CC/2024/07232

ENVIRONMENTAL MANAGEMENT PLAN

FOR

THE PROPOSED CONSTRUCTION AND OPERATION OF THE 20 MEGAWATTS (MW) SOLAR PV POWER PLANT & ASSOCIATED INFRASTRUCTURE LOCATED IN SHANKARA VILLAGE, NDONGA LINENA CONSTITUENCY, KAVANGO EAST REGION, NAMIBIA

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PROPONENT

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1 INTRODUCTION

1.1 Project Background

Tsika Energy (Pty) Ltd (hereafter referred to as *the proponent*) intends to contribute to the REFIT Programme through the development, construction and operation of the Shankara 20-megawatt (MW) solar photovoltaic (PV) power plant. The proposed development will be located at Shankara Village, within the Ndonga Linena Constituency of the Kavango East Region, Namibia. The proposed solar facility and associated infrastructure will be constructed within a footprint of approximately 50 hectares (ha).

The proposed project forms part of Namibia's broader commitment to increasing the contribution of renewable energy to the national electricity mix, enhancing energy security, and reducing reliance on imported electricity and fossil fuel-based generation. Namibia has one of the highest solar irradiation levels globally, with average daily solar radiation ranging between 5.5 and 6.5 kWh/m² across most regions, making solar photovoltaic technology a technically and economically viable option for utility-scale power generation (Hancock & Evans, 2017; Ministry of Mines and Energy, 2017).

The programme forms part of the Government's 2024 Ministerial Determination and Namibia's Integrated Resource Plan (NIRP 2022), aimed at strengthening security of supply, reducing imports, and expanding least-cost renewable generation across the country. The development further aims to contribute to the Renewable Energy Feed-in Tariff (REFIT) Programme, which is jointly implemented by NamPower and the Electricity Control Board (ECB) of Namibia. The REFIT Programme was established to promote investment in renewable energy generation by Independent Power Producers (IPPs) through the provision of guaranteed tariffs for electricity generated from approved renewable energy technologies, including solar photovoltaic systems. The programme plays a strategic role in diversifying Namibia's energy supply, stimulating private sector participation, and supporting national renewable energy targets (Electricity Control Board, 2016; NamPower, 2018).

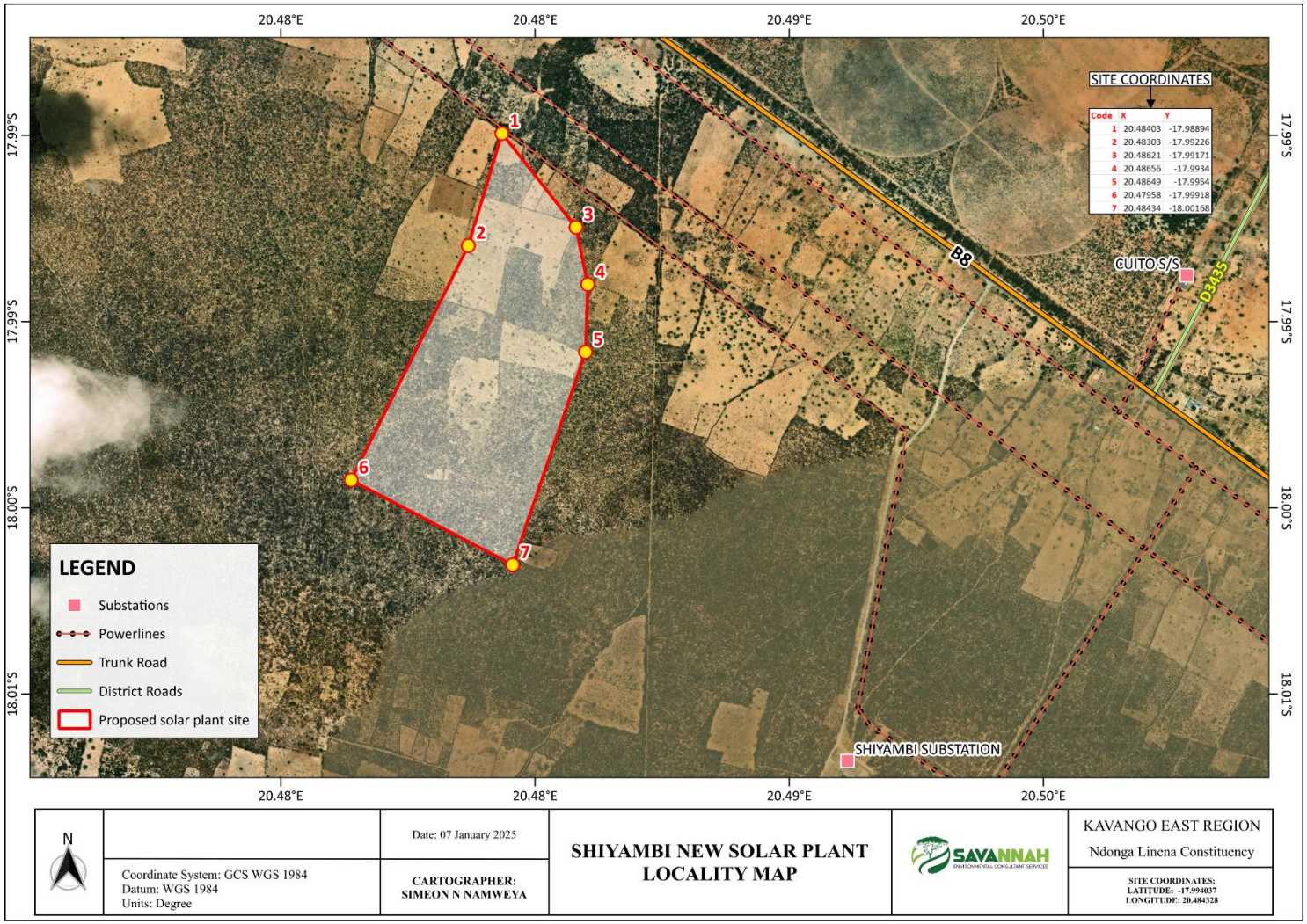

Figure 1: The Locality of the proposed site

1.2 Purpose of the Draft Environmental Management Plan (EMP)

The Draft EMP was developed following Regulation 8(j) of the EIA Regulations (2012) that it should be included as part of the Environmental Assessment (EA) scoping report. A 'Management Plan' is defined as:

"…a plan that describes how activities that may have significant environmental effects on the environment are to be mitigated, controlled, and monitored."

An EMP is one of the most important outputs of the EA process as it synthesizes all the proposed management & mitigation, and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the EA process and the required mitigation measures to be implemented during planning, construction, operation and decommissioning. It is important to note that an EMP is a statutory document, and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and can be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The EMP is therefore aimed at guiding environmental management throughout the different phases namely;

Planning phase – Preparation of all the administrative and technical requirements needed for the actual works on the ground. The planning would entail obtaining the necessary permitting and authorization from relevant national and local stakeholders (such as affected land custodians/users), facilitating the recruitment and procurement processes, etc.

Construction and installation Phase

The construction phase will be temporary in nature and will comprise activities including site preparation and levelling, vegetation clearance strictly limited to the approved project footprint, establishment of temporary construction camps, and installation of mounting structures, photovoltaic panels, inverters, transformers, cabling, internal access roads, and perimeter fencing. Construction activities will require the use of construction machinery and equipment, delivery vehicles, water, a diesel generator, and a temporary workforce. Waste generated during this phase will be managed in accordance with applicable Namibian legislation and recognised industry best practice.

Operational Phase

The operational phase represents the long-term phase of the project and will involve the generation of electricity through solar photovoltaic technology. Activities during this phase will include routine monitoring of system performance, preventative and corrective maintenance of electrical equipment, cleaning of photovoltaic panels using minimal water, vegetation control within the facility, and periodic replacement of components as required. All operational activities will be conducted in compliance with relevant environmental, health, and safety requirements.

Decomissioning phase

Once the operation phase needs to cease, closure plan should be developed by the proponent at least 5 years prior to the expected date of decommissioning.

2. GUIDELINES FOR THE PROPOSED PROJECT LEGISLATION, POLICIES AND ACTS

This section outlines the relevant legal frame works that the proponent should consider once the ECC of the proposed project is issued.

The legislations included or identified in this document, need to be honored by the proponent, during the course of the project. The legal requirements provided here are those that are required project

Table 1: Regulatory framework applicable to the project

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act EMA (No 7 of 2007)	Requires that projects with significant environmental impacts be subject to an environmental assessment process (Section 27). Details principles that are to guide all EAs.	The EMA and its regulations should inform and guide this EA process. Should the ECC be issued to the Proponent, it should be renewed every 3 years, counting from the date of issue.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21).	

	Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
Traditional Authority Act (Act No. 25 of 2000):	The Traditional Authorities should be involved in the planning of land use and development for their area.	The affected communal land falls under the Traditional Authority, therefore they must be consulted throughout the project.
Water Resources Management Act (No 11 of 2013)	Ensure that the water resources of Namibia are managed, developed, used, conserved, and protected in a manner. **Therefore, a Groundwater Abstraction & Use Permit should be applied for. A permit is required for all commercial and industrial water uses. Although exploration is not entirely commercial, the associated activities, such as drilling, fall under industrial activities; thus, a need to apply for an abstraction permit.**	The Water Permit should be applied for from the Ministry of Agriculture, Fisheries, Water, and Land Reform (MAFWLR)
	For any project wastewater planned for discharge into the environment, **a discharge permit should be applied for and obtained.**	**MAFWLR, DWA's Water Environment Division**

Petroleum Products and Energy Act (No. 13 of 1990) Regulations (2001)	Regulation 3(2)(b) states that "No person shall possess or store any fuel except under authority of a licence or a certificate, excluding a person who possesses or stores such fuel in a quantity of 600 litres or less in any container kept at a place outside a local authority area"	The Proponent should obtain the necessary authorisation from the MIME for the storage of fuel on-site (Consumer Installation Permit).
National Heritage Act No. 76 of 1969	Call for the protection and conservation of heritage resources and artefacts.	Should any archaeological material, such as bones, unknown graves, old weapons/equipment, etc, be found on the site, work should stop immediately, and the National Heritage Council (NHC) of Namibia must be informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

3. EMP ADMINISTRATION

To guarantee that the EMP is completely implemented, it is imperative to to clearly outline the roles and responsibilities of all stakeholders .To ensure the effective execution of the EMP, the proponent must additionally designate an accountable individual (project manager), as shown below.

Table 2: Roles and Responsibilities in EMP Implementation

ROLE	ENVIRONMENTAL RESPONSIBILITIES
Tsika Energy (Pty) Ltd	• Responsible to enforce EMP implementation to contractors
Environmental Control Officer (ECO)	• Implement, review, and update the EMP. • Ensure all reporting and monitoring required under EMP is undertaken, documented, and distributed as needed • Conduct environmental site training (toolbox talks) and inductions with the support of an environmental consultant. • Conducts environmental audit at work site with the support of an environmental consultant. • Close out all non-conformances. • Ensure materials being used on site are environmentally friendly and safe.
The Department of Environmental Affairs	• Approve the EMP and any amendments to the EMP. • Approve reports of environmental issues and non-conformances as issued. • Review and approve environmental reports submitted as part of EMP implementation
Environmental Consultant	• Conduct and monitor actions required by the EMP if required • Conduct environmental site training (tool box talks) and inductions if assistance is required • Conducts environmental audit at work site • Ensure materials being used on site are environmentally friendly and safe.
Site Technical Team / Health and safety officer /project manager	• Control and monitor actions required by the EMP. • Report all environmental issues to Environmental Control Officer. • Ensure documented procedures are followed and records kept on site. • Ensure any complaints are passed onto the management within 24 hours of receiving the complaint. • Conduct environmental site training (tool box talks) and inductions if assistance is required

ROLE	ENVIRONMENTAL RESPONSIBILITIES
	• Ensure all workers are complying with the EMA as well as the safety at work
Workers	• Follow requirements as directed by the site technical. • Report any potential environmental issues to the site engineer/project manager, indicating spilled oil, excess waste, excessive dust generation, dirty water running off the site, and other possible non-conformances

4. EMP MANAGEMENT ACTIONS

The management actions aim to avoid potential impacts where possible. Where impacts cannot be avoided, management actions are outlined in order to minimize the significant impacts.

The tables below outline the specific management actions which to be undertaken during the planning, design, construction, operational phase and decommissioning

Table 3: Management action during the planning and design phase

Aspect	Potential Impact	Key Mitigation / Management Measures	Key Performance Indicators (KPIs)	Responsibility
EMRP implementation and training	Lack of EMRP awareness and non-compliance	• Develop project-specific ESMS and EMRP framework; • Establish non-compliance penalty system; • Appoint ESH officers and external ECO	• ESMS and EMRP approved; • ESH officers and ECO appointed; • Penalty system in place	• Environmental Control Officer • Project Manager
Authorisations and permits	Delays due to missing permits and agreements	• Obtain all statutory permits, • Licences, and agreements prior to works; • Maintain communication with the landowner	• All permits and agreements obtained before construction	• Environmental Control Officer;; • Project Manager
Aesthetic and visual impacts	Visual intrusion and landscape alteration	• Bury cables and pipelines where feasible; • Design infrastructure to minimise visual disturbance and protect	• Infrastructure designed to minimise visual impacts	• Environmental Control Officer •

		scenic and heritage values		
Stakeholder communication	• Conflict due to poor communication	• Appoint Community Liaison Officer; • Establish communication and grievance mechanism; • Maintain transparency	• CLO appointed; • Grievance register in place; ongoing stakeholder engagement	• Tsika Energy Pty Ltd;
Employment creation	Limited local employment benefits	• Plan for preferential local employment; • Comply with the Labour Act; promote gender equality and prohibit child/forced labour	• Recruitment plan prioritising local labour; labour compliance	• Tsika Energy Pty Ltd; •
Procurement of goods and services	Limited participation of local businesses	• Prioritise local and regional service providers; • Procure from compliant and registered suppliers	• Evidence of local procurement	• Environmental Control Officer; • Project Manager
Corporate Social Responsibility	Missed community development opportunities	• Plan for community investment initiatives in	• Documented CSR commitments	• Environmental Control Officer

		Shankara and the surrounding areas		
Land use	Socio-economic disputes	• Commit to land access and lease conditions; • Plan timely payment of land use fees	• Proof of agreements and planned payments	• Environmental Control Officer
Water use and hydrology	Over-abstraction and pollution	• Plan water-efficient systems; • Prohibit borehole drilling; • Design compliant sanitation;	• Water management measures included in design; • Water supply agreement obtained	• Environmental Control Officer;; • Site Engineers
Energy consumption	Inefficient energy use	• Incorporate energy-efficient equipment and systems; • Including electrical safety measures	• Energy-efficient systems specified	• Tsika Energy Pty Ltd; • Design Engineers
Waste management	Environmental pollution	• Develop waste management plan; • Apply the waste hierarchy; • Plan hazardous waste disposal at the certified landfill, which can be	• Waste permits identified and planned	• Project Manager; • ESH Officer

		the Oshakati Dumping site.		
Occupational health and safety	Worker health and safety risks • Injuries to workers such as Occupational dermatitis, slips and fall of humans and objects, musculoskeletal disorders, etc.	• Develop OHS procedures; • Plan PPE provision; • Appoint safety personnel	• OHS plan prepared; • PPE requirements specified	• Tsika Energy Pty Ltd; • Project Manager
Infrastructure layout and routing	Disruption of socio-economic activities of the surrounding local land users	• Optimise layout and routing of access roads and power lines; • Align new lines with existing corridors	• Environmentally optimised site layout	• Environmental Control Officer; • Project Manager

Table 4: Management action during the construction and operation phase

Aspect	Key Impacts	Core Management and Mitigation Measures	Key Performance Indicators (KPIs)	Responsibility
EMRP implementation	No;n-compliance and weak environmental control	Implement EMRP penalty system; appoint ESH officers and external ECO; daily inspections; biannual audits and reporting to MEFT	EMRP systems operational; ECO audits completed;	• Tsika Energy Pty Ltd; Project Manager; • ESH Officers;

			biannual reports submitted	• Enviromental Control Officer
Site preparation	Disturbance beyond the approved footprint	Demarcate site boundaries; restrict activities to approved areas; site manager inspections	No work outside the demarcated footprint	• Tsika Energy Pty Ltd; ; • Contractor
Sourcing of materials	Environmental damage from illegal sources	Procure materials only from environmentally authorised suppliers	Proof of certified material sources	• Tsika Energy Pty Ltd; ; • Project Manager
Land clearing	Excessive vegetation and soil disturbance	Limit clearing to a minimum footprint; restrict machinery use; control vehicle movement	Minimal cleared areas; no farmer complaints	• Environmental Control Officer; Contractor • Site Manager
Worker facilities	Poor worker welfare	Provide potable water, sanitation and rest areas	• Adequate facilities available onsite	• Tsika Energy Pty Ltd; ; • Contractor
Solid waste management	Pollution and littering	Implement Waste Management Plan; waste segregation; recycling; no burning or burying; licensed disposal	• No visible litter; • waste records retained	• Project Manager; Contractor; • ESH Officer

Hazardous waste	Soil and water contamination	• Bunded fuel storage; Spill prevention; • Emergency response; disposal at licensed hazardous facilities	• No uncontrolled spills; • hazardous waste records	Enviornmental Control Officer; ; Project Manager
Human waste	Sanitation pollution	• Provide toilets; • Contract licensed sewage removal services	• Functional ablutions; disposal contracts in place	• Tsika Energy Pty Ltd; • ; Contractor
Soil and water protection	Pollution and contamination	• Spill prevention; • Impervious surfaces; drip trays; • Offsite equipment washing; emergency spill plans	• No visible pollution; • Trained personnel	• Tsika Energy Pty Ltd; ; • Contractor
Water use	Overuse of scarce water	• Maintain infrastructure; reuse greywater; leak inspections;	Water-saving measures documented	• Tsika Energy Pty Ltd; ; • Project Manager
Stormwater management	Sediment and polluted runoff	Install berms, drains, silt fences and sediment traps; maintain systems	Stormwater controls in place	• Tsika Energy Pty Ltd; ; • Contractor

Fire management	Accidental veld and site fires	Fire prevention training; firefighting equipment; no open fires; emergency response plans	No fire incidents; trained personnel	Environmental officer Contractor
Biodiversity – fauna	Injury, disturbance, poaching	• Prohibit hunting; • Environmental awareness training; • Snake handling capacity; • Secure trenches	• No wildlife incidents; • trained ESH staff	• Tsika Energy Pty Ltd; ; • Contractor
Biodiversity – flora	• Loss of aesthetic value of the proposed project area. • The few small animals still habiting the place such as small rodents and birds will be forced away. • The ecosystem food chain on and around the area will be broken	• Restrict clearing; • protect undisturbed areas; • compost cleared material; • no firewood collection	No unauthorised vegetation removal	• Tsika Energy Pty Ltd; ; • Contractor
Bird–power line interaction	Bird electrocution and collision	Bird-safe tower design; install flight diverters	Minimal bird mortality records	Tsika Energy Pty Ltd; ; Contractor

Noise Pollution Noise will be generated through: • Construction of drainage services and water reticulation systems. • Construction of buildings • Moving vehicles. • Installation of PV panels stands	Community residents could be disturbed by the noise. • General annoyance • Driving away of local animal species near the project site	Maintain equipment; restrict work to daylight hours; PPE; complaints register	No unresolved noise complaints	Tsika Energy Pty Ltd; ; Contractor
Dust Generation	• Air quality degradation • Can lead to respiratory illnesses especially to those working in the area.	Road maintenance; watering; dust suppressants; speed limits	No dust complaints; visible suppression	Tsika Energy Pty Ltd; ; Contractor

	• General air pollution. • Nuisance to nearby residents			
Occupational health and safety	Worker injury or illness	OHS plan; PPE; training; first aid; emergency preparedness; GRM	Zero fatalities; safety compliance	Tsika Energy Pty Ltd; ; Contractor; ESH Officers
Community health and safety	Accidents and social disruption	Prefer local employment; secure loads; limit night driving; dust control; access control	No community safety complaints	Tsika Energy Pty Ltd; ; Contractor
Traffic management	Road safety risks Description; • Road Accidents • Damage to roads	Licensed drivers; speed limits; vehicle maintenance; designated parking Traffic signs and symbols should be used at all necessary points along the roads. • Schedule construction work to allow for the movement of material and heavy equipment. • All drivers should be competent and with • Arrange for parking and storage of material onsite where feasible. • Schedule vehicle movement to minimize disruption to traffic flow along the main and access roads. • Make provision	No traffic incidents linked to project	Environmental Control Officer ; Contractor

		for handling peak traffic flows. • Identify traffic hazards and mitigate them		
Archaeological and heritage resources	Damage to heritage sites	Implement Chance Finds Procedure; stop work if discoveries occur; notify authorities	All finds of protected archeological features must be reported	Tsika Energy Pty Ltd; ; Contractor

Create a table for the Positive Impacts associated with the project (see example below)

Impact	Description	Effects	Time frame	Responsibility	Action	Phase
Employment Creation	• The development provides an opportunity of outsourcing work	• Improves disposable income to those employed and their immediate families.	Project lifetime	• Project Manager / Tsika Energy	•	• Construction and Operation
Infrastructure development	• The development presents a unique	• Existing roads will be upgraded which will	• Project lifetime			• Construction and Operation

	opportunity for infrastructure development	benefit the local community. • Development of the facilities will also pave way for future developers to grow interests in the area and result in ripple effects and quick growing of the area				
Support climate change mitigation	• The project is towards clean energy production and is highly beneficial to the country	• Alternative clean energy generation	• Operation phase			Operation

5. Decommissioning and Closure

Decommissioning of the proposed solar power plant will take place at the end of its operational lifespan, typically between 25 years. The process will involve the systematic and safe removal of all project infrastructure, including photovoltaic panels, mounting structures, inverters, transformers, cabling, and associated electrical components. Where required by land restoration objectives and landowner agreements, underground cables and concrete foundations may also be removed.

All dismantled materials will be managed in accordance with applicable environmental legislation and best practice. Reusable and recyclable components such as glass, aluminium, and silicon will be recovered and sent to appropriately licensed recycling facilities, while hazardous and non-recyclable waste will be transported to authorised disposal sites. Measures will be implemented to prevent soil and groundwater contamination during dismantling and waste handling activities.

Following removal of infrastructure, the site will be rehabilitated to a stable and sustainable condition consistent with the agreed post-closure land use. This may include restoration to its pre-development condition or preparation for alternative uses such as agriculture, conservation, or future energy developments. Decommissioning activities will be supported by appropriate planning, financial provision, and regulatory oversight to ensure full compliance with statutory requirements and a smooth transition of land use.

Objectives of Decommissioning

The objectives of decommissioning the solar power plant are as follows:

1. **Safe dismantling and removal**
   To ensure the secure and efficient dismantling and removal of all solar panels, mounting structures, inverters and electrical infrastructure without posing risks to workers, the public or the environment.
2. **Environmental protection**
   To minimise environmental impacts by preventing soil and water contamination, managing hazardous substances responsibly and restoring the site to an environmentally sustainable condition.
3. **Recycling and waste management**
   To maximise recovery and recycling of reusable materials, including glass, aluminium and silicon, and to ensure safe and lawful disposal of non-recyclable and hazardous waste.
4. **Land restoration and reuse**
   To rehabilitate the site to its original condition or prepare it for alternative land uses such as agriculture, conservation or redevelopment for future energy projects.

5. **Regulatory compliance**
   To comply fully with national and local environmental legislation, land-use agreements, health and safety standards and any conditions stipulated in the Environmental Clearance Certificate.
6. **Financial and economic responsibility**
   To ensure that adequate financial provision is in place to cover all decommissioning and rehabilitation costs, thereby avoiding future financial liabilities for landowners or authorities.
7. **Community and stakeholder engagement**
   To maintain transparent communication with landowners, local communities and relevant authorities, addressing concerns and supporting sustainable post-closure land-use outcomes.
8. **Safety and risk management**
   To implement strict occupational health and safety measures that prevent incidents such as electrical shocks, structural failures and exposure to hazardous materials during decommissioning activities.

6. ENVIRONMENTAL MONITORING PLAN
7.

8. CONCLUSION AND RECOMMENDATIONS

The Updated Environmental Management Plan (EMP) is compiled in accordance to the Environmental Management Act 2007 and EMA Regulation 2012. Further consideration was given to relevant legislation throughout the entire process to ensure a successful assessment process.

Impacts likely to occur during project phases were assessed depicting a positive outlook despite limited details of the magnitude of the proposed development. Based on the assessment, the overall project is less damaging to the environment demonstrating improved economic development, high job creation opportunities and community development. Impacts with negative effects were also identified and summarized in a form of environmental management plan to ensure sustainable implementation.

It is important that the proponent observe and maintain accountability to both socio-economic and environmental sensitive activities from the project, such that the project is harmonized with policy, regulations, administrative frameworks and social interface with the public as proposed in the environmental management plan. Failure to observe these measures will significantly affect the local environment and lead to non-compliance. Therefore, implementation environmental protection measures should be executed in consultation with the key stakeholders.

Savannah Environmental Consulting Services cc hereby encourage the proponent to fully implement the Shankara Solar Plant EMP.

APPENDIX 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of proposed development activity are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found during development work. The procedure set out here covers the reporting and management of such finds.

Scope: The "*chance finds*" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "*a person who discovers any archaeological …. Object ……must as soon as practicable report the discovery to the Council*". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC are correctly identified in the field.

Responsibility:

Operator: To exercise due caution if archaeological remains are found.

Foreman: To secure site and advise management timeously.

Superintendent: To determine safe working boundary and request inspection.

Archaeologist: To inspect, identify, advice management, and recover remains.

Procedure:

Action by person identifying archaeological or heritage material

a) If operating machinery or equipment stop work

b) Identify the site with flag tape

c) Determine GPS position if possible

d) Report findings to foreman

Action by foreman

a) Report findings, site location and actions taken to superintendent

b) Cease any works in immediate vicinity

Action by superintendent

a) Visit site and determine whether work can proceed without damage to findings

b) Determine and mark exclusion boundary

c) Site location and details to be added to project GIS for field confirmation by an archaeologist

Action by Archaeologist

a) Inspect site and confirm addition to project GIS

b) Advise NHC and request written permission to remove findings from work area

c) Recovery, packaging and labelling of findings for transfer to National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by archaeologist to confirm that remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.