the Act under S11.</u>		
<u>Promotion of Administrative Justice Act (Act No 3 of 2000)</u>	<ul style="list-style-type: none"> » <u>In terms of S3 the government is required to act lawfully and take procedurally fair, reasonable, and rational decisions.</u> » <u>Interested and affected parties have right to be heard.</u> 	<ul style="list-style-type: none"> » <u>National Department of Environmental Affairs (DEA)</u> 	<ul style="list-style-type: none"> » <u>No permitting or licensing requirements</u>

PURPOSE & OBJECTIVES OF THE EMP**CHAPTER 4**

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

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

The EMP has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools. During its lifecycle, projects journey through four distinctive phases, i.e. planning, construction, operational, and decommissioning phases. The EMP is accordingly separated into measures dealing with the various project phases.

This EMP has the following objectives:

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

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

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

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

!KaXu CSP South Africa (Pty) Ltd (!KaXu CSP) must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMP through its integration into the contract documentation. Since this EMP is part of the EIA process it is important that this guideline document be read in conjunction with the Scoping Report and EIA Report. This will contextualise the EMP and enable a thorough understanding of its role and purpose in the integrated environmental management process. This EMP has been compiled in accordance with Section 33 of the EIA Regulations on June 2010, and will be further developed in terms of specific requirements as the project develops.

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

- » Ensuring that employees have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document. Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- » Providing basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.

- » Ensuring awareness of any other environmental matters, which are deemed to be necessary by the Environmental Control Officer (ECO).

STRUCTURE OF THIS EMP

CHAPTER 5

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

- » Planning and design activities;
- » Construction activities;
- » Operation activities; and
- » Decommissioning activities.

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

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

Project Component/s	List of project components affecting the objective.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/Risk Source	Description of activities which could impact on achieving objective.
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion.

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

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

consideration responsibility, frequency, methods and reporting.

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

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

5.1. Project Team

This draft EMP was compiled by:

	Name	Company
EMP Compilers:	Karen Jodas – EAP Jo-Anne Thomas - EAP	Savannah Environmental
Specialists:	David Hoare – Impacts on Fauna, Flora & Ecological Environment	David Hoare Consulting
	David Morris – Impacts on Heritage Resources	McGregor Museum
	Martin Taylor - Ornithologist	Birdlife South Africa
	Iain Paton – Impacts on Geology, Soils & Erosion Potential	Outeniqua Geotechnical Services
	Lourens du Plessis – Impacts on Visual Aesthetics	MetroGIS
	Patsy Scherman & Brian Colloty – Impacts on Water Resources	Scherman, Colloty & Associates
	Tony Barbour - Social Impacts	Tony Barbour Environmental Consulting & Research

The Savannah Environmental team have extensive knowledge and experience in EIA and environmental management, having been involved in EIA processes over the past ten (10) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

MANAGEMENT PLAN FOR THE SOLAR ENERGY FACILITY: PLANNING & DESIGN

CHAPTER 6

6.1. Goal for Planning and Design

Overall Goal for Planning and Design: Undertake the planning and design phase of the solar energy facility 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 concerns and that these are appropriately addressed through design and planning (where appropriate).
- » Ensures that the best environmental options are selected for the project, including the power line alignment and substation site.
- » Enables the solar energy facility construction activities to be undertaken without significant disruption to other land uses in the area.

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

6.2. Objectives

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

From the specialist investigations undertaken for the proposed solar energy facility development site, no absolute 'no go' areas were identified. However, a number of potentially sensitive areas were identified to be associated with the proposed project.

In order to minimise impacts associated with the construction and operation of the solar energy facility and associated infrastructure, the following surveys are required to be undertaken during the final design phase of the facility:

- » Geotechnical survey.
- » A stormwater management plan that details how stormwater runoff from hard surfaces will be managed to reduce velocities and volumes of water that could lead to erosion of surfaces.

Project Component/s

Project components affecting the objective:

- | |
|--|
| » Power tower and heliostat field, parabolic troughs, and PV panels. |
|--|

	<ul style="list-style-type: none"> » Power islands. » Access roads. » Substation. » Power line.
Potential Impact	Design fails to respond optimally to the environmental consideration.
Activities/Risk Sources	<ul style="list-style-type: none"> » Positioning of solar components and access roads. » Positioning of substation. » Alignment of power line.
Mitigation: Target/Objective	Ensure that the design of the facility responds to the identified environmental constraints and opportunities.

Mitigation: Action/Control	Responsibility	Timeframe
Undertake pre-construction geotechnical surveys.	Specialists	Design phase
Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, flora, water resources and associated ecology, avifauna, and heritage, as detailed within the EIA report and relevant appendices.	EPC contractor, solar component suppliers, and !KaXu CSP	Design review stage
<u>Appropriate bird deterrent devices must be placed at locations around the facility to lessen the impact on avifauna.</u>	<u>EPC contractor</u> <u>!KaXu CSP</u>	<u>Design phase</u>
<u>Obtain all relevant permits (e.g. protected plants and trees) prior to construction in an area.</u>	<u>EPC contractor</u> <u>!KaXu CSP</u>	<u>Design phase</u>
Access roads to be carefully planned to minimise the impacted area and prevent unnecessary over compaction of soil.	EPC contractor !KaXu CSP	Design phase
<u>Road alignments must be planned in such a way that the minimum of cut and fill operations are required.</u>	<u>EPC contractor</u> <u>!KaXu CSP</u>	<u>Design phase</u>
<u>As far as possible, existing roads must be used or upgraded.</u>	<u>EPC contractor</u> <u>!KaXu CSP</u>	<u>Design phase</u>
A detailed geotechnical investigation is required for the design phase.	!KaXu CSP	Design phase
Compile a comprehensive storm water management plan for hard surfaces (e.g. substation and power islands footprints) as part of the final design of the project (refer to Appendix D).	EPC contractor, and !KaXu CSP	Design phase
A sustainable design approach should be considered in finalising the design of key elements.	EPC contractor, and !KaXu CSP	Tender design, and design review stage
<u>Submit a final layout to DEA prior to the commencement of construction</u>	<u>EPC contractor, and</u> <u>!KaXu CSP</u>	<u>Pre-construction</u>

Performance Indicator	Design meets objectives and does not degrade the environment. Design etc respond to the mitigation measures and recommendations in
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	the EIA report.
Monitoring	Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Project Manager, !KaXu CSP and the ECO prior to the commencement of construction.

OBJECTIVE: Ensure selection of best environmental option for alignment/design of the 132 kV power line, substation and associated access roads

One overhead 132 kV power line is proposed to connect the substation within the power islands to the electricity network/grid, at the existing Paulputs Transmission Substation. Alternative routes/corridors for the power line were identified and assessed in the EIA phase. From the conclusions of the specialist studies undertaken within the EIA, the preferred power line alternative is Alternative 1 as it represents an opportunity for the consolidation of linear infrastructure:

Project Component/s	Power line. Substation.
Potential Impact	Route that degrades environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, erosion. Substation site that degrades environment unnecessarily, particularly with respect to visual aesthetics, loss of indigenous flora, erosion.
Activities/Risk Sources	Alignment of power line within corridor. Construction of substation.
Mitigation: Target/Objective	To ensure selection of best environmental option for alignment for the power line and site for the substation.

Mitigation: Action/Control	Responsibility	Timeframe
Select an alignment that curtails environmental impacts and enhances environmental benefits.	EPC contractor, !KaXu CSP	Prior to submission of Final EIA
Consider design level mitigation measures recommended by the specialists, especially with respect to visual aesthetics, flora, ecology (i.e. drainage lines), avifauna, and heritage, as detailed within the EIA report and relevant appendices.	EPC contractor	Design phase
Plan new access roads according to contour lines to minimise cutting and filling operations.	EPC contractor	Design phase
Use bird-friendly power line tower and conductor designs.	EPC contractor	Design phase
<u>Monopole bird friendly structures must be used for the</u>	<u>EPC contractor</u>	<u>Design phase</u>

Mitigation: Action/Control	Responsibility	Timeframe
<u>power line to minimise the number of electrocutions.</u>		
The most sensitive landscape features for planning purposes in the study area will be the presence of drainage lines, and areas of indigenous natural vegetation.	EPC contractor	Design phase

Performance Indicator	Power line alignments meet environmental objectives. Selected power line alignments that minimises negative environmental impacts and maximises benefits.
Monitoring	Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the design by the Project Manager, and the ECO prior to the commencement of construction.

OBJECTIVE: Minimise the loss of riparian systems

Project Component/s	Site selection minimising the overall impact on the functioning of the riparian environment.
Potential Impact	Loss of important habitat and fragmentation of the riverine systems.
Activities/Risk Sources	Site selection and incorrect placement of the development footprint.
Mitigation: Target/Objective	Minimise the loss of riparian systems - incorrect footprint / site selection.

Mitigation: Action/Control	Responsibility	Timeframe
Select a favourable site having the least impact or within an area that is least sensitive, i.e. the south-eastern portion of the site (i.e. south of the existing Eskom 132kV distribution line).	!KaXu CSP	Planning & design phase

Performance Indicator	N/A
Monitoring	N/A

OBJECTIVE: Minimising the overall impact on the functioning of the riparian environment

Project Component/s	Site selection minimising the overall impact on the functioning of the riparian environment.
Potential Impact	Loss of important habitat and fragmentation of the riverine systems.
Activities/Risk Sources	Placement of hard engineered surfaces.
Mitigation: Target/Objective	Minimise the loss of riparian habitat – physical removal and replacement by hard surfaces.

Mitigation: Action/Control	Responsibility	Timeframe
Select a favourable site, having the least impact or within an area that is least sensitive, i.e. the south eastern portion of the site below the existing Eskom 132 kV distribution line.	!KaXu CSP	Planning, and design phase

Performance Indicator	N/A
Monitoring	N/A

OBJECTIVE: Minimising alteration of the hydrological regime

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

Mitigation: Action/Control	Responsibility	Timeframe
» The most significant form of mitigation would be to select a development area that contained no drainage lines. However due to the nature of the site, this was not possible, thus an area, with the least number of riparian systems was earmarked, i.e. the south eastern corner of the site. Any stormwater within the site will be handled in a suitable manner, i.e. splitting clean and dirty water	EPC contractor	Planning, design, and operation phase

Mitigation: Action/Control	Responsibility	Timeframe
streams around the plant, install stilling basins to capture large volumes of run-off, trapping sediments, and reduce flow velocities.		

Performance Indicator	Water quality and quantity management - "Water Use Licence Conditions."
Monitoring	Surface water monitoring plan.

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.

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

<u>Mitigation: Action/control</u>	<u>Responsibility</u>	<u>Timeframe</u>
<u>Compile and implement a grievance mechanism procedure for the public to be implemented during both the construction and operational phases of the facility (refer to generic grievance mechanism included within Appendix E). This procedure should include details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues.</u>	<u>!KaXu CSP</u>	<u>Pre-construction (construction procedure)</u> <u>Pre-operation (operation procedure)</u>
<u>Develop and implement a grievance mechanism for the construction, operational and closure phases of the project for all employees, contractors, subcontractors and site personnel. This procedure should be in</u>	<u>!KaXu CSP Contractor</u>	<u>Pre-construction (construction procedure)</u> <u>Pre-operation (operation</u>

<u>Mitigation: Action/control</u>	<u>Responsibility</u>	<u>Timeframe</u>
<u>line with the South African Labour Law.</u>		<u>procedure)</u>
<u>Liaison with landowners is to be undertaken prior to the commencement of construction in order to provide sufficient time for them to plan agricultural activities.</u>	<u>!KaXu CSP Contractor</u>	<u>Pre-construction</u>

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

MANAGEMENT PLAN FOR THE SOLAR ENERGY FACILITY: CONSTRUCTION

CHAPTER 7

7.1. Overall Goal for Construction

Overall Goal for Construction: Undertake the construction phase of the solar energy facility 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 in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- » Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value (i.e. drainage lines).
- » Minimises impacts on avifauna and other fauna using the site.
- » Minimises the impact on the heritage and historical value of the site.
- » Establishes an environmental baseline during construction activities on the site, where possible, particularly with regard to priority bird species using the site.

7.2. Objectives

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

OBJECTIVE: Environmentally sensitive location of construction equipment camps on site

It is expected that all construction workers will be accommodated within existing accommodation within the study area as far as possible. No construction workers, aside from critical, and security personnel will be accommodated on site. In addition, construction equipment may need to be stored at an appropriate location on the site, along the power line and pipeline routes and at the substation site for the duration of the construction period.

**Project
Component/s**

- » Project components affecting the objective:
- » Heliostat field and power tower.
- » Parabolic troughs.
- » PV panels.
- » Power islands.

	<ul style="list-style-type: none"> » Power line. » Access roads.
Potential Impact	<ul style="list-style-type: none"> » Damage to indigenous natural vegetation. » Damage to and/or loss of topsoil. » Compacting of ground. » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.
Activities/Risk Sources	<ul style="list-style-type: none"> » Bush clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise impacts on the social and biophysical environment. » To limit equipment storage to within the demarcated site.

Mitigation: Action/Control	Responsibility	Timeframe
The siting of the construction equipment camp will take cognisance of any sensitive areas identified by the EIA studies. The location of this construction equipment camp shall be approved by the project ECO.	!KaXu, and EPC contractor	Pre-construction
<u>No temporary site camps will be allowed outside the footprint of the development area.</u>	<u>EPC Contractor</u>	<u>Contract duration</u>
As far as possible, minimise vegetation clearing and levelling for equipment storage areas.	EPC contractor	Construction
Rehabilitate all disturbed areas at the construction equipment camp as soon as construction is complete within an area.	EPC contractor	Post construction

Performance Indicator	<p>No visible erosion scars once construction in an area is completed.</p> <p>No claims due to unauthorised removal of vegetation.</p> <p>All damaged areas successfully rehabilitated after construction completion.</p> <p>No damage to drainage lines and/or riverine areas.</p> <p>Appropriate waste management.</p>
Monitoring	<p>Regular audits of the construction camps and areas of construction on site</p> <p>An incident reporting system should be used to record non-conformances to the EMP.</p>

OBJECTIVE: Securing the site and site establishment

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

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

Project Component/s	<ul style="list-style-type: none"> » Project components affecting the objective: » Heliostat field and power tower. » Parabolic troughs. » PV panels. » Power islands. » Power line. » Access roads. » Pipeline and abstraction point.
Potential Impact	<ul style="list-style-type: none"> » Hazards to adjacent landowners and public. » Security of materials. » Substantially increased damage to adjacent sensitive vegetation, due largely to ignorance of where such areas are located.
Activities/Risk Sources	<ul style="list-style-type: none"> » Open excavations (foundations and cable trenches). » Movement of construction vehicles in the area and on-site.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/Control	Responsibility	Timeframe
Secure site, working areas and excavations in an appropriate manner.	EPC contractor	Construction
Where necessary to control access, fence and secure area.	EPC contractor	Construction
Fence and secure Contractor's equipment camp.	EPC contractor	Construction
All development footprints for roads, buildings, underground cables, laydown areas should be fenced off or demarcated. There is to be no disturbance outside these demarcated areas without the permission of the ECO.	EPC contractor	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.	EPC contractor	Construction
Ablution or sanitation facilities should not be located within 100 m from a 1:100 year flood line including water courses, wetlands or within a horizontal distance of less than 100 m, whichever is applicable.	EPC contractor	During site establishment, construction, and operation
Supply adequate waste collection bins at site where construction is being undertaken.	EPC contractor	Construction
Dispose of all solid waste collected at an appropriately	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
registered waste disposal site. Waste disposal shall be in accordance with all relevant legislation and under no circumstances may waste be burnt on site.		
Where a registered waste site is not available close to the construction site, provide a method statement with regard to waste management.	EPC contractor	Site establishment, and construction

Performance Indicator	<ul style="list-style-type: none"> » Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured.
Monitoring	<ul style="list-style-type: none"> » An incident reporting system will be used to record non-conformances. » ECO to monitor all construction areas on a continuous basis until all construction is completed; immediate report backs to site manager.

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

The construction phase is expected to create approximately 400 - 600 employment opportunities over a two - three year period. Contractors typically make use of their own skilled and semi-skilled staff. Direct employment opportunities to members of local communities are therefore likely to be limited to low skilled opportunities.

Project Component/s	Construction and establishment activities associated with the establishment of the facility, including infrastructure etc.
Potential Impact	The opportunities and benefits associated with the creation of local employment and business should be maximised where possible.
Activities/Risk Sources	The employment of outside contractors to undertake the work and who make use of their own labour will reduce the direct employment and business opportunities for locals, but will lead to secondary opportunities.
Mitigation: Target/Objective	!KaXu CSP and the EPC contractor should encourage subcontractors to employ as many as possible of the low-skilled workers from the local area where practical.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that as many as possible of the low-skilled workers are sourced from the local area.	Subcontractors	Before and during construction phase
Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase.	EPC contractor, or subcontractors	Before, and during construction phase
Identify potential opportunities for local businesses.	!KaXu CSP / EPC contractor	Before construction phase commences.

Performance Indicator	Semi and unskilled labour locally sourced.
Monitoring	Appointed ECO must monitor indicators listed above.

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

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can affect local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour of male construction workers, including:

- » An increase in alcohol and drug use;
- » An increase in crime levels;
- » The loss of girlfriends and/or wives to construction workers;
- » An increase in prostitution; and
- » An increase in sexually transmitted diseases (STDs).

Project Component/s	Construction and establishment activities associated with the establishment of the solar energy facility, including infrastructure etc.
Potential Impact	The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks.
Activities/Risk Sources	The presence of construction workers can impact 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 which can be achieved by setting a code of conduct and where possible, maximising the number of locals employed during the construction phase.

Mitigation: Action/Control	Responsibility	Timeframe
Where possible source low-skilled workers from the local area, the local area being in and around the towns of Pofadder, Keimoes, and Kakamas where possible.	EPC contractor	Before construction phase
Identify local contractors who are qualified to undertake the required work and afford them the opportunity to tender for opportunities.	!KaXu CSP, and EPC contractor	Before construction phase commences
Develop a Code of Conduct to cover the activities of the	!KaXu CSP and,	Before

Mitigation: Action/Control	Responsibility	Timeframe
construction workers housed on the site.	EPC contractor	construction phase commences
Ensure that construction workers attend a briefing 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.	!KaXu CSP, and EPC contractor	Before construction phase commences
Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	EPC contractor	Before construction phase commences
On completion of the construction phase all construction workers must leave the site.	EPC Contractor	At the end of the construction phase
<u>Implement an HIV/AIDS awareness and prevention plan (refer to Appendix F)</u>	<u>EPC Contractors</u>	<u>Construction Phase</u>

Performance Indicator	Code of Conduct drafted before commencement of construction phase; Briefing session with construction workers held at outset of construction phase.
Monitoring	Appointed ECO must monitor indicators listed above.

OBJECTIVE: Avoid and or minimise potential impacts of the activities during the construction on the safety of local communities and the potential damage to farm infrastructure

Project Component/s	Construction and establishment activities associated with the establishment of the solar thermal plant, including infrastructure etc.
Potential Impact	Impact on safety of farmers and communities (increased crime etc) and potential damage to farm infrastructure, such as gates and fences.
Activities/Risk Sources	The presence of construction workers on the site can in theory pose a potential safety risk to local farmers and communities. The activities of construction workers may also result in damage to farm infrastructure.
Mitigation: Target/Objective	To avoid and or minimise the potential impact on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
The housing of construction workers on the site should be limited to critical and security personnel.	EPC contractor	Construction phase

Mitigation: Action/Control	Responsibility	Timeframe
Develop a Code of Conduct for construction workers.	EPC contractor, and !KaXu CSP	Develop Code of Conduct prior to commencement of construction phase.
Inform all workers of the conditions contained in the Code of Conduct.	EPC contractor	Inform all construction workers of Code of Conduct requirements before construction phase commences
<u>Implement an appropriate security protocol and plan during construction (refer to Appendix G)</u>	<u>EPC Contractors</u>	<u>Construction phase</u>

Performance Indicator	Code of Conduct developed and approved prior to commencement of construction phase. All construction workers made aware of Code of Conduct within first week of being employed.
Monitoring	Appointed ECO must monitor indicators listed above.

OBJECTIVE: Avoid and or minimise the potential risk of veld fires during the construction phase

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

Mitigation: Action/Control	Responsibility	Timeframe
<u>Ensure that open fires on the site are not permitted.</u>	EPC Contractors	Construction Phase
<u>Ensure construction personnel are aware of the consequences of starting a fire on site to avoid</u>	<u>EPC Contractors</u>	<u>Construction Phase</u>

Mitigation: Action/Control	Responsibility	Timeframe
<u>damage to neighbouring farms</u>		
Provide adequate fire fighting equipment onsite.	EPC contractor	Outset of the construction phase
Provide fire-fighting training to selected construction staff.	EPC contractor	Before the construction phase commences
<u>Implement the fire management plan as compiled for the project (refer to Appendix H)</u>	<u>EPC Contractors</u>	<u>Construction Phase</u>

Performance Indicator	Conditions contained in the Construction EMP. 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	Appointed ECO must monitor indicators listed above.

OBJECTIVE: Avoid and or minimise potential impacts of safety, noise and dust and damage to roads caused by construction vehicles

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

Mitigation: Action/Control	Responsibility	Timeframe
Implement dust suppression measures for heavy vehicles such as wetting roads on a regular basis when required by climatic conditions, such as strong wind conditions and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers if wind conditions necessitate such.	EPC contractor	Pre-construction and during construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that all vehicles are road-worthy, drivers are qualified and are made aware of the potential noise, dust and safety issues.	EPC contractor	Pre-construction and during construction
Ensure that drivers adhere to speed limits.	EPC contractor	Construction phase
Ensure that damage to roads is repaired before completion of construction phase	EPC contractor	Prior to completion of construction phase

Performance Indicator	<p>Conditions included in the Construction Phase EMP.</p> <p>Dust suppression measures implemented for all heavy vehicles that require such measures during the construction phase commences.</p> <p>Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed.</p> <p>Road worthy certificates in place for all heavy vehicles at outset of construction phase.</p>
Monitoring	Appointed ECO must monitor indicators to ensure that they have been met for the construction phase.

OBJECTIVE: Avoid and or minimise potential impacts on current and future farming activities during the construction phase

Project Component/s	Construction phase activities associated with the establishment of the solar thermal plant and associated infrastructure.
Potential Impact	The footprint of the solar energy plant and associated infrastructure will result in a loss of land that will impact on farming activities on the site.
Activities/Risk Sources	The footprint taken up by the solar energy plant and associated infrastructure.
Mitigation: Target/Objective	To minimise the loss of land taken up by the solar facility and associated infrastructure and to enable farming activities to continue where possible, specifically grazing.

Mitigation: Action/Control	Responsibility	Timeframe
Minimise the footprint of the facility and the associated infrastructure.	!KaXu CSP, and EPC contractor	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Rehabilitate disturbed areas on completion of the construction phase.	EPC contractor	Duration of construction

Performance Indicator	Footprint of solar thermal plant included in the Construction Phase EMP.
Monitoring	ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Management of dust and air emissions

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

Project Component/s	Construction and establishment activities associated with the establishment of the solar energy facility and associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents and visibility. » Release of minor amounts of air pollutants (for example NO₂, CO and SO₂) from vehicles and construction equipment.
Activities/Risk Sources	<ul style="list-style-type: none"> » Clearing of vegetation and topsoil. » Excavation, grading, scraping, levelling, digging, drilling. » Transport of materials, equipment and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning vehicle and construction engines.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure emissions from all vehicles and construction engines are minimised, where possible, for the duration of the construction phase. » To minimise nuisance to the community from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.

Mitigation: Action/Control	Responsibility	Timeframe
Roads must be maintained to a manner that will ensure that nuisance to the community from dust emissions from road or vehicle sources is not visibly excessive	EPC contractor	Site establishment

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that damage to roads is repaired before completion of construction phase.		Duration of construction
Appropriate dust suppressant must be applied on all exposed areas and stockpiles as and where required to minimise/control airborne dust.	EPC contractor	Duration of contract
Haul vehicles moving outside the construction site carrying material that can be wind-blown must be covered with tarpaulins when required by the wind conditions.	EPC contractor	Duration of contract
Speed of construction vehicles must be restricted, as defined by the ECO.	EPC contractor	Duration of contract
The frequency of application of dust control/suppressants may have to be increased during periods of high winds if visible dust is blowing toward nearby residences.	EPC contractor	Duration of contract
Strictly control vibration pollution from compaction plant or excavation plant.	EPC contractor	Duration of contract
Disturbed areas must be re-vegetated as soon as practicable.	EPC contractor	Completion of the construction phase
Vehicles and equipment must be maintained in a road-worthy condition at all times.	EPC contractor	Duration of contract
If monitoring results or complaints indicate inadequate performance against the criteria indicated, then the source of the problem must be identified, and existing procedures or equipment modified to ensure the problem is rectified.	EPC contractor	Duration of contract

Performance Indicator	<ul style="list-style-type: none"> » No complaints from affected residents or community regarding dust or vehicle emissions. » Dust suppression measures implemented for all heavy vehicles that require such measures, if necessitated by the climatic conditions, 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.
Monitoring	<ul style="list-style-type: none"> » Monitoring must be undertaken to ensure emissions are not exceeding the prescribed levels via the following methods: » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » A complaints register must be maintained, in which any complaints from residents/the community will be logged, thereafter complaints will be investigated and, where appropriate, acted upon. » An incident reporting system must be used to record non-

conformances to the EMP.

OBJECTIVE: Control loss of indigenous vegetation

Project Component/s	Any infrastructure or activity that will result in disturbance to natural areas.
Potential Impact	Loss of indigenous natural vegetation due to construction activities.
Activity/Risk Source	<ul style="list-style-type: none"> » Vegetation clearing. » Construction of access roads. » Placement of power line and cables. » Construction/placement of water pipeline, storage/treatment reservoirs. » Establishment of borrow and spoil areas. » Chemical contamination of the soil by construction vehicles and machinery. » Operation of construction camps. » Storage of materials required for construction.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To retain natural vegetation in the highly sensitive areas of the site. » To minimise footprints of disturbance of vegetation/habitats on-site. » To minimise loss of indigenous vegetation. » No loss of species of conservation concern.

Mitigation: Action/Control	Responsibility	Timeframe
<u>Clearance of indigenous vegetation must be kept to a minimum and rehabilitation of the cleared areas must start as soon as possible.</u>	<u>EPC Contractor</u>	<u>Construction phase</u>
<u>All species of special concern (SSC) must be identified and every effort must be made to rescue them.</u>	<u>EPC Contractor Specialist</u>	<u>Construction phase</u>
<u>The <i>Aloe Dichotoma</i> tree is endemic to the Northern Cape. Cape must be taken as to not damage these trees. If removal of these trees must be done, the necessary permits must be obtained from the relevant Department.</u>	<u>EPC Contractor Specialist</u>	<u>Construction phase</u>
The construction impacts must be contained to the footprint of the infrastructure.	EPC contractor	Construction phase
Limit unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld, use access roads only.	EPC contractor	Construction phase
<u>Disturbed areas must be rehabilitated as soon as possible once construction is completed in an area.</u>	<u>EPC contractor</u>	<u>Construction phase</u>

Performance Indicator	Loss of natural vegetation equivalent to the exact footprint of the proposed project.
Monitoring	Before construction, determine required number of hectares to accommodate footprint of proposed infrastructure. After construction, determine amount of natural vegetation lost due to construction.

OBJECTIVE: Control the establishment and spread of alien invasive plants

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

Mitigation: Action/Control	Responsibility	Timeframe
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.	EPC contractor, and !KaXu CSP	Construction, and operational phase
<u>An alien invasive management plan must be compiled and implemented during construction and operation of the facility. The plan must include mitigation measures to reduce the invasion of alien species and ensure that the continuous monitoring and removal of alien species is undertaken.</u>	<u>EPC Contractor</u>	<u>Construction phase</u> <u>Operational phase</u>
Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act).	EPC contractor, and !KaXu CSP	Construction, and operational phase
Immediately control any alien plants that become established using registered control methods.	EPC contractor, and !KaXu CSP	Construction, and operational phase

Performance Indicator	For each alien species: number of plants and aerial cover of plants within project area and immediate surroundings.
Monitoring	» On-going monitoring of area by ECO during construction.

	<ul style="list-style-type: none"> » On-going monitoring of area by environmental manager during operation. » If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants, following which the species should be controlled using registered control methods. <p>The environmental manager should be responsible for driving this process.</p>
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OBJECTIVE: Limit damage to drainage lines in terms of ecology

Project Component/s	Any infrastructure or activity that will result in disturbance to watercourses.
Potential Impact	Damage to watercourses by any means that will result in hydrological changes (includes erosion, siltation, dust, direct removal of soil of vegetation, dumping of material within wetlands). The focus should be on the functioning of the watercourse as a natural system.
Activity/Risk Source	Construction and operation of the facility.
Mitigation: Target/Objective	No unnecessary damage to watercourse areas within project area.

Mitigation: Action/Control	Responsibility	Timeframe
For any new construction, cross watercourses perpendicularly to minimise disturbance footprints.	EPC contractor, and ECO	Construction, and operational phase
Rehabilitate any disturbed areas as quickly as possible.	EPC contractor, and ECO	Construction, and operational phase
Control storm water and runoff water.	EPC contractor, and ECO	Construction, and operational phase
Obtain a permit from DWA to impact on any wetland or water resource.	EPC contractor, and ECO	Construction, and operational phase

Performance Indicator	No impacts on water quality, water quantity, wetland vegetation, natural status of watercourses outside of footprint of infrastructure.
Monitoring	Habitat loss in watercourses should be monitored before and after construction.

The environmental manager should be responsible for driving this process.

OBJECTIVE: Soil and rock degradation and erosion control

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. 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 excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems. Degradation of parent rock is considered low as there are few deep excavations envisaged.

Project Component/s	<ul style="list-style-type: none"> » Heliostat field and power tower, parabolic troughs, and PV panels. » Power islands. » Power line. » Water pipeline and water storage/treatment reservoirs. » Offices & workshops.
Potential Impact	<ul style="list-style-type: none"> » Soil and rock degradation. » Soil erosion. » Increased deposition of soil into drainage systems. » Increased run-off over the site.
Activities/Risk Sources	<ul style="list-style-type: none"> » Construction activity – removal of vegetation, excavation, stockpiling, compaction and pollution of soil. » Rainfall - water erosion of disturbed areas. » Wind erosion of disturbed areas. » Concentrated discharge of water from construction activity.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise extent of disturbance areas. » To minimise activity within disturbance areas. » To minimise soil degradation (mixing, wetting, compaction, etc). » To minimise soil erosion. » To minimise deposition of soil into drainage lines. » To minimise instability of embankments/excavations.

Mitigation: Action/Control	Responsibility	Timeframe
Restrict construction activity within disturbance areas.	ECO and EPC contractor	Before and during construction
Access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary	ECO and EPC contractor	Before and during

Mitigation: Action/Control	Responsibility	Timeframe
excavation, placement, and compaction of soil.		construction
Dust control on construction site: wetting of denuded areas, where and when required.	ECO and contractor	EPC During construction
Minimise removal of vegetation which adds stability to soil.	ECO and contractor	EPC During construction
Rehabilitate disturbance areas as soon practicable when an area is vacated.	ECO and contractor	EPC During and after construction
Soil conservation: Stockpile topsoil for re-use in rehabilitation phase, protect stockpile from erosion.	ECO and contractor	EPC Before and during construction
Erosion control measures: Run-off attenuation on slopes (sand bags, logs), silt fences, stormwater catch-pits, shade nets, or temporary mulching over denuded area as required.	ECO and contractor	EPC Before and during construction Maintenance for duration of contract
Where access roads cross natural drainage lines, culverts must be designed to allow free flow and regular maintenance must be carried out.	ECO and contractor	EPC Before and during construction Maintenance for duration of contract
Control depth of excavations and stability of cut faces/sidewalls.	ECO and contractor	EPC Before and during construction Maintenance for duration of contract
<u>Compile and implement an erosion management plan for monitoring and rehabilitating erosion events associated with the facility. Appropriate erosion mitigation must form part of this plan to prevent and reduce the risk of any potential erosion.</u>	<u>EPC Contractor</u>	<u>Before construction</u> <u>Maintenance</u> <u>Duration of contract</u>

Performance Indicator	<ul style="list-style-type: none"> » No activity outside disturbance areas. » Acceptable level of activity within disturbance areas, as determined by ECO. » Acceptable level of soil erosion around site, as determined by ECO. » Acceptable level of increased siltation in drainage lines, as determined by ECO. » Acceptable level of soil degradation, as determined by ECO. » Acceptable state of excavations, as determined by ECO. » No activity in restricted areas.
Monitoring	<ul style="list-style-type: none"> » Monthly inspections of the site. » Monthly inspections of sediment control devices.

- » Monthly inspections of surroundings, including drainage lines.
- » Immediate reporting of ineffective sediment control systems.
- » An incident reporting system will record non-conformances.

OBJECTIVE: Minimise river system erosion and downstream sedimentation

Project Component/s	Poor stormwater management and the alteration of the hydrological regime. Placement of access roads, pipelines, and dams off-site.
Potential Impact	Risk of river system erosion and downstream sedimentation.
Activities/Risk Sources	Placement of hard engineered surfaces.
Mitigation: Target/Objective	Minimise the potential impact by the supporting infrastructure on the riparian systems.

Mitigation: Action/Control	Responsibility	Timeframe
<p>Any stormwater within the site will be handled in a suitable manner, i.e. clean and dirty water streams around the plant will be separated and install stilling basins to capture large volumes of run-off, trapping sediments and reduce flow velocities (i.e. water used when washing the mirrors).</p> <p>The placement of pump inlets and the supporting infrastructure to prevent the potential for scour / erosion and downstream sedimentation of the Orange River.</p> <p>The current placement is within an area of dense reed growth (<i>Phragmites australis</i>), and would not be considered a severe impact. Care should however be taken that if any clearing is done, that this area is monitored for plant re-growth, firstly to prevent alien plant infestations and to ensure no erosion or scour takes place.</p>	EPC contractor	Planning, design, construction and operation phase

Performance Indicator	Water quality and quantity management – “Water Use Licence Conditions.”
Monitoring	Surface water monitoring plan.

OBJECTIVE: Minimise river system erosion and downstream sedimentation

Project Component/s	Placement of access roads, pipelines, and dams off-site.
Potential Impact	<p>There is a high risk of elevated sediment input into the Orange River during the establishment of the water abstraction facilities on the banks and floodplains of the Orange River.</p> <p>Backwash water discharged from the sand filters could result in sediment laden water reaching the Orange River.</p> <p>Poor planning and design of new abstraction infrastructure and new flood protection measures on the floodplain, resulting in bank erosion or slumping to occur during river flooding events.</p>
Activities/Risk Sources	Design, placement, and operation of water abstraction infrastructure.
Mitigation: Target/Objective	Minimise the potential impact by the supporting infrastructure on the riparian systems.

Mitigation: Action/Control	Responsibility	Timeframe
<ul style="list-style-type: none"> » The risk of erosion and bank slumping or collapse during both pre-construction, construction work can readily be prevented by careful design and planning. » Appropriate hard-engineered bank erosion protection structures. » Careful rehabilitation using natural riparian vegetation to stabilize the riverbanks and all disturbed areas in the riparian zone. » Local stormwater run-off over the flood embankments and natural riverbanks could potentially cause erosion and subsequent bank slumping, unless stormwater drains are correctly located and designed with appropriate erosion-control features. » During construction, adjacent riparian habitats outside the "footprint" of the new infrastructure should be declared sensitive habitats and out of bounds for all construction activities and for all construction workers. 	EPC contractor	Planning, design, construction and operation phase

Performance Indicator	Water quality and quantity management – "Water Use Licence Conditions."
Monitoring	Surface water monitoring plan.

OBJECTIVE: Protection of heritage resources

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

Project Component/s	Excavation activities, construction of access roads and establishment of water supply pipeline and transmission pylons.
Potential Impact	Wider areas or extended linear developments may result in further destruction, damage, excavation, alteration, removal or collection of heritage objects from their current context on the site.
Activity/Risk Source	Activities which could impact on achieving this objective include deviation from the planned lay-out of road/s and infrastructure without taking heritage impacts into consideration.
Mitigation: Target/Objective	A facility EMP that takes cognisance of heritage resources in the event of any future extensions of roads or other infrastructure.

Mitigation: Action/control	Responsibility	Timeframe
Provision for on-going heritage monitoring which provides guidelines on what to do in the event of any major heritage feature being encountered during any phase of development or operation.	!KaXu CSP and ECO	Before commencement of development
<u>Should any archaeological sites, artefacts, palaeontological fossils or graves be exposed during construction work, work in the immediate vicinity of the find must be stopped, SAHRA informed and the services of an accredited heritage professional obtained for an assessment of the heritage resources must be made.</u>	!KaXu CSP ECO	<u>Construction phase</u>

Performance Indicator	Inclusion of further heritage impact consideration in any future extension of infrastructural elements. Immediate reporting to relevant heritage authorities of any heritage feature discovered during any phase of development or operation of the facility.
Monitoring	Officials from relevant heritage authorities (National and Provincial) to be permitted to inspect the operation on agreement with the contractor relating to the heritage component of the EMP.

OBJECTIVE: Minimisation of visual impacts associated with construction and operational phases

During the construction phase heavy vehicles, components, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users. The placement of lay-down areas and temporary construction camps should be carefully considered in order to not negatively influence the future perception of the facility. Secondary visual impacts associated with the construction phase, such as the sight of construction vehicles, dust and construction litter must be managed to reduce visual impacts. The use of dust-suppression techniques on the access roads (where required), timely removal of rubble and litter, and the erection of temporary screening will assist in doing this.

During the operational phase, mitigation of the appearance of the facility is not possible. The largest structure, being the power tower, will be impossible to hide. The 4 000 – 6 000 heliostats (at 120 m²) and their functional design cannot be changed in order to reduce visual impacts. Considering the topography of the land and the visual absorption capacity of the vegetation, very little can be done to mitigate the visual impacts caused by these structures. Furthermore, the functional design of these structures and the dimensions of the facility cannot be changed in order to reduce visual impacts. Therefore the potential for mitigation is low.

Project Component/s	Construction site, access road, and power line.
Potential Impact	The potential scarring of the landscape due to the creation of new access roads/tracks or the unnecessary removal of vegetation.
Activity/Risk Source	The viewing of the abovementioned visual scarring by observers near the solar facility.
Mitigation: Target/Objective	Minimal disturbance to vegetation cover in close vicinity to the proposed solar facility and its related infrastructure.

Mitigation: Action/Control	Responsibility	Timeframe
Implement an environmentally responsive planning approach to roads and infrastructure to limit cut and fill requirements.	EPC contractor	During construction
Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.	EPC contractor	During construction
Limit access to the construction sites (during both construction and operational phases) along existing	EPC contractor	Construction / operational

Mitigation: Action/Control	Responsibility	Timeframe
access roads.		phases
Rehabilitate all disturbed areas to acceptable visual standards.	EPC contractor	Construction and operational phases
Maintain the general appearance of the facility in an aesthetically pleasing way.	!KaXu CSP	Construction and Operational phase
<u>The visual impact of the pipeline must be mitigated by placing the pipe underground and rehabilitating the vegetation within the pipeline servitude.</u>	<u>EPC contractor</u>	<u>Construction and operational phases</u>

Performance Indicator	Vegetation cover that remains intact with unnecessary access roads or erosion scarring in close proximity of the solar facility.
Monitoring	Monitoring of vegetation clearing during the construction phase.

OBJECTIVE: The mitigation of potential visual impacts caused by the unnecessary removal of vegetation cover for the power line servitude

Project Component/s	Distribution power line servitude.
Potential Impact	The potential scarring of the landscape due to the creation of cleared cut-lines and new roads/tracks.
Activity/Risk Source	The viewing of the abovementioned cut lines/roads by observers.
Mitigation: Target/Objective	Minimal disturbance to vegetation cover in close vicinity to the proposed distribution power line.

Mitigation: Action/Control	Responsibility	Timeframe
Avoid the unnecessary removal of vegetation for the distribution power line servitudes and limit access to the servitudes (during both construction and operational phases) along existing access roads as far as possible.	EPC contractor	Construction/Operation

Performance Indicator	Vegetation cover that remains intact with no visible cut lines, access roads or erosion scarring in and around the power line servitude.
Monitoring	The monitoring of vegetation clearing during the construction and operational phases of the project.

OBJECTIVE: The mitigation and possible negation of the potential visual impact of lighting at the solar facility

Project Component/s	Solar facility lighting fixtures.
Potential Impact	The potential night time visual impact of lighting fixtures on observers.
Activity/Risk Source	The effects of glare and light trespass on motorists.
Mitigation: Target/Objective	The containment of light emitted in order to eliminate the risk of additional night time visual impacts. Optimised usage of security and other lighting.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that proper planning is undertaken regarding the placement of lighting structures Undertake regular maintenance of light fixtures.	EPC contractor and !KaXu CSP	Construction and operational phases

Performance Indicator	The effective containment of the light on the site.
Monitoring	The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.

OBJECTIVE: 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 solar 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.

Existing national roads (i.e. the N14) will be used to access the sites in conjunction with the proposed access road during construction and operational phases.

Project Component/s	<ul style="list-style-type: none"> » Heliostat field and power tower. » Parabolic troughs. » PV panels. » Power islands. » Power line. » Construction vehicles.
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Potential Impact	<ul style="list-style-type: none"> » Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Risk of accidents. » Deterioration of road pavement conditions (both surfaced and gravel road) due to abnormal loads.
Activity/Risk Source	<ul style="list-style-type: none"> » Traffic congestion increase. » Site preparation and earthworks. » Foundations or plant equipment installation. » Transportation of ready-mix cement from off-site batching plant to the site. » Mobile construction equipment movement on-site. » Power line and substation construction activities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise impact of traffic associated with the construction of the facility on local traffic. » 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 carried appropriately and within any imposed permit/licence conditions.

Mitigation: Action/Control	Responsibility	Timeframe
All relevant permits for abnormal loads must be applied for from the relevant authority.	EPC contractor	Pre-construction
A designated access to the proposed site must be created to ensure safe entry and exit.	EPC 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.	EPC contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	EPC contractor	Pre-construction
Appropriate dust suppression techniques must be used to minimise dust emissions on un-surfaced roads when and if required.	EPC contractor	Duration of contract
Times for arrival and departure of heavy vehicles must be co-ordinated to minimise congestion as is possible.	EPC contractor	Duration of contract
Any traffic delays as a result of construction traffic must be co-ordinated with the appropriate authorities.	EPC contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	EPC contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards).	EPC contractor	Duration of contract
Appropriate maintenance of all vehicles of the	EPC contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
contractor must be ensured.		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.	EPC contractor	Duration of contract
Keep hard road surfaces as narrow as possible.	EPC contractor	Duration of contract
Prevent damage to roads by construction vehicles.	EPC contractor	Duration of contract
<u>Compile and implement a traffic management plan for the site access road to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. This plan must include measures to minimise impacts on local commuters.</u>	<u>EPC Contractor</u>	<u>Construction</u>

Performance Indicator	No traffic incidents involving !KaXu CSP personnel or appointed contractors. Appropriate signage in place. No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the solar energy facility.
Monitoring	Visual monitoring of dust produced by traffic movement. Visual monitoring of traffic control measures to ensure they are effective A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. An incident reporting system will be used to record non-conformances to the EMP.

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

The construction phase will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents (refer to Appendix I). The main wastes expected to be generated by the construction of the facility will include general solid waste, hazardous waste and liquid waste.

Comprehensive fire and emergency procedures must be established for use during construction and operational phases of the project. Personnel must be trained to respond to veld fires in order to control them as quickly as possible.

Project Component/s	Storage and handling of chemicals, hazardous substances and waste.
Potential Impact	<ul style="list-style-type: none"> » Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices. » Pollution of water and soil resources.
Activity/Risk Source	<ul style="list-style-type: none"> » Vehicles associated with site preparation and earthworks. » Power line construction activities. » Substation construction activities. » Packaging and other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » 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. » To comply with waste management guidelines. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	EPC contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is received, 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.	EPC contractor	Duration of contract
<u>Implement an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.</u>	<u>EPC Contractor</u>	<u>Duration of contract</u>
<u>Leakage of fuels must be avoided at all times and if spillage occurs, it must be remediated immediately.</u>	<u>EPC Contractor</u>	<u>Duration of contract</u>
In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.	EPC contractor	Duration of contract

Mitigation: Action/Control	Responsibility	Timeframe
Spilled cement must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	EPC contractor	Duration of contract
Any contaminated/polluted soil removed from the site must be disposed of at a licensed hazardous waste disposal facility.	EPC contractor	Duration of contract
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.	EPC contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface.	EPC contractor	Duration of contract
<u>Areas around fuel tanks must be banded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1.</u>	<u>EPC Contractor</u>	<u>Duration of contract</u>
Fuel storage areas must be inspected regularly to ensure bund stability, integrity, and function.	EPC contractor, and ECO	Duration of contract
Construction machinery must be stored in an appropriately sealed area.	EPC contractor	Duration of contract
Oily water from bunds at the substations must be removed from site by licensed contractors.	Contractors	Duration of contract
The storage of flammable and combustible liquids such as oils will be in designated areas which are appropriately banded, and stored in compliance with MSDS files.	EPC contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals will be compiled with.	EPC contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	EPC contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	EPC contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste as required. Location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	EPC contractor	Duration of contract
Where practically possible, construction and general	EPC contractor	Duration of

Mitigation: Action/Control	Responsibility	Timeframe
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.).		contract
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors <u>and disposal at appropriately licensed waste disposal sites.</u>	EPC contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area.	EPC contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	EPC contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature, and fate of any regulated waste. Waste disposal records must be available for review at any time.	EPC contractor / ECO	Duration of contract
An incident/complaints register must be established and maintained on-site.	EPC contractor / ECO	Duration of contract
The sediment control and water quality structures used on-site must be monitored and maintained in a fully operational state at all times.	EPC contractor	Duration of contract
<u>An integrated waste management approach that is based on waste minimisation must be used and must incorporate reduction, recycling, re-use and disposal where appropriate. A waste management plan must be implemented for the duration of construction (refer to Appendix J).</u>	<u>EPC Contractor</u>	<u>Duration of contract</u>
Upon the completion of construction, the area must be cleared of potentially polluting materials.	EPC contractor	Completion of construction

Performance Indicator	<p>No chemical spills outside of designated storage areas.</p> <p>No water or soil contamination by spills.</p> <p>No complaints received regarding waste on site or indiscriminate dumping.</p> <p>Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately.</p> <p>Provision of all appropriate waste manifests for all waste streams.</p>
Monitoring	<p>Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase.</p> <p>A complaints register must be maintained, in which any complaints from the community will be logged.</p> <p>Observation and supervision of waste management practices throughout construction phase.</p> <p>Waste collection will be monitored on a regular basis.</p>

	<p>Waste documentation completed.</p> <p>A complaints register will be maintained, in which any complaints from the community will be logged.</p> <p>Complaints will be investigated and, if appropriate, acted upon</p> <p>An incident reporting system will be used to record non-conformances to the EMP.</p>
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OBJECTIVE: Ensure disciplined conduct of on-site contractors and workers

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

Project Component/s	<ul style="list-style-type: none"> » Heliostat field and power tower. » Parabolic troughs. » PV panels. » Power islands. » Power line. » All associated infrastructure
Potential Impact	<p>Pollution/contamination of the environment.</p> <p>Disturbance to the environment.</p>
Activity/Risk Source	<p>Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment.</p>
Mitigation: Target/Objective	<p>To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.</p>

Mitigation: Action/Control	Responsibility	Timeframe
The terms of this EMP and the Environmental Authorisation (once issued) will be included in all tender documentation and Contractors contracts.	!KaXu CSP and EPC contractor	Tender process
<u>Implement Health and Safety Plan (refer to Appendix K)</u>	<u>!KaXu CSP</u>	<u>Duration of construction</u>
An ECO must be on site throughout the road construction, pipe laying, line construction and foundation excavation periods, and at other times should visit the site at least once a month.	!KaXu CSP	Duration of construction

Mitigation: Action/Control	Responsibility	Timeframe
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no ablution activities will be permitted outside the designated area. 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.	EPC contractor	Duration of contract
Cooking/meals must take place in a designated area No firewood or kindling may be gathered from the site or surrounds.	EPC contractor	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	EPC contractor	Duration of contract
No one other than the ECO or personnel authorised by the ECO must disturb flora or fauna outside of the demarcated construction area/s.	EPC contractor	Duration of contract
Contractors appointed by !KaXu CSP must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct and trespassing on adjacent farms.	EPC contractor	Construction
On completion of the construction phase all construction workers must leave the site.	EPC contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » Compliance with specified conditions of Environmental Authorisation, EIA report and EMP. » No complaints regarding contractor behaviour or habits. » Fire fighting equipment and training provided before the construction phase commences. » Code of Conduct drafted before commencement of construction phase Briefing session with construction workers held at outset of construction phase.
Monitoring	<ul style="list-style-type: none"> » Observation and supervision of Contractor practices throughout construction phase. » A complaints register will be maintained, in which any complaints from the community will be logged. » Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE: Fencing of development footprints in sensitive areas is in order to minimise disturbance to adjacent sensitive areas

Project Component/s	<ul style="list-style-type: none"> » Heliostat field and power tower. » Parabolic troughs. » PV panels. » Power islands. » Power line. » Water supply pipeline and water storage/treatment reservoirs. » All associated infrastructure.
Potential Impact	<p>Unnecessary damage to indigenous natural vegetation. Loss of threatened plant species and protected tree species.</p>
Activity/Risk Source	<p>Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment.</p>
Mitigation: Target/Objective	<ul style="list-style-type: none"> » No loss of or damage to sensitive vegetation in areas outside immediate development footprint. » Less than 10 ha (1%) of construction related disturbance in sensitive areas outside fenced footprints; measured monthly during duration of construction.

Mitigation: Action/Control	Responsibility	Timeframe
<p>Wire fencing around all development footprints in areas of natural vegetation as determined by the ecological specialist. The wire to be inter-threaded with danger tape, and signage saying "Sensitive Area – Keep Out / Sensitiewe Gebied – Bly Weg" placed on fences at appropriate intervals.</p>	!KaXu CSP and ECO	To be completed prior to construction activities

Performance Indicator	No damage to surrounding natural vegetation.
Monitoring	<ul style="list-style-type: none"> » ECO to monitor all construction areas until all construction is completed » An incident reporting system will be used to record non-conformances to the EMP.

OBJECTIVE: Search and rescue of all indigenous plants from development footprints

Project Component/s	<ul style="list-style-type: none"> » Heliostat field and power tower. » Parabolic troughs.
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	<ul style="list-style-type: none"> » PV panels. » Power islands. » Power line. » Water supply pipeline and water storage/treatment reservoirs. » All associated infrastructure.
Potential Impact	Unnecessary damage to indigenous natural vegetation. Loss of threatened plant species.
Activity/Risk Source	Contractors are not aware of the requirements of the EMP, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » No loss of or damage to sensitive vegetation in areas outside immediate development footprint. » Less than 10 ha (1%) of construction related disturbance in sensitive areas outside fenced footprints, measured monthly during duration of construction.

Mitigation: Action/Control	Responsibility	Timeframe
Search and Rescue to be completed in all areas of natural vegetation prior to any construction related activities in these areas. General items that can be considered for rescue are all bulbs and tuberous species (including <i>Haemanthus</i> , <i>Brunsvigia</i> , <i>Babiana</i> , <i>Trachyandra</i> , <i>Albuca</i> , <i>Veltheimia</i> , <i>Arctopus</i> , etc.), plus selected specimens of succulents such as <i>Ruschia</i> and <i>Lampranthus</i> species. Material to be bagged up or stored in suitable conditions; to be replanted in areas requiring rehabilitation following cessation of all construction related disturbance in particular area.	!KaXu CSP and ECO	To be completed prior to construction activities

Performance Indicator	No damage to surrounding natural vegetation.
Monitoring	<ul style="list-style-type: none"> » ECO to monitor and conduct search and rescue until construction is completed. » An incident reporting system will be used to record non-conformances to the EMP.

7.3. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the Solar Energy Facility

As the proponent, !KaXu CSP must ensure that the implementation of the solar energy facility complies with the requirements of any and all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMP, and the implementation of the EMP through its integration into the contract documentation. !KaXu CSP will retain various key roles and responsibilities during the construction of the solar energy facility. These are outlined below.

OBJECTIVE: To establish clear reporting, communication, and responsibilities in relation to environmental incident

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

The **Project Manager** will:

- » Ensure that all specifications and legal constraints specifically with regards to the environment are highlighted to the EPC Contractor(s) so that they are aware of these
- » Ensure that the EPC Contractor(s) are made aware of all stipulations within the EMP
- » Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings with the site Manager, ECO and EPC Contractor. This will be documented as part of the site meeting minutes
- » Be fully conversant with the EIA for the project, the EMP, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation

The **Site Manager** (!KaXu CSP's on-site representative) will:

- » Be fully knowledgeable with the contents of the EIA
- » Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued)
- » Be fully knowledgeable with the contents of the EMP
- » Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these
- » Have overall responsibility of the EMP and its implementation
- » Conduct audits to ensure compliance to the EMP
- » Ensure there is communication with the Project Manager, the ECO, and relevant discipline engineers on matters concerning the environment.
- » Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site
- » Confine activities to the demarcated construction site

An independent **Environmental Control Officer** (ECO) must be appointed by !KaXu CSP prior to the commencement of any authorised activities. The **ECO** will be responsible for monitoring, reviewing, and verifying compliance by the EPC Contractor

with the environmental specifications of the EMP and the conditions of the Environmental Authorisation. The ECO will:

- » Be fully knowledgeable with the contents with the EIA.
- » Be fully knowledgeable with the contents with the conditions of the Environmental Authorisation (once issued)
- » Be fully knowledgeable with the contents with the EMP
- » Be fully knowledgeable with the contents with all relevant environmental legislation, and ensure compliance with them
- » Ensure that the contents of this document are communicated to the EPC Contractor site staff and that the Site Manager and EPC Contractor are constantly made aware of the contents through discussion
- » Ensure that the compliance of the EMP is monitored through regular and comprehensive inspection of the site and surrounding areas
- » Ensure that if the EMP conditions or specifications are not followed then appropriate measures are undertaken to address this
- » Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible
- » Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements
- » Ensure that activities on site comply with all relevant environmental legislation.
- » Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMP
- » Ensure that the compilation of progress reports takes place on a regular basis and are signed off by the Site Manager, 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 to the site manager and project manager immediately
- » Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

As a general mitigation strategy, the Environmental Control Officer (ECO) should be present full-time on site for:

- » facilitate environmental induction with construction staff, and
- » the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas,
- » supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations).
- » Excavation, levelling and terracing for all infrastructure footprints (as indicated in the layout in Appendix B).

- » monitoring of linear infrastructure construction activities (pipeline, power line and access road),

The ECO shall remain on site on a full-time basis until the end of Phase 4 as per the Project Management Plan included in Appendix C.

Thereafter, monthly or bi-weekly site compliance inspections would probably be sufficient, reducing as construction proceeds, provided compliance is maintained. However, in the absence of the ECO there should be a designated environmental officer present to deal with any environmental issues that may arise such as fuel or oil spills.

The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

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

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

An Environmental Plan to which EPC contractors should adhere has been developed by the developer (refer to Appendix L).

7.4. Detailing Method Statements

OBJECTIVE: Ensure all construction activities/practices/procedures are undertaken with the appropriate level of environmental awareness to minimise environmental risk, in line with the specifications of the EMP

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

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

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

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

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

The ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

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

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

To achieve effective environmental management, it is important that EPC Contractor is aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. The EPC 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 EPC Contractors obligations in this regard include the following:

- » Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- » Ensuring that a copy of the EMP is readily available on-site, and that all site staff are aware of the location and have access to the document.
- » Employees will be familiar with the requirements of the EMP and the environmental specifications as they apply to the construction of the facility.
- » Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session.
- » The training session 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 to be necessary by the ECO.
- » Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" are erected at prominent locations throughout the site.
- » Records must be kept of those that have completed the relevant session.
- » Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.

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

describing their obligations towards environmental controls and methodologies in terms of this EMP. This training and awareness will be achieved in the following ways:

7.5.1. Environmental Awareness Training

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

7.5.2. Induction Training

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

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

7.5.3. Toolbox Talks

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

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

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

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been

accounted for in the EMP that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, !KaXu CSP through the Site Manager will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Project Manager will ensure that the monitoring is conducted and reported.

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

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

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

7.6.1. Non-Conformance Reports

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

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

7.6.2. Monitoring Reports

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

7.6.3. Final Audit Report

A final environmental audit report must be submitted to DEA upon completion of the construction and rehabilitation activities. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMP.

MANAGEMENT PLAN FOR THE SOLAR ENERGY FACILITY: CHAPTER 8 REHABILITATION OF DISTURBED AREAS

8.1. Overall Goal for the Rehabilitation of Disturbed Areas

Overall Goal for the Rehabilitation of Disturbed Areas: Undertake the rehabilitation measures in a way that:

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

8.2. Objectives

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

***OBJECTIVE:** To ensure appropriate rehabilitation of disturbed areas following the execution of the works, 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.

The main areas requiring rehabilitation will be the disturbed areas around the footprint of the solar array and the power islands, any cable routings where these fall outside the above-mentioned areas, and disturbed areas around the substation and maintenance building, disturbed areas associated with the power line tower foundations, water supply pipeline and associated water storage/treatment reservoirs, and access roads.

Project Component/s	Components of the solar energy facility (including temporary access roads and construction areas). Power islands and associated service roads. Water supply pipeline and water storage/treatment reservoirs. Power line servitude.
Potential Impact	Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention..
Activity/Risk	Temporary construction areas.

Source	Temporary access roads/tracks. Other disturbed areas/footprints.
Mitigation: Target/Objective	To ensure and encourage site rehabilitation of disturbed areas. To 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.	EPC contractor	Following execution of the works
All temporary fencing and danger tape must be removed once the construction phase has been completed.	EPC contractor	Following completion of construction activities in an area
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	EPC contractor	Following completion of construction activities in an area
A rehabilitation plan should be drawn up that specifies the rehabilitation process and should be approved by the ECO.	EPC contractor, !KaXu CSP and ECO	Pre-construction
Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local seed mix. Re-use of native/indigenous plant species removed from disturbance areas in the rehabilitation phase to be determined by the ECO.	EPC contractor, ECO	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.	!KaXu CSP, ECO	Post-rehabilitation
Erosion control measures should be used in sensitive areas such as steep slopes, hills and drainage lines where necessary.	!KaXu CSP, ECO	Post-rehabilitation
On-going alien plant monitoring and removal must be undertaken on all areas of natural vegetation on an annual basis.	!KaXu CSP, ECO	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 temporarily utilised areas. Disturbed areas rehabilitated and acceptable plant cover achieved on
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	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 PLAN FOR THE SOLAR ENERGY FACILITY: CHAPTER 9 OPERATION

9.1. Overall Goal for Operation

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

- » Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
- » Enables the solar energy facility operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
- » Minimises impacts on birds and other fauna using the site.
- » Monitors and evaluates the impacts of the solar energy facility on birds that frequent the area, in particular monitoring of bird collisions and interactions with the facility, electrocutions and nesting activities.
- » Establishes an environmental baseline for solar energy facility sites in South Africa, particularly with regard to priority bird species using the site.

9.2. Objectives

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

OBJECTIVE: To establish clear reporting, communication and responsibilities in relation to environmental incident

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

The Power Station Manager will:

- » Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMP.
- » Conduct annual basis reviews of the EMP to evaluate its effectiveness.

- » Take appropriate action as a result of findings and recommendations in management reviews and audits.
- » Provide forums to communicate matters regarding environmental management.

The Environmental Manager will:

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

OBJECTIVE: Protection of indigenous natural vegetation

Indirect impacts on vegetation during operation could result from maintenance activities and the movement of people and vehicles on site.

Project component/s	Components of the solar energy facility. Power islands and associated service roads. Water supply pipeline and water storage/treatment reservoirs. Power line servitude.
Potential Impact	Disturbance to or loss of vegetation and/or habitat.
Activity/Risk Source	Movement of employee vehicles within and around site.
Mitigation: Target/Objective	To maintain minimised footprints of disturbance of vegetation/habitats on-site. To ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways.	!KaXu CSP	Operation
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	!KaXu CSP	Operation
An on-going weed monitoring and eradication programme must be implemented, where necessary.	!KaXu CSP	Operation
An environmental manager must be appointed during operation whose duty it will be to minimise impacts on surrounding sensitive habitats.	!KaXu CSP	Operation

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

OBJECTIVE: Maintenance of rehabilitated areas

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. Fire breaks should be established, where appropriate, to limit both incoming and outgoing veld fires.

Project Component/s	Components of the solar energy facility. Power islands and associated service roads. Water supply pipeline and water storage/treatment reservoirs. Power line servitude.
Potential Impact	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	Constructions areas. Access roads. Other disturbed areas.
Mitigation: Target/Objective	To ensure and encourage site rehabilitation of disturbed areas.

Mitigation: Action/Control	Responsibility	Timeframe
A botanist familiar with the vegetation of the area should monitor the rehabilitation success and alien plant removal on an annual basis.	!KaXu CSP and specialist	Annual monitoring until successful re-establishment of vegetation in an area
Fire breaks should be established, where appropriate and applicable.	!KaXu CSP	Duration of contract
Appoint an environmental manager during operation whose duty it will be to minimise impacts on surrounding sensitive habitats.	!KaXu CSP	Operation

Performance Indicator	Successful rehabilitation of disturbed areas.
Monitoring	On-going alien plant monitoring and removal should be undertaken on an annual basis.

OBJECTIVE: Protection of terrestrial fauna and habitats

Indirect impacts on terrestrial fauna during operation could include disturbance and further habitat destruction because of maintenance activities and the movement of people and vehicles on site, and direct fatalities from vehicle movements on-site.

Project Component/s	Solar energy facility (including access roads). Power islands. Power line, pipeline, and access road servitudes.
Potential Impact	Disturbance to or loss of fauna and/or habitat. Direct mortalities.
Activity/Risk Source	Movement of vehicles within and around site. Power lines, water supply pipeline and access roads.
Mitigation: Target/Objective	To keep number of vehicle movements to a minimum. To maintain minimised footprints of disturbance of vegetation/habitats on-site. To ensure and encourage site rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements restricted to designated roadways.	!KaXu CSP	Operation
Appoint an environmental manager during operation	!KaXu CSP	Operation

whose duty it will be to minimise impacts on surrounding sensitive habitats.		
Adherence to reduced vehicle speeds (as prescribed by the environmental manager) by any vehicles moving on the site to reduce potential for direct mortalities.	!KaXu CSP	Operation

Performance Indicator	No further disturbance to faunal populations on the site. Continued improvement of faunal protection efforts.
Monitoring	Observation and recording of mortalities associated with the solar energy facility.

OBJECTIVE: Protection of avifauna and priority bird species

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

Due to the low overall significance of the potential impacts on avifauna, the implementation of a monitoring programme, such as the type required and usually specified for a wind energy facility, would not be required.

Project Component/s	Power line.
Potential Impact	Collision and electrocution events with the overhead power line.
Activities/Risk Sources	Overhead power line.
Mitigation: Target/Objective	To maintain a low number of collision and electrocution events.

Mitigation: Action/Control	Responsibility	Timeframe
Fit the earth wire with bird marking/deterrent devices (i.e. in defined problem areas) which have proved to be extremely effective in preventing bird collisions by making the line more visible.	EPC contractor and !KaXu CSP	Construction
The power line should be kept as low as possible taking into account engineering and legal requirements.	EPC contractor	Construction
The span lengths should be kept as short as possible taking into account engineering and legal requirements.	EPC contractor	Construction
Notes of electrocution and collision events must be sent	!KaXu CSP	Operation

Mitigation: Action/Control	Responsibility	Timeframe
to a qualified Ornithologist for the recommendation of further mitigation measures.		

Performance Indicator	Zero collision or electrocution events.
Monitoring	Observation of electrocution or collision events with the power line Monitor power line servitude for.

OBJECTIVE: Minimisation of visual impacts

The placement of the solar energy facility and its associated infrastructure will have a visual impact on the natural scenic resources and rural character of this region. The rural and relatively unspoilt wide-open vistas surrounding the solar energy facility will be transformed for the entire operational lifespan (approximately 30 years plus any extensions) of the plant.

The primary visual impact, namely the appearance and dimensions of the solar energy facility (i.e. mainly the power tower) is not possible to mitigate to any significant extent within this landscape. The functional design of the structures and the dimensions of the facility cannot be changed in order to reduce visual impacts. Due to the nature of the area within which the facility is planned, there are only a few potentially sensitive receptors.

Other impacts include impacts associated with lighting of the substation and the operational, security and safety lighting fixtures of the proposed solar energy facility will have some impact surrounding observers.

Project Component/s	Solar energy facility. Power islands and associated infrastructure. Water supply pipeline and water storage/treatment reservoirs. Power line. Operational, security and safety lighting fixtures.
Potential Impact	Risk to aircraft in terms of the potential for collision. Enhanced visual intrusion. Impact on ambient lighting conditions.
Activity/Risk Source	Size/scale of power tower Substation, operational, and security associated lighting. Access roads. Power line, pipeline, and water storage/treatment reservoirs. Other associated infrastructure.

Mitigation:	To minimise potential for visual impact.
Target/Objective	To ensure that the facility complies with Civil Aviation Authority requirements for the visibility of the power tower to aircraft. Minimise contrast with surrounding environment and visibility of the associated infrastructure. The containment of light emitted from the facility in order to eliminate the risk of additional night-time visual impacts.

Mitigation: Action/Control	Responsibility	Timeframe
Ensure that proper planning is undertaken regarding the placement of lighting structures.	EPC contractor	Construction, operation, and maintenance
Care must be taken in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass.	EPC contractor	Erection and maintenance
Maintain the general appearance of the facility in an aesthetically pleasing way.	!KaXu CSP	Operation and maintenance
Undertake regular maintenance of light fixtures.	!KaXu CSP	Operation and maintenance
Limit access to the solar energy facility site, power line, water supply pipeline and associated infrastructure.	!KaXu CSP	Operation and maintenance
Avoid the unnecessary removal of vegetation for the distribution power line servitude and limit access to the servitudes (during both construction and operational phases) along existing access roads.	EPC contractor and !KaXu CSP	Operation and maintenance

Performance Indicator	Minimised visual intrusion on surrounding areas. Appropriate visibility of infrastructure to aircraft. The effective containment of light.
Monitoring	Ensure that aviation warning lights or other measures are installed before construction is completed. Ensure that Aviation warning lights or other measures are functional at all times. The monitoring of the condition and functioning of the light fixtures during the operational phase of the project.

OBJECTIVE: *To ensure the implementation of an appropriate fire management plan during the operation phase*

The vegetation in the study area may be at risk of fire, particularly the parabolic troughs which are situated closer to the ground. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

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

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate fire fighting equipment on-site.	EPC contractor	Duration of construction
Provide fire-fighting training to selected operation and maintenance staff.	EPC contractor	Duration of construction
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	!KaXu CSP	Pre-construction

Performance Indicator	Fire fighting equipment and training provided before the construction phase commences.
Monitoring	ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE: Appropriate handling and management of hazardous substances and waste

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

Project Component/s	Parabolic troughs (i.e. oil). 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.
Activity/Risk Source	Transformers and switchgear – substation. Parabolic troughs. Water storage tank. Fuel and oil storage. Maintenance building.

Mitigation:	To comply with waste management guidelines.
Target/Objective	To minimise production of waste. To ensure appropriate waste disposal. To avoid environmental harm from waste disposal.

Mitigation: Action/Control	Responsibility	Timeframe
Hazardous substances (such as used/new transformers) must be stored in sealed containers within a clearly demarcated designated area.	!KaXu CSP	Operation
Storage areas for hazardous substances must be appropriately sealed and bunded.	!KaXu CSP	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.	!KaXu CSP	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 will be cleaned up according to specified standards regarding bioremediation.	!KaXu CSP	Operation and maintenance
Waste handling, collection, and disposal operations must be managed and controlled by a waste management contractor.	!KaXu CSP / 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.	!KaXu CSP	Operation
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	!KaXu CSP	Operation
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	!KaXu CSP	Operation
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	!KaXu CSP	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.
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	No contamination of soil or water.
Monitoring	<p>Waste collection must be monitored on a regular basis.</p> <p>Waste documentation must be completed and available for inspection on request.</p> <p>An incidents/complaints register must be maintained, in which any complaints from the community must be logged.</p> <p>Complaints must be investigated and, if appropriate, acted upon.</p> <p>Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor.</p> <p>All appropriate waste disposal certificates accompany the monthly reports.</p>

MANAGEMENT PLAN FOR THE SOLAR ENERGY FACILITY: CHAPTER 10 DECOMMISSIONING

The solar infrastructure which will be utilised for the proposed solar energy facility is expected to have a lifespan of 30 years and eventual extensions (i.e. with maintenance and refurbishment) potentially increasing this to 50 years. 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 mitigations contained under the construction section should be applied during decommissioning and this is not repeated in this section.

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.

10.1. 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.

10.2 Disassemble and Replace Infrastructure

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

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

Project Component/s	Decommissioning phase of the solar energy facility.
Potential Impact	Decommissioning will result in job losses, which in turn can result in a number of social impacts, such as reduced quality of life etc. (i.e. 60 -80 people). Decommissioning is similar to the construction phase in that it will also create temporary employment opportunities.
Activity/Risk	Decommissioning of the solar energy facility.

Source	
Mitigation: Target/Objective	To avoid and or minimise the potential social impacts associated with decommissioning phase of the solar energy facility.

Mitigation: Action/control	Responsibility	Timeframe
Retrenchments should comply with current South African Labour Legislation.	!KaXu CSP	At decommissioning

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

**APPENDIX A:
ENVIRONMENTAL AUTHORISATION**

**APPENDIX B:
FINAL LAYOUT**

**APPENDIX C:
PROJECT MANAGEMENT PLAN**

**APPENDIX D:
STORMWATER MANAGEMENT PLAN**

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

**APPENDIX F:
HIV/AIDS AWARENESS AND PREVENTION PLAN**

**APPENDIX G:
SECURITY PROTOCOL AND PLAN**

**APPENDIX H:
FIRE MANAGEMENT PLAN DURING CONSTRUCTION**

**APPENDIX I:
LIST OF HAZARDOUS MATERIAL WHICH WILL BE ON
SITE DURING CONSTRUCTION**

**APPENDIX J:
WASTE MANAGEMENT PLAN FOR CONSTRUCTION**

**APPENDIX K:
HEALTH AND SAFETY PLAN**

**APPENDIX L:
ENVIRONMENTAL PLAN TO WHICH THE EPC
CONTRACTOR MUST COMPLY**