ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR A 20 MW SOLAR PLANT AT LISELO SUB KHUTA, KATIMA RURAL CONSTITUENCY, ZAMBESI REGION.

FOR

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PREPARED BY

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building prosperous individuals, communities and organizations through

"RESEARCH, TRAINING & CAPACITY BUILDING"

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PROJECT DETAILS

DOCUMENT TYPE	FINAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE CONSTRUCTION AND OPERATION OF A 20 MW SOLAR PLANT AT LISELO IN ZAMBEZI REGION
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Many thanks to all stakeholders, Interested and Affected Parties and key stakeholders for their corporation and contributions that have shaped this EIA study.

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ABBREVIATIONS

ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESR	Environmental Scoping Report
EMA	Environmental Management Act (2007)
MEFT	Ministry of Environment, Forestry and Tourism
MIME	Ministry of Industry, Mines and Energy

Purpose of this Document

An Environmental Scoping and Management Plan is one of the most important products of an Environmental Assessment (EA) process. It synthesizes all recommended mitigation and monitoring measures, laid out according to the various stages of a project life cycle, with clearly defined follow-up actions and responsibility assigned to specific actors based on the potential project impacts identified during the scoping exercise. This ESMP is a legally binding document and has been compiled in accordance with the Namibian Environmental Management Act (No. 7 of 2007) and its Environmental Impact Assessment Regulations (2012) (MEFT, 2008). This plan describes project scope, potential impacts, the mitigation and monitoring measures to be implemented during the following phases of these developments.

Decommissioning did not form part of the scope of this EIA and should it become necessary to decommission the plant a clearance certificate should be applied for and due process followed. The decommissioning of the solar energy facility would therefore be addressed in a new EIA process to be conducted prior to the site being decommissioned. However, this ESMP makes recommendations that should be considered in the new EIA process prior to decommissioning.

The components of the ESMP should meet the requirements of the EIA Regulations. The ESMP must address the potential environmental impacts of the proposed activity on the environment covering design, construction and operation. It is therefore the responsibility of MEFT and the proponent to ensure that the proposed activity as well as the ESMP process conforms to the principles of the EMA and should ensure that any contractors appointed comply thereto. Outrun Consultants CC therefore, carried out the ESMP process according to the EMA.

Executive Summary

The applicant, CI (PTY) LTD is a wholly Namibian owned company and are planning to set up a 20 MW Solar Plant at Liselo Sub Khuta in Katima Rural Constituency, Zambesi Region. Construction of energy related infrastructure is a listed activity in the Environmental Management Act of 2007 making it mandatory to conduct an Environmental Impact Assessment and apply for an Environmental Clearance Certificate before implementing the project. Outrun Consultants CC an independent consulting company, conducted the EIA process for CI. The EIA was conducted in 2 phases, the Scoping Phase during which interested and affected parties were given the opportunity to comment on the proposed project activities. Comments received during the scoping exercise were incorporated. The second phase gave rise to the draft environmental scoping and management plan report which was shared with stakeholders for their inputs. The proposed construction and operation of a solar plant pose potential environmental damage in the form of air pollution due to dust, destruction of the landscape, aesthetic view and visual impacts. Liselo Sub Khuta rural area whose source of livelihood is centred on crop and livestock production coupled with income derived from other sources such as fishing, businesses, cash remittances, salaries and wages and pensions. The predicted environmental impacts can be managed resulting in minimal or insignificant residual effects through the successful implementation of the proposed Environmental and Social Management Plan. Specific instructions have been formulated as part of the ESMP.

1. Introduction

The ever-increasing demand for energy and need to find more sustainable and environmentally friendly energy resources have prompted developers to explore new energy generation options. Increasing economic growth and social development in Namibia is placing a growing demand on energy supply. Coupled with the rapid advancement in economic and social development, is the growing awareness of environmental impact, climate change and the need for sustainable development. Namibia's abundance of solar resources and the increasing of solar technologies and applications are of a high priority for the country.

To utilise renewable energy resources, Camelot Investments (Pty) Ltd (CI) is proposing to construct a 20 Megawatt (MW) Solar Power Plant on a 62.5 Ha communal land plot at Liselo Sub Khuta, in Zambesi Region. This project will be comprised of Photovoltaic (PV) solar technology. The development site is located on communal lands and are registered as customary land rights by the Ministry of Land Reform:

Table 1: The land parcels customary land rights bought by Camelot Investments (Pty) Ltd (Certificates are annexed as Annexure 1).

NAME OF LEASE HOLDER	REGISTRATION CERTIFICATE
Linnox Lutambo Lutambo	ZAMCLB-CLR-006323
Agnes Masikilo Tuombale	ZAMCLB-CLR-005467
Linnox Lutambo Lutambo	ZAMCLB-CLR-007342
Lutambo Euthent Lutambo	ZAMCLB-CLR-009838
Manja Lennah Lutambo	ZAMCLB-CLR-009839

This document has been drafted according to the Namibian Environmental Management Act (No. 7 of 2007) and its Regulations of (2012) whereby various aspects of the intended development were considered under the listed activities with potential impacts on the environment. Therefore, this development requires authorisation granted in the form of an Environmental Clearance Certificate (ECC) by the Environmental Commissioner (Ministry of Environment and Tourism).

CI (Applicant) appointed Outrun Consultants cc, an independent environmental consulting company to conduct the impact assessment and subsequently apply for the ECC in fulfilment of the Environmental Management Act (2012). The

commitments described here form part of the Environmental Clearance Certificate (ECC) between CI and the state, as represented by the Ministry of Environment, Forestry and Tourism (MEFT). Non-compliance is considered illegal and may have legal consequences. The amendment, transfer or renewal of the ECC should be communicated to the Environmental Commissioner as stipulated in the Environmental Management Act (EMA) of 2007 and its EIA Regulations 2012. Any changes to this ESMP will require an amendment to the ECC for these developments.

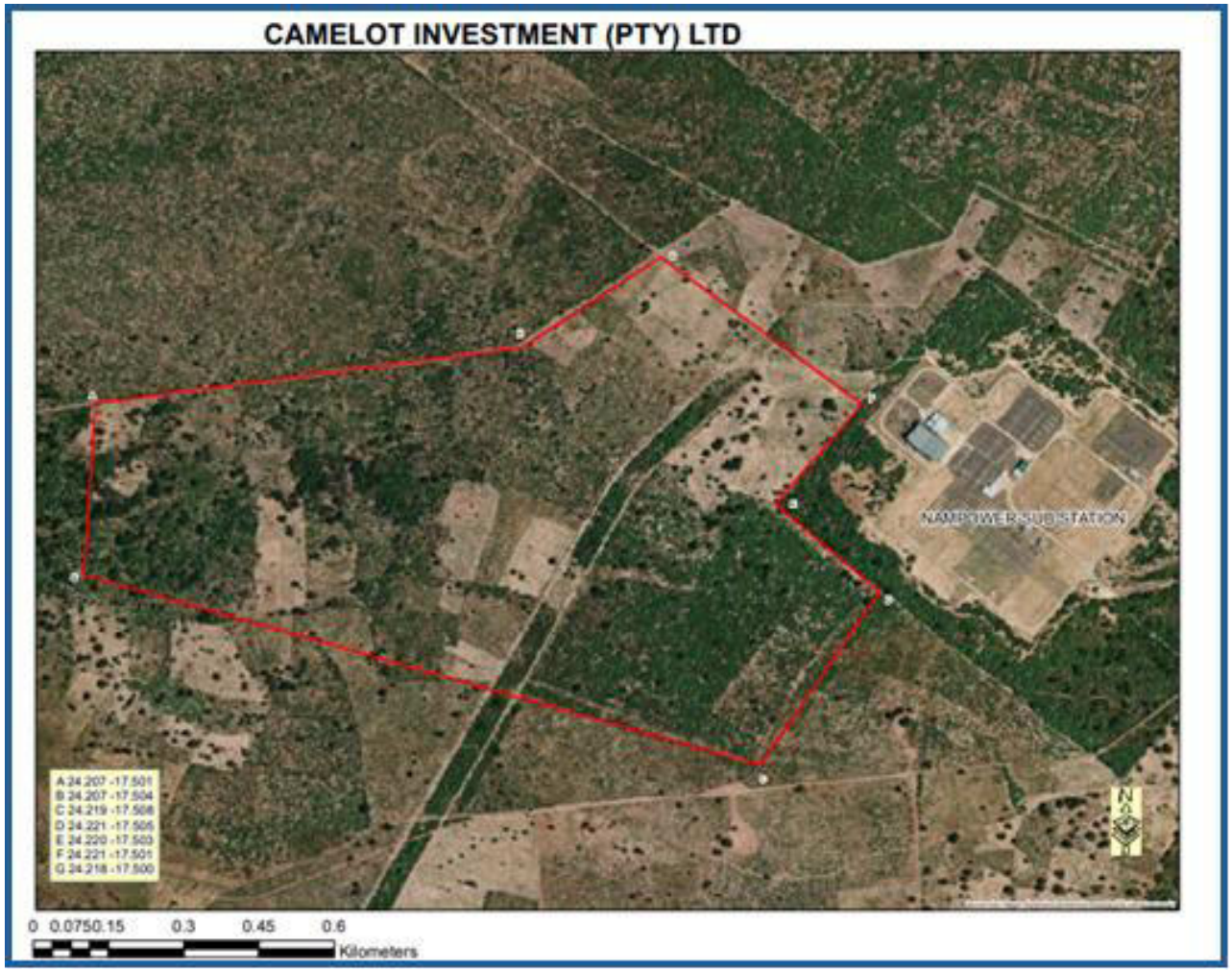

Figure 1: The location of the proposed project site.

1.2. Project Overview

CI (Pty) Ltd intends to construct and operate a solar panels based photovoltaic (PV) plant at Liselo Sub Khuta, in Katima Rural Constituency, Zambesi Region. The proposed Solar Power Plant entails the construction and operation of one 20 MW solar plant, associated infrastructure and services for the provision of renewable electricity to the national power grid. The proposed solar plant entails the transformation of fallow agricultural (crop) land to accommodate the proposed plant, associated infrastructure and services. The infrastructure and structures for the proposed project includes but is not limited to inter alia:

The project includes the following components:

- Photovoltaic infrastructure: numerous rows of PV panels and associated support infrastructure to generate electricity.
- Buildings: operation and maintenance buildings to house equipment and a guard cabin for security.

1.3. Phases of the Project

The process which was followed in compiling this report follows the Environmental Management Act of (2007) and Environmental Impact Assessment Regulations 2012 and applies the principles of sustainable development. The purpose of is to predict potential impacts and formulate mitigation measures that are made binding on all contractors during the construction phase as well as during the operational phase. The point of departure from the formulation of the ESMP is to take a proactive route by addressing potential problems before they occur. This should limit corrective measures needed during the construction and operational phases of the development. Additional mitigation will be included throughout the project's various phases, as required and if necessary. This assessment deals with the following phases as detailed below:

1.3.1. Planning and Design Phase

This stage offers an ideal opportunity to incorporate proactive environmental management measures with the goal of attaining sustainable development. While there is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g. as proposed in the ESMP) during the planning phase, the necessary corrective action can be taken to further limit potential impacts.

1.3.2. The Construction Phase

Most of the impacts during this phase will have immediate effects (e.g. noise, dust and water pollution). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts can then be mitigated through the contingency plans identified in the planning phase, together with a commitment to sound environmental management.

1.3.3. Operation and Maintenance

By taking proactive measures during the planning and construction phases of the solar plant, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete. It is therefore a goal of this report to reduce the impact on the immediate and surrounding environment by minimising environmental harm and preventing environmental incidents:

- Systematically manage environmental risk.
- Where practicable eliminate environmental risk, or if not practicable adequately control via application of a hierarchy of risk control measures.
- Reduce the impact on the immediate and surrounding environment by minimising

To comply with the requirements of:

- The contract specifications
- Legislation prescribed by the relevant Regulatory Authorities MEFT Namibia Energy Policy

2. Environmental Management Plan

2.1. Planning and Design

This section outlines how environmental considerations have informed and been incorporated into the planning and design phases of the proposed 20 MW (solar) power/ energy plant at Liselo Sub Khuta. The following design related mitigation measures have been recommended to reduce the environmental impacts and gave rise to the ESMP that follows. This ESMP has been structured to provide its various intended recipients (Developer, ER, consulting engineers and contractors) with mitigation measures immediately applicable to their respective scopes of work. The management requirements for the various recipients carrying out work for this project are divided according to the main project phases. Namibia is known for its high amount of solar radiation making solar energy an efficient renewable energy source. However the azimuth changes over time during the day and between seasons and as a result a design factor to consider will be tracking the azimuth to harness maximum insolation.

2.1.1. Biodiversity and Ecology

The following mitigation measures are recommended for the planning and design phase to reduce the impact on the biological environment:

- Minimisation and management of impacts to indigenous or otherwise protected flora that is located on-site, including the protection of habitats therein.
- Locate access routes and other infrastructure to avoid the removal of bigger trees as far as possible.
- Limit development and associated infrastructure in sensitive areas such as riparian vegetation.
- Design electrical boundary fencing if needed, so that the first 50cm from ground level is not electrified to allow for small burrowing animals.

- The design should include covers on transformers to prevent owls and genet from nesting on them.
- Design a bund wall around transformers.
- Ensure landscaping designs prohibits the planting of potentially alien invasive plant species (e.g. Tecoma stans, Pennisetum setaceum, etc.) for decorative purposes (e.g. around offices, etc.) and incorporates indigenous vegetation (especially the protected species such as A. erioloba, Albizia anthelmintica, B. albitrunca, B. foetida, Faidherbia albida, Parkinsonia africana, Ziziphus mucronata) into the developments as far as possible (e.g. around offices, etc.).
- Promptly identify weed species and habitats and adopt specific weed control requirements.
- Design overhead transmission lines to include coils/flappers (approximately two coils/flappers within a pylon at equal lengths apart) on new pylon routes longer than 100 m to increase visibility and reduce bird mortalities.

2.1.2. Socio-Economic

The following mitigation measures are recommended for the planning and design phase to reduce the impact on the socio-economic aspects.

- The contractor should employ local labour (i.e. from Liselo Sub Khuta area) where possible. The requirements for Employing local people should be formalised within the contractor's contract. Should a position be offered to non-local person the contractor should be able to prove that no local person qualifies for such a position, through advertising. Follow up must be undertaken to ensure that the contractor is indeed following the guidelines as prescribed in this ESMP.
- A provision stating that all unskilled labour should be sourced from local communities should be included within tenders concerning the construction and/or maintenance of services infrastructure.
- Specific recruitment procedures ensuring qualified local companies enjoy preference during tender adjudication should be included within tenders concerning the construction and/or maintenance of services infrastructure.
- Provisions promoting gender equality pertaining to recruitment should be included within tender documents concerning the construction and/or maintenance of services infrastructure.

- Women and the physically challenged should be given preference for certain unskilled jobs (e.g. flag bearers).

It is crucial that the project procurement criteria include requirements for training and skills development of the contractor's workforce by the contractor. Furthermore, this training should be able to capacitate the Employees to apply for permanent positions during the operations of the solar power facilities.

2.1.3. Heritage

The following mitigation measures have been recommended for the planning and the design phase.

- Should any archaeological artefacts be found on site during excavations, a formal application must be made through the National Heritage Council (NHC)?

2.1.4. Roads

The following mitigation measure is recommended in line with the planning and design phase to reduce the impact on a traffic and roads perspective:

- Request for permission from NAMPOWER to use the existing access road and connect new road to the site.
- The intersection of the access road to the Solar Facility site must be designed by a professional engineer and submitted to the Roads Authority (RA) for approval.
- Furthermore, the proponent is required to notify RA well in advance as to when the actual construction phase will begin.

2.1.5. Visual

The following mitigation measures are recommended for the planning and design phase to reduce the impact on visual resources:

- Limit offices and structures to single storey and site carefully to reduce visual intrusion.
- Select colours for buildings to reflect hues of the surrounding vegetation and/or the ground (grey green). Door and window frame colour must reference either the roof or wall colours.

- Locate the construction yard away from the new access road and retain as much of the adjacent vegetation as possible.
- Limit the size of signage and use colour tones that are visible but not dominating, so that size and colour contrast do not dominate the attention of the casual observer.
- Ensure that fencing is grey in colour and located as close as possible around the PV site.
- Keep facility lighting to a minimum, within the requirements of safety and efficiency. Where lighting is required, use energy savers and design low-level lighting shielded to reduce light spillage and pollution. Use down-lighters for external lighting (including security and perimeter lighting) so that no light falls outside the area needing to be lit and ensure that no naked light sources are directly visible from a distance.
- Should single axis tracking PV technology be used, this must be limited to 7m in height.

2.1.6. Noise

The following mitigation measures are recommended for the planning and design phase to reduce the impact from a noise perspective:

- Ensure that the facility is designed to consider the maximum allowable equivalent continuous day and night rating levels of the potentially impacted sites outside the project boundary. Where the noise levels at such external sites are presently lower than the maximum allowed, the maximum must not be exceeded.
- Design buildings to minimise the transmission of noise from the inside to the outdoors.
- Insulate particularly noisy plant areas and equipment and keep all plant, equipment and vehicles in good repair.
- Where possible, ensure very noisy activities do not take place at night.

2.1.7. Cabling and wiring

- Cables should be installed in line with the manufacturer's recommendations. Installation should be done with care as damage can occur when pulling the cable into position. The correct pulling tensions and bending radii should be

adhered to by the installation contractor to prevent damage to the cable. Similarly, cables attached to the mounting structure require the correct protection, attachment and strain relief to make sure that they are not damaged.

- Underground cables should be buried at a suitable depth (generally between 500mm and 1,000mm) with warning tape or tiles placed above and marking posts at suitable intervals on the surface. Cables may either be buried directly or in ducts. If cables are buried directly, they should be enveloped in a layer of sand or sifted soil to avoid damage by backfill material.

2.2. Responsibilities

The responsibility for the implementation of the ESMP ultimately lies with Camelot Investments (PTY) LTD (the Developer), who is also responsible for the eventual operation of these developments. The implementation of this ESMP requires the involvement of several key individuals, each fulfilling a different but vital role to ensure sound environmental management during each phase of these developments.

The Developer should appoint an Employer's Representative (ER) to oversee all aspects of these developments for all development phases (including all contracts for work outsourced). Furthermore, the developer may decide to assign this role to one person for the full duration of these developments, or may assign an ER to each of the development phases i.e. one for the Planning and Design Phase, one for the Construction Phase and one for the Operational and Maintenance Phase. The ER will in turn appoint an Environmental Control Officer (ECO) to oversee the implementation of the whole ESMP during the Construction and Operation and Maintenance Phases of the Solar Power Facility. Again, the ER (and/or the Developer) may decide to assign this role to one person for both phases, or may assign a different ECO for each phase
– i.e. one for the Construction Phase and another for the Operation and Maintenance Phase. The following positions and their respective responsibilities are outlined below:

- Employer's Representative;
- Environmental Control Officer; and
- Contractor (Construction and Operations and Maintenance).

2.3. Employers Representative (ER)

The ER is appointed by the Developer to manage all contracts for work/services that are outsourced during all development phases. Any official communication regarding work agreements is delivered through this person. The ER should with the commencement of the project appoint a competent ECO who will represent the Developer on-site.

During the Planning and Design and Construction Tender Preparation Phase, the ER will have the following responsibilities regarding the implementation of this ESMP:

- Ensuring that the necessary legal authorisations have been obtained;
- Developing, managing implementation of and maintaining all records;

2.4. Environmental Control Officer (ECO)

The ECO should be a competent person appointed by the ER. The ECO is the Developer's on-site representative primarily responsible for the monitoring and review of on-site environmental management and implementation of the ESMP by the Contractor. If no ECO is appointed the duties of the ECO fall upon the ER. During the Construction Phase and Operation and Maintenance Phase the ECO's duties include the following:

- Assisting the ER in ensuring that the necessary legal authorisations have been obtained;
- Maintaining open and direct lines of communication between the ER, Developer, the Construction and/or Operations and Maintenance Contractor, and Interested and Affected Parties (I&APs) with regard to this ESMP and matters incidental thereto.
- Monthly site inspection of all construction and/or infrastructure maintenance areas regarding compliance with this ESMP.
- Monitor and verify adherence to the ESMP (audit the implementation of the ESMP) and verify that environmental impacts are kept to a minimum.
- Be fully conversant with the Environmental Management Plan.
- Be fully conversant with all relevant environmental legislation and the Namibian Energy Policy environmental policies and procedures and ensure compliance.

2.5. Safety Health and Environmental (SHE) Officer

The SHE Officer will:

- Be fully conversant with the Environmental Management Programme.
- Be fully conversant with all relevant environmental legislation applicable to the project and ensure compliance with them.
- Compilation of Method Statements together with the contractor that will specify how potential environmental impacts in line with the requirements of the ESMP will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the ESMP are achieved.
- Convey the contents of this ESMP to the construction site staff and discuss the contents in detail with the Contractor.
- Undertake regular and comprehensive inspection of the site and surrounding areas to monitor compliance with the ESMP.
- Take appropriate action if the specifications contained in the ESMP are not followed.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.
- Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the ESMP.
- Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the ESMP.
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.
- Ensuring that the list of transgressions issued by the ECO is available on request.
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction.

These incidents include:

- Public involvement / complaints.

- Health and safety incidents involving hazardous materials stored on site.
- Non-compliance incidents.

2.6. Monitoring

A monitoring programme will be in place not only to ensure compliance with the ESMP through the contract/work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the ESMP that are or could result in significant environmental impacts for which corrective action is required.

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- Monthly audits will be conducted by the ECO/s for the duration of the construction phase – the ECO shall undertake this environmental monitoring with the audits considering compliance with the ESMP, the EA conditions, as well as the conditions of any permits and/or licences.
- On-going monitoring is to be undertaken by the Contractors' Environmental Manager/Officer – this will include notification to the ECO and proponent EO should an incident take place.
- External auditing may take place at unspecified times by the authorities and/or other relevant authorities.
- An independent, suitably qualified, auditor will need to be contracted to conduct an audit once the construction phase of the project is completed according to the provisions of the ESMP.
- The Contractor's Environmental Officer must undertake regular site inspections (at least twice weekly) to ensure all legislative requirements are adhered to. Proof of such inspections shall be kept on file for ease of reference or for audit purposes.

2.7. Contractor

The Contractor is responsible for the implementation of the ESMP, on-site monitoring and evaluation of the ESMP. It is envisaged that various contractors might be appointed at various periods for various tasks throughout the life cycle (construction through to decommissioning phase) of this project. These can be broadly grouped into Construction Contractors and Operations and Maintenance Contractors. To

ensure sound environmental management, the relevant sections of this ESMP should be included in all contracts of work outsourced thus legally binding all appointed contractors and sub-contractors. All contractors shall ensure that adequate environmental awareness training of senior site personnel takes place and that all construction workers and newcomers are inducted on the environmental, health and safety issues related to the project as well as importance and implications of the proposed ESMP. The induction process shall be conducted, as far as is possible, in the employees' language of choice. The Contractor should keep records of all environmental training sessions, including names, dates and the information presented.

2.8. Environmental Specifications: Awareness, Training and Competence

It is important to ensure that all personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental harm.

To achieve effective environmental management, it is important that ESMPloyees, Contractors and Subcontractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this ESMP. Environmental training may typically include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment;
- Employees will be familiar with the requirements of the ESMP and the environmental specifications as they apply to the construction of the power station.
- Basic training in the identification of archaeological artefacts, and rare and endangered flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Records must be kept of those that have completed the relevant training.

Training can be done both in a written or verbal format and in an appropriate language but will be in an appropriate format for the receiving audience. Where training has been done verbally, persons having received training must indicate in

writing that they have indeed attended a training session. A regular form of written or verbal testing will have to be designed.

2.9. The Construction Phase and Construction Mitigation Details

All activities involved in the development phases of the solar facility have been identified together with all aspects that may have potential impacts. The construction phase of the ESMP aims to address environmental and social risk pertaining to the construction phase. The following table provides a large-scale overview of all the major environmental management themes pertaining to the project activities.

Table 2: Establishment of the working area / mobilisation.

Section	Aspect	Impact	Mitigation	Indicator	Suggested Responsibility
1	**Demarcate the construction site**	Without properly demarcating the site, the public would be able to access the site and would be at risk. The surrounding vegetation and watercourse might also be impacted by the activities.	It is of outmost importance to prevent the encroachment of construction areas into the surrounding environments.	Proper fencing in place to demarcate the construction site.	Contractor
2	**Stockpiling of equipment and materials**	Incorrect storing of materials can result in water and soil contamination, dust and or erosion. Incorrect storage and handling of materials also pose a risk of environmental contamination and could jeopardise the safety of public / site staff.	Ensure that all materials and equipment handled and stored in a manner that environmental contamination and safety hazards are limited. • The IPP Contractor shall be advised by the Contractor of the housekeeping arrangements including areas intended for the stockpiling of materials. • Implement General Specifications as presented in this document.	No public complaints or water/ soil contamination Correct handling, use and storage of materials, including hazardous materials. No incidents of environmental contamination.	Contractor and ECO

				No accidents or incidents related to the handling of materials. No public complaints	
3	**Ablution facility**The	lack of adequate ablution facilities and recess areas can compromise the health of site staff and result in environmental degradation.	To minimise the potential environmental impacts associated with workers on the site. • Implement General Specifications	Adequate ablution facilities are in place.	Contractors and ECO

Section	Aspect	Impact	Mitigation	Indicator	Suggested Responsibility
1	**Demarcating the site area for**	There may be Unnecessary environmental impacts outside the site footprint if the area is not demarcated.	To keep the site area to a minimum to avoid unnecessary impacts to the surrounding environment. • Thesite mustbeclearly demarcated with fencing or orange construction barrier to keep clearing activities to a minimum.	The site area is clearly fenced off.	Contractor and ECO

			• No site staff must be allowed in the area outside of the demarcated area to prevent trampling of surrounding vegetation		
2	**No-Go areas (Those areas which have been designated by the EAP as sensitive environments).**	Without No-Go areas the free moving of site staff could result in impacts to sensitive areas.	To keep the site area to a minimum and to protect sensitive environmental areas. • Implement General Specifications.	Comprehensive record, including photographic record, of compliance available.	ECO and Contractor
3	**Removal of vegetation**	If the removal of vegetation is done incorrectly it may leave the site prone to erosion and compromise rehabilitation requirements post construction.	To ensure that the site is not prone to erosion and any disturbed areas can be rehabilitated as necessary post-construction. • Implement General Specifications.	Topsoil conserved in stockpiles for later use if necessary.	Contractor and ECO
4	**Excavations for bulk earthworks**	Created embankments (cut and fill) and retaining walls are required to level and stabilise the site.	To limit the impact to the environment caused by excavations. • Implement General Specifications	No heaps of materials left on site after the construction phase.	Contractor and ECO

		Excavations are also required to accommodate bulk services which might impact on the environment.			
5	**Removal of equipment, materials and any temporary structures**	If the construction site is not decommissioned it can result in environmental degradation	It is very imperative to leave the impacted area in an acceptable state. • Implement General Specifications.	The area impacted by the construction activities pose no threat to the environment	Contractor and ECO

2.10. The Operational and Maintenance Phase

The following mitigation measures should be complied with and carried out during any maintenance works associated with the services infrastructure within the planned development areas.

Table 3: The proposed mitigation measures for the respective environmental aspects of the project.

Aspect	Mitigation Measure
ESMP Implementation	If any construction is to be conducted as part of maintenance works for the services infrastructure within the project area please refer to the construction mitigation measures of this ESMP.
Environmental management **Documentation and procedures**	To ensure that the operation of the facility does not result in avoidable impacts on the environment, and that any impacts that do occur are anticipated and managed. • Appoint a suitably qualified, independent ECO to monitor compliance and compile an environmental audit report. • Audit the compliance with the requirements of the environmental specification contained within the ESMP
Socio-economic impact	To ensure that the operation of the facility maximises positive impacts on the socioeconomic environment. 1) Procurement of materials, goods and services must be from local suppliers, where possible. 2) Employ local labour for the operational phase, where possible, and particularly for day-to-day operations and maintenance. 3) The contractor must be required to Employ skilled or semi-skilled local labour (depending on their capacity to operate the facility). The requirement to Employ local labour labour must be incorporated in the contractor`s contract. Follow-up compliance monitoring shall be undertaken. 4) Where possible encourage the use of local suppliers for procurement of goods, materials and services.

	5) Implement training and capacity building programmes to enhance the ability of local community members to take advantage of available ESMPloyment opportunities.
Protection of ecology	To prevent unnecessary disturbance to natural vegetation and fauna. • Any alien plants within the site footprint must be immediately controlled to avoid establishment of a soil seed bank. Control measures must follow established norms and legal limitations in terms of the MEFThod to be used and the chemical substances used. • Ensure removal and control of existing invasive alien plant species (i.e. Prosopis sp.) onsite and within the surrounding 6 m wide fire break. • Maintain track discipline with maximum speed limits (e.g. 40km/h). TESMPorary speed humps could also be used to limit the speed at which people travel but care must be taken to ensure these do not cause erosion. • Avoid off-road driving and unnecessary nocturnal driving in the area. • Remove all refuse on site. • Maintain coils/flappers on new pylon routes longer than 100m to increase visibility and prevent further bird mortalities. • If nesting on pylon structures becomes problematic, “dummy poles” could be erected for species such as sociable weaver to avoid this problem. • Initiate land rehabilitation and re-vegetation as soon as possible and continue to monitor land for early signs of degradation and erosion. • Re-vegetate with more palatable plant species to enable faster stocking initiation. • Prevent and discourage setting of fires as this could easily cause runaway veld fires. • Do not allow domestic pets – e.g. cats and dogs to accompanying Employee’s onsite. • Prevent and discourage the collection of firewood in and surrounding the project area. • Maintain transformer covers to ensure that no owls, genet or other animals are nesting on the transformers. • Ensure that solar panels are cleaned regularly and kept free of bird streamers.

Storm water runoff, erosion, and pollution of surface water and groundwater resources.	Prevent storm water from eroding the land and becoming contaminated. • The areas likely to contribute to contaminated runoff, such as the workshop must be designed to have hardened surfaces equipped with oil and grease traps to capture any contaminated runoff. These must be maintained during operation. • Should storm water infrastructure be required, a management plan must be in place to ensure as a minimum that the structures are visually monitored after large rainfall events to ensure that eroded areas do not develop. • Storm water runoff from the constructed areas must be monitored to ensure that eroded areas do not develop, particularly near the outlets. • Any refuse generated must be disposed of in suitable bins and removed from site at regular intervals. • Maintain the groundwater table above critical groundwater levels during water abstraction periods. • Ensure proper groundwater abstraction Management strategies
Visual impact	To protect the sense of place. • Keep access roads clear • Keep all lighting minimal, within the requirements of safety and efficiency. • Where such lighting is deemed necessary, use shielded low-level lighting to reduce light spillage and pollution. • Avoid naked light sources that are directly visible from a distance. Only reflected light must be visible from outside the site. • Rehabilitation of all impacted areas must continue until the state of the vegetation meets the requirements of the ecological assessment and is satisfactory to the Environmental Control Officer.
Noise impact	To ensure that noise from the operational activities does not exceed unacceptable levels. • All plant, equipment and vehicles must be kept in good repair. • When ordering plant and machinery, manufacturers must be requested to provide details of the sound power level. Where possible, those with the lowest sound power level (most quiet) must be selected.

Post-construction usage of borrow pits	Borrow pits to be utilised post-construction should adhere to the same topsoil and rehabilitation measures outlined within construction mitigation measures of this ESMP
Post-construction environmental training and awareness	All contractors appointed for maintenance work on the respective services infrastructure must ensure that all personnel are aware of necessary health, safety and environmental considerations applicable to their respective work.
Monitoring	The ECO should monitor the implementation of the Property Development ESMP: • The ECO should inspect the site before construction starts; and • The ECO should inspect the site at the end of the construction period.

2.11. Monitoring Programmes

Table 4: Environmental Monitoring Programme.

Section	Aspect	Phase	What to monitor	Standards to be Achieved
1	**Access roads**	Construction and operation	• Generation of mud on access roads after heavy rainfall event	Roads in a well maintained condition and causing no damage to vehicles
2	**Dust**	construction	• Dust and ensuring its suppression during construction of infrastructure	Meet the standard for the South African Atmospheric Pollution Prevention Act 2
3	**Erosion**	Construction and operation	• Area (m^2) affected by erosion Effectiveness of erosion control measures (improvement over	No incidences of erosion occurring Should erosion occur, successful remediation of erosion, so that areas are rehabilitated
4	**Pollution**	Construction and operation	• No incidences of Zero pollution incidences	As incidents occur Fortnightly and after every event logged
5	**Pollution safety**	Construction and operation	• Integrity of impervious floor layer of fuel storage and dispensing areas • Integrity of bund walls	Zero pollution incidences

			• The storage and dispensing areas are secure when not in use, e.g. over-night. • Clean up kits for accidental spills are available and 100% complete in terms of their contents. • Any pollution or safety incidence and number of pollution incidences recorded.	
6	**Erosion and Water pollution**	Construction	• Storm water system integrity	Weekly or after each heavy rainfall event.
7	**Waste**	Construction	• Certificates of disposal at registered facility • Incidences of waste management contraventions • Distribution and integrity of waste disposal containers • Awareness training for staff related to waste matters (proof of workers trained)	Zero waste management infringements Application of responsible waste management measures
8	**Vegetation and fauna**	Construction and operation	• Incidents of unauthorised entry into no-go areas • Erosion (area in m^2) • Rehabilitation of disturbed areas	Zero incidents No incidences of erosion occurring

			• Occurrence of alien species (type, location and area invested (m^2)) • Establishment of bird nests on pylons and transformers as well as beneath solar panels.	Should erosion occur, successful remediation of erosion, so that areas are rehabilitated Measurable targets for this must be determined by the ECO at the commencement of the rehabilitation activities Zero alien species occurring in the footprint area and a 20m buffer area around footprint. No incidences of nesting birds (owls, genets and sociable weavers)

2.12. Decommissioning

In terms of EMA it is necessary to consider the environmental impacts of decommissioning of any development, however, the solar facility is expected to be operational for a period of 20 years or more. Thereafter, the PV facility could either be decommissioned or upgraded, depending on the feasibility.

According to Namibian Legislation, decommissioning is considered as a separate activity which should be dealt with on its own. The decommissioning of the PV facility would therefore be addressed in a new EIA process to be conducted prior to the site being decommissioned. This section makes recommendations that should be considered in the new EIA process prior to decommissioning.

The Project Proponent should develop a closure plan to be updated on an annual basis commencing at least 10 years prior to the envisaged decommissioning. The closure plan should identify the targets and objectives for closure, and will be important in allowing operations to work toward closure objectives. The Project Proponent should commission specialist inputs from time to time to provide direction on the closure plan to ensure the end result is as closely aligned with prevailing best practice as is possible, thereby minimising the risk and potential costs associated with decommissioning phase. The various stakeholders should also be engaged as early on in the closure planning process to ensure their interests are known and catered for from the point of origin. The construction phase ESMP could be used as a guideline to facilitate the detailed decommissioning phase ESMP.

Specific mitigation measures have been recommended for the decommissioning phase of the project and are listed below. . It should however be noted that these conditions are subject to change.

2.13. Recommended Mitigation Measures For the Decommissioning Phase

2.13.1. Ecology

The following mitigation measures are recommended from an ecological point of view as part of the closure phase:

- Rehabilitate all areas impacted on by the infrastructure

- Remove all construction waste; rip tESMPorary tracks, if feasible, and replace the topsoil.
- Re-introduce indigenous vegetation (especially protected species – i.e. Mopane) should form part of the rehabilitation process

2.13.2. Visual

The following mitigation measures are recommended from a visual point of view as part of the closure phase:

- All PV structures, associated structures and fencing must be removed and recycled as far as possible. Where it is not possible to recycle material, the waste shall be disposed of at a registered landfill site.
- Rehabilitate internal roads that cannot be used by the landowner.
- Rehabilitate and restore all impacted footprint areas as per the requirements of the ecological assessment.
- Rehabilitation of all impacted areas must continue until the state of the vegetation meets the requirements of the ecological assessment and is satisfactory to the ECO.

2.13.3. Socio economic

The following mitigation measures are recommended from a socio-economic point of view as part of the closure phase:

- Maximise the use of local labour on decommissioning activities;
- Provide adequate notification to staff and other stakeholders of the pending decommissioning;
- Provide staff with references so that they can pursue work with other companies;
- If feasible, assist staff in finding ESMPloyment at other operations.

2.13.4. Surface water

The following mitigation measures are recommended for surface water management as part of the closure phase:

- A decommission plan should address the removal of the PV facilities and infrastructure. Such a plan must address aspects such as monitoring and management of surface water flows and erosion.

3. Conclusion and Recommendations

3.1. Conclusion

The construction of a 20 MW solar plant at Liselo Sub Khuta has negative environmental impacts. The EIA study findings showed negative environmental impacts to the environment to varying degrees depending on the nature of the activity and impacts arising thereof. Management and corrective measures were formulated and implementation timelines proposed depending on the gravity of threat to human life and the environment.

The identified impacts, mitigation and monitoring activities, indicators, responsible parties and monitoring frequency are indicated in the ESMP. The ESMP should form the obligatory conditions upon which the EIA clearance certificates will be issued and non-compliance attracts prosecution. The ESMP should be implemented throughout the project lifecycle and an Environmental Management System formulated and implemented based on the EIA study findings. Environmental monitoring and performance evaluations should be conducted and targets for environmental improvement set and monitored throughout the project lifespan. It is also our determination that the findings should be incorporated earlier and sound SHE policies and supportive programmes implemented.

3.2. Recommendations

Recommendations were developed to guide the Proponent on the key activities that should be done to effectively manage safety, health and environment:

- Make provision of lightning protection to households within 200 m of the project site.
- Seek permission from NAMPOWER to use the existing access road leading to the substation.
- Develop SHE policies based on the study findings and use impacts evaluation to formulate the objectives.
- Develop and implement Environmental Management Systems.
- Develop an occupational health and safety plan.

- Adhere to the environmental management obligations upon which the EIA clearance certificate will be issued by the MEFT: DEA
- The EIA clearance will not exempt the Proponent from obtaining other relevant permits and should do as such:
    - Permit to remove protected trees on a portion of the project site.
    - Water connection;
    - Connection to the National Grid;
    - Access roads etc.
- Provide relevant training to capacitate the workers with knowledge and skills to manage safety, health and the environment.