PROJECT: 55 MW SOLAR PHOTOVOLTAIC (PV) PLANT, SOKOTO
COUNTRY: NIGERIA

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)
SUMMARY

April 2018

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<thead>
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<th>Chiamaka Nwokolo, Investment Officer</th>
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ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN SUMMARY

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<tr>
<th>Project Title</th>
<th>55 MW Solar PV Plant, Sokoto</th>
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<tr>
<td>Project No</td>
<td>P-NG-F00-014</td>
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<tr>
<td>Country</td>
<td>Nigeria</td>
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<td>Department</td>
<td>PESR</td>
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<td>Division</td>
<td>PESR.2</td>
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<td>Project Category</td>
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1 INTRODUCTION

Nigeria has been facing acute power shortages for decades due to unreliability of the main power sources. With a population of over 170 million inhabitants, the country has an estimated electric power requirement of 30,000MW; with the current peak power generation in the country at 5,000MW. This represents a significant deficit in energy, which is manifested across the country as limited access to energy, or where available it has a very low reliability and stability. In order to address the acute and consistent power shortages in the country, the Federal Government of Nigeria has taken steps to invest in the energy sector, including fostering sustainable growth by encouraging private investors to enter the buoyant energy market. As part of this process, in 2016, the Nigerian Bulk Electricity Trader (NBET) signed 14 power purchase agreements (PPA) with a number of developers to produce electricity for supply to the national grid to meet the ever-growing needs of the nation.

The solar photovoltaic power plant in Sokoto State (Northern Nigeria) is one of the projects that signed a PPA with the NBET in 2016. The Project consists of the development, construction and operation of a 55 MW solar PV power plant in Sokoto State which benefits from an estimated irradiation of 2,694 kWh/m2/year. The Project scope also includes the construction of a substation connected to the grid via a 100M long T-line. The project proponent, KVK Power Nigeria PVT Limited is a Special Purpose Vehicle (SPV) incorporated in Nigeria in 2014. KVK is 80% owned by the Africa Finance Corporation and 20% owned by Phanes FZ LLC and other minority shareholders.

This ESMP summary is prepared in accordance with the African Development Bank’s (AfDB) Integrated Safeguard System (ISS) and Environmental Assessment Procedures (ESAP). The ESIA (dated 16 October 2017) and the ESMP (dated 28 March 2018) were prepared in accordance with applicable regulations of the Federal Republic of Nigeria as well as the Equator Principles and IFC guidelines as indicators of best practice by the Wood Group, with specialist input from GeoEnvironmental Resources Limited and Turnstone Ecology.

The project has been assessed to have potential adverse impacts that are site specific, limited in number, reversible and equivalent to the AfDB Operational Safeguard 1, Category 2. This ESMP summary therefore provides information on the project...
components; anticipated impacts of project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangements to facilitate the implementation and monitoring of the ESMP. KVK will have overall responsibility for the implementation and monitoring of the project’s ESMP. The contractors and their subcontractors will be required to prepare work plans for environmental management in line with the project ESMP and associated conditions as may be required by the Federal Republic of Nigeria or Sokoto State Government. To ensure effective management, monitoring and reporting of project related risks, KVK will develop and implement an Environmental and Social Management System during the lifecycle of the project. This will ensure close collaboration and support from the AfDB.

2 PROJECT LOCATION

The project is located on Sultan Atiku Road (Along Dagawa-Argungu Road) Binjin Muza in the Yabo Local Government Area, Sokoto State, Northern Nigeria. The site is approximately 15 km from Binjin Muza community, 5 km from Yabo town (the project affected/host community) and 54 km from the State capital. The site is generally flat with scattered vegetation of shrubs and drought resistant species of trees.

3 BRIEF PROJECT DESCRIPTION AND COMPONENTS

The proposed 55MW Sokoto PV plant is a medium size utility grade grid-connected solar-PV power system consisting of photovoltaic modules/panels, Maximum Power Point Tracking (MPPT) solar power inverters, power conditioning units, medium voltage/33kV step-up power transformers and grid connection equipment. No batteries will be used in the plant because the plant will feed power directly into the grid via the 132kV transmission line that runs adjacent to the site along the Sokoto - Kano / Dutse road.

The solar PV plant, will be constructed on 178 hectares of land and shall comprise of the following components:

- Solar modules of 250 Wp rating and 60,000 pieces in number mounted on single axis trackers;
- Combiner boxes each rated 1,250kVA subsystems constructed and configured with 5.5kWp-22 modules x250 Wp smaller units, with a combiner unit of 19 strings, making a sub-unit of 104.5 kWp;
- Power inverters of size 675kVA and 18-24 in number, each expected to handle installed solar-PV capacity of 836 kWp;
- Power transformers of size 1.250 kVA and 9-12 in number, to step up power from 240 V to 33 kV needed for power transmission and grid feed-in;
- Power substation equipped with protection and control devices as well as circuit breaker sub-systems and relays.
The transmission line will include power cables/conductors, transforms, a tower and supports (e.g. guy wires). Due to the short distance to the connection point, along the southern boundary, only a single tower would be required.

The project will be implemented over a number of phases i.e. pre-construction, construction, operation and decommissioning phases. The activities to be undertaken during each of the phases are summarised in Table 1 below.

<table>
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<tr>
<th>Project Phase</th>
<th>Brief Description of activity</th>
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<tr>
<td>Pre-construction</td>
<td>This will include carrying out land survey, power plant design review with reference to ESIA recommendations, planning for storm water drainage and containment, undertaking site preparation, manufacturing/procurement of items and transporting the required components and construction equipment to site and construction of the base camp.</td>
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<tr>
<td>Construction</td>
<td>This will include establishment of internal and external access roads, establishment of construction areas, construction of the entire 55 MWac solar array, construction of the power substation and other onsite structures and other ancillary infrastructure (i.e. power-line for evacuation of electricity) and inter-connection of the solar plant substation to the national electricity utility grid.</td>
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<tr>
<td>Operational phase</td>
<td>This will include plant operation and maintenance, site remediation, clearance and deposition of debris off the site, restoration of areas where construction activities temporarily disturbed the environment as well as the repairs and replacements of failed parts.</td>
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<td>Decommissioning</td>
<td>The project will have an economic useful lifespan of 30 years, after which the power plant will either be upgraded (subject to a new licence) or decommissioned.</td>
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<td>If the plant is upgraded, it will consist of replacing old PV modules for new ones, increasing the total peak power of the plant or increasing the power of the plant by adding new elements such as trackers, PV modules or transformers. If it is decommissioned, all facilities, above ground and below ground infrastructure on the site will be removed and the site will be returned to conditions, which are close as possible to its original state.</td>
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4 MAJOR ENVIRONMENTAL, SOCIAL AND CLIMATE CHANGE IMPACTS

In accordance with the AfDB’s Environmental and Social Assessment Procedure (ESAP), the project has been classified as a Category 2 project. This means that all known environmental and social risks can be minimised and managed through implementing preventative measures and effective management plans.

Positive Impacts

The Sokoto Power Project is aligned to Nigeria’s development agenda of increased economic growth and social development in a clean and secure environment. The main positive impact of the project is that it would address the critical energy shortages in Nigeria and provide a reliable source of energy to meet the huge demands in Nigeria. The proposed project will help stabilise the grid power supply and cushion the grid against power fluctuations. Increased power supply will help improve access to electricity and thus encourage further investments, locally and nationally.
The project is expected to provide employment opportunities to the locals and other Nigerians at large and the increases in income will result in improvements of the economic conditions and standard of life of the local residents of Yabo. It is also expected to improve infrastructure, encourage economic growth, reduce incidences of wood/charcoal burning, improve local capacity in renewable energy development technologies and increase Government of Nigeria’s revenue base through levies.

**Negative Impacts**

During construction phase, earthworks, road construction and use of heavy vehicles could alter surface drainage patterns leading to increased erosion and surface run off sediments. Sustained groundwater abstraction via boreholes for the construction and operational phases could affect groundwater levels, resulting in reduced groundwater availability for other local users as well as raise potential conflicts. Leaks associated with uncontrolled discharges from poor site practices or poorly maintained site equipment could result in pollution of groundwater resources. Poor waste management practices during the construction and operational phases could result in negative impacts. Increased transportation associated with project could result in increases in the risk of traffic accidents.

It is anticipated that the project will impact on a water pond located in the north west of the project site adjacent to the Binji Muza road and at the border of the project. The pond will be fenced out of the Project area and will not be used by the project. The influx of migrant workers during the construction phase could also result in conflicts between local residents and construction workers linked to increased alcohol and drug use, crime level, unwanted pregnancies, communicable diseases and increased risk of sexually transmitted diseases. In addition, the influx of migrant workers could result in increased pressures on the existing social infrastructure of the project area.

Although anticipated, the project will NOT involve any economic displacement, nor resettlement either voluntary or involuntary. No displacement will occur as a result of this project. However, to mitigate the potential economic and physical displacement impacts, further hydro-geological studies will be conducted by the EPC contractor to understand the extent of water availability in the affected area and associated impacts to community wells.

Generally, the bulk of the potential negative effects will be during construction phase of the project. During the operational phase, there will be no significant enduring negative effects from the project. As such, most of the project impacts are of low magnitude, localized in extent and short-term in duration related mainly to the construction phase. The mitigation measures recommended in the ESMP will guide and ensure that impacts of the construction works are minimised. A number of environmental good management measures are also proposed for the operational phase in order to minimise potential environmental and social impacts. The ESMP is aligned with the AfDB’s ISS.
Climate Change Impacts

The project contributes to Nigeria’s vision to develop a low carbon economy. The proposed project is clean energy, which will reduce Nigeria’s contribution to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increases the carbon load on the environment. The positive impacts of the project associated with improved infrastructure, reduced dependence on wood charcoal burning as an energy source will reduce climate change overall.

5 ENHANCEMENT/MITIGATION MEASURES AND COMPLEMENTARY INITIATIVES

A summary of the main environmental and social impacts, the recommended mitigation and enhancement measures, the environmental supervision/monitoring programme as well as the stakeholders responsible for them for the pre-construction and construction phases, operational and decommissioning phases of the project is presented in Annex I, II and III respectively.

The AfDB as the project lenders as well as the shareholders (Phanes Group and other minority shareholders represented by the SPV KVK Pvt Ltd) will require compliance with the relevant performance standards and requirements. KVK has the overall responsibility of developing, reviewing, and updating the ESMP. It will also monitor and audit the implementation of the ESMP on a regular basis. KVK will provide appropriate training for their staff in relation to implementing the ESMP.

The EPC contractor, Sumec Group Corporation, shall be responsible for management of the construction site and their activities in compliance with the ESMP, the relevant laws and regulations and the international standards set out in the ESMP. They shall take the required precautions, carrying out the necessary actions to minimise environmental and social impacts that may occur during the construction and operation of the 55MW Sokoto Solar PV Project. In addition, to the contractor method statements, the following management plans have also been developed by the contractor to ensure that all E & S issues are adequately addressed during the construction phase:

1. Project HSE Management Plan: Sokoto Solar Farm
2. Occupational Health and Safety Plan
3. Transport Management Plan.
4. Waste Management Plan (includes Hazardous Waste Management)
5. Water Resource and Management Plan (includes Drainage Design)
6. Community Health and Safety Plan
7. Emergency Preparedness and Response Plan
8. Noise Reduction Plan
9. Pollution Prevention and Control Plan (includes Wastewater Management, Hazardous Materials Safety and Dust Management)
10. Chance Find Procedure
11. Ecological Management Plan (includes Indigenous Vegetation Management and Rehabilitation and Landscaping)
12. Site Security Plan
During the operational phase, the O & M Contractor will develop specific management plans as required e.g. Liquid Waste Management Plan.

6 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAM

As part of the 55MW Sokoto PV Project, a programme of Environmental and Social Monitoring will be undertaken in order to verify the effectiveness of the proposed mitigation measures and where required, develop alternative or supplementary mitigation measures if the expected outcomes are not being achieved. As part of the ESMP, a number of key performance indicators (KPIs) have been developed for the monitoring plan and programme. The KPIs, which were developed in line with national standards and international best practice for all project phases are summarised in Annex IV.

7 PUBLIC CONSULTATIONS AND DISCLOSURE REQUIREMENTS

As part of the ESIA for the project, consultation was undertaken with a number of stakeholders in order to disclose project information and obtain stakeholder feedback, which could be integrated into the ESIA development process. The consultation and disclosures undertaken as part of the Project were aligned with the AfDB ISS, OS 1 & 2 (Involuntary resettlement, land acquisition, population displacement and compensation), the Equator Principle 5 (Consultation and Disclosure), Equator Principles 6 (Grievance Mechanism) and IFC Performance Standards 1 (Social and Environmental Assessment and Management Systems), 4 (Community, Health, Safety and Security) and 5 (Land acquisition and Involuntary Settlement). During the consultation process, engagements were undertaken with a number of stakeholders namely, Government agencies related to the project approval and review process, educational organizations, NGOs/Public Organizations, local residents and citizens independent of pastures and local communities. In total 8 meetings were held with various stakeholders. Site visits were in October 2014 and September 2016 including meetings with local stakeholders within the project area. Additional to this, further consultations took place in August 2017 with various stakeholders from local authorities to affected community members as part of the stakeholder engagement plan.

The consultations undertaken as part of the ESIA, established that the project host/affected community is Yabo. Other neighbouring communities are Sainyinan Daji, Toronkawa, Kibiare, Alkaliji, Chilgori, Kalangu and Baware; all within the Yabo Local Government Area. The consultations established that most locals viewed the project positively in relation to job creation (97% of respondents) and some felt that the project would have significant impacts on the environment (52% of respondents).

Stakeholder engagement is a continuous process and it is expected that engagement with surrounding communities would continue during the construction and operational phases including mechanisms for community complaints to prevent, mitigate, or resolve tensions and conflicts between the project and local communities. The ESIA and ESMP will be disclosed on KVK’s website and at locations accessible...
to local communities. KVK will also disclose a Stakeholder Engagement Plan as well as the monitoring reports during the lifecycle of the project.

A project-level Grievance Mechanism has been developed to address any environmental & social complaint or incident that may arise from the site activities. An independent consultant has been appointed to start the distribution of Grievance Forms. The concrete actions which form part of the grievance mechanism procedure include:

- Contact telephone numbers including a 24-hour number will be published in leaflets distributed to occupants of neighbouring communities and will also be detailed on the site entrance sign;
- The complaint and notifiable incidents procedure/s will be followed by the site management and office staff;
- Any complaints and incidents are reported to the Environmental Manager who ensures that they are fully investigated, resolved and closed out.

The flowchart below shown the general process of managing the complaints and other grievances during the lifecycle of the project.
8 INSTITUTIONAL ARRANGEMENTS AND CAPACITY BUILDING

The overall responsibility for the implementation of all the environmental and social mitigation actions detailed in the ESMP rest with the project proponent, KVK Pvt Ltd. KVK will appoint an ESMP team led by an EHS Manager to assume overall responsibility for monitoring the implementation of the ESMP through the construction phase of the project. KVK will also develop internal capacity in monitoring, audits and reporting to provide an enabling environment to address environmental and social issues competently, timeously, effectively and in a culturally appropriate manner. A Sokoto Solar Farm environmental committee will be established prior to commencing the site construction phase and meetings will be held regularly during the construction phase. The committee will include representatives from the local government, Contractors, KVK, the project’s E & S Consultant and local residents’ representative. The committee would act as a forum for the exchange of information on progress of the site and for the company to listen to any views of local residents relating to the development and respond accordingly. The committee will agree the frequency of the meetings, and if considered necessary, the meetings will extend into the first year of the operational phase of the project. The local regulatory authorities will also monitor the EIA Permit conditions.

KVK shall in liaison with the EPC contractor, identify, develop and deliver training courses to personnel of the power plant during the construction and operational phases of the power plant. Whilst this will be the case, it is generally considered that the project team has the capacity to effectively and adequately manage the social and environmental issues that could emerge from the project. The EPC contractor will regularly report the outcome of the ESMS and ESMP implementation and monitoring to the EHS Manager of KVK Pvt Ltd. Regular periodic reporting to the EHS Manager will mainly be the responsibility of the Contractors and their subcontractors. During the operational phase, direct responsibility for environmental and social compliance as well as the implementation of the mitigation, management and monitoring measures described in the ESMP report, will continue to be with the management level of the O & M Contractor of the solar plant.

9 ESMP IMPLEMENTATION COST

As the project proponent, KVK Pvt Ltd has proposed that a dedicated ESMP team will undertake the majority of the mitigation and monitoring tasks during the construction phase. The team shall comprise an ESMP specialist with support from junior staff. In addition, there will be a requirement to carry out specialist monitoring in relation to topics such as archaeology and ecology. It is estimated that over the 12-month construction period, the implementation of the mitigation and monitoring measures in the ESMP will cost $106,000 USD (0.14% of total project costs). A breakdown of the estimated costs is presented in Table 2.
Table 2: Summary of ESMP Implementation Costs

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<thead>
<tr>
<th>Task</th>
<th>Responsible Person</th>
<th>Estimated Costs (USD)</th>
<th>% of Project Costs</th>
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<tbody>
<tr>
<td>Management of ESMP and coordination of team</td>
<td>EHS Manager</td>
<td>$35,000</td>
<td>0.05%</td>
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<tr>
<td>Day to day implementation, audits and reporting</td>
<td>2 EHS Consultants</td>
<td>$30,000</td>
<td>0.04%</td>
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<tr>
<td>Archaeological survey, watching brief and reporting</td>
<td>Project archaeologist</td>
<td>$20,000</td>
<td>0.03%</td>
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<tr>
<td>Pre-construction ecological surveys</td>
<td>Project ecologist</td>
<td>$20,000</td>
<td>0.03%</td>
</tr>
<tr>
<td>Analysis of water and soil samples</td>
<td>Suitably qualified third party laboratory</td>
<td>$1,000</td>
<td>0.001%</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>$106,600</strong></td>
<td><strong>0.14%</strong></td>
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</table>

As part of the implementation of the ESMP, it is expected that the appointed EPC Contractor (Sumec) will follow industry good practice at all times via the implementation of their own management systems and construction works method statements, which will be aligned with the project wide ESMP. The Contractor costs related to addressing E & S issues as part of the general construction methods have not been estimated as part of the project wide ESMP, because it falls under the scope of the EPC Contractor and are to be committed under the terms and conditions of a contractual agreement with the proponent, KVK Pvt Ltd.

10 IMPLEMENTATION SCHEDULE AND REPORTING

Construction work for the project is envisaged to start in 2018 and would last for 12 months. The operational phase of the project is expected to last for 30 years. The project proponent, KVK Pvt Ltd will have a dedicated ESMP implementation team lead by an EHS Manager to manage the monitor the implementation of the ESMP mitigation measures.

KVK will carry out the required monitoring and audits aimed at improving Sokoto solar farm’s environmental and social performance. The monitoring will be comprised of weekly checklists, follow-up checklists, and quarterly audits during construction and monthly, semi-annual, and annual audits during operation. As part of the monitoring programme, quarterly monitoring reports will be prepared by the Contractors, under KVK supervision summarising the all-monitoring results against the requirements of the ESMP. The monitoring reports will be submitted to the AfDB for review and approval.

In accordance with the ISS, the AfDB environmental & social safeguards specialists will also be undertaking periodic monitoring visits to monitor compliance against the project ESMS, ESMP as well as offer additional support on matters of environmental and social risk management.

11 CONCLUSION

The planned construction of the 55MW Solar PV Project in Sokoto will result in positive impacts related to the production renewable energy, with no greenhouse gas emissions. However, the site preparation and construction phases of the project will generate some short-term negative environmental and social impacts. These impacts can be minimized by applying appropriate management and mitigation measures, which are detailed in the ESMP developed by the project proponent, KVK Pvt Ltd.
There will be a requirement to continuously monitor and audit all activities during the construction and operational phase of the project to ensure that the ESMP is fully implemented and complied with in accordance with national regulations and AfDB safeguards requirements. Parties responsible for non-conformances of the ESMP will be held responsible for any rehabilitation that may need to be undertaken. Subject to the implementation of the ESMP, including performance monitoring and reporting, the project will have an overall positive impact in the medium to long term.

12 REFERENCES AND CONTACTS

References


AfDB Integrated Safeguards System (ISS) and Environmental and Social Assessment Procedures (ESAP), 2013

Contacts
For additional information in relation to the 55 MW Sokoto PV Project, contact the following individuals.

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Michal Milacek, Senior Project Development Officer, Phanes Group. Email: mm@phanesgroup.com
## ANNEX 1: ESMP FOR THE PRECONSTRUCTION AND CONSTRUCTION PHASE

<table>
<thead>
<tr>
<th>A1</th>
<th>Loss of Vegetation Cover and Effects on Fauna</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>1.</td>
<td>Implement proper management measures to prevent damage to biodiversity within the proposed project site</td>
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<td>2.</td>
<td>Ensure that the roads, control compound, transmission line route and other site facilities are clearly demarcated before construction begins</td>
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<td>3.</td>
<td>Where possible, initial site preparation and site clearance should be undertaken during the dry season to reduce impacts on nesting birds and other breeding species.</td>
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<td>4.</td>
<td>Undertake a pre-construction survey for works within the wet season to check for animals (reptiles and active bird nests). If species of conservation importance are identified, construction activities are to avoid such features until they have been moved or there is a natural cessation of breeding effort.</td>
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<td>5.</td>
<td>During road construction, gravel will be placed on a four to six meter-wide access road that will accommodate vehicles and reduce soil erosion in adjacent areas.</td>
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<td>6.</td>
<td>Store equipment in dedicated areas and implement site inspections to ensure that it is being adhered to</td>
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<td>7.</td>
<td>All construction vehicles are to be confined to designated roadways. The use of vehicles and equipment off prepared roads is to be prohibited.</td>
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<td>8.</td>
<td>Ensure that construction traffic and workers do not move outside of the designated construction areas as well as the adjacent wetland area.</td>
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<td>9.</td>
<td>Develop a plan to maintain the indigenous vegetation during construction</td>
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<td>10.</td>
<td>Develop an appropriate landscaping plan and use indigenous vegetation for landscaping to preserve floral diversity</td>
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<td>11.</td>
<td>Designate access routes and a parking area within the site to reduce vegetation disturbance</td>
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<td>12.</td>
<td>Ensure regular inspection of construction works.</td>
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<td>13.</td>
<td>Road conditions to be monitored regularly and damaged and rutted roads are to be repaired rather than bypassing damaged sections.</td>
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<td>14.</td>
<td>Ensure that a ban on hunting activities is enforced.</td>
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<td>15.</td>
<td>No works are to be completed at night under artificial lighting.</td>
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<tr>
<td>16.</td>
<td>Ensure that night-time vehicle movements and lighting are controlled.</td>
<td></td>
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<tr>
<td>17.</td>
<td>Machinery to be maintained regularly to reduce potential noise disturbance.</td>
<td></td>
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<tr>
<td>18.</td>
<td>Install bird diverters (at 10m intervals) on newly constructed overhead lines in order to reduce the potential bird collision risk and prevent collision mortality.</td>
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</tbody>
</table>

### Dust Management

<table>
<thead>
<tr>
<th>A2</th>
<th>Pollution of Ground/Surface Water from Liquid Wastes (including Sewage Effluent)</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Develop a Wastewater Management Plan for use at the site in line with wastewater management regulations and water quality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>regulations</td>
<td></td>
<td></td>
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<tr>
<td>3.</td>
<td>Ensure proper storage of wastewater at the site before disposal to a designated facility by a registered waste handler</td>
<td></td>
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<tr>
<td>4.</td>
<td>Prohibit illegal disposal of wastewater into water resources around the project site</td>
<td></td>
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<tr>
<td>5.</td>
<td>Ensure regular inspection of wastewater management practices within the solar farm to check for compliance</td>
<td></td>
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<tr>
<td>6.</td>
<td>Ensure there are proper and adequate sanitation facilities at the site during construction.</td>
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<tr>
<td>7.</td>
<td>Ensure that the sanitation facilities are inspected regularly and kept in good working order.</td>
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<tr>
<td>8.</td>
<td>Ensure that liquid wastes (including sanitary waste) is disposed of at registered waste disposal facilities by licensed waste contractors and that waste transport vehicles used are appropriate for the type, class and quantity of waste being transported.</td>
<td></td>
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</tbody>
</table>

### Wastewater Management Plan

<table>
<thead>
<tr>
<th>A3</th>
<th>Change in Air Quality</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A Transport Management Plan will be prepared to include measures for reducing air pollution as well as reducing risks to drivers and components being transported. The TMP will include (amongst others):</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>a.</td>
<td>Monitoring the efficiency of deliveries of construction materials to the Project site and ensure that sufficient storage provision is made available on site to prevent delays to the construction process.</td>
<td></td>
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<tr>
<td>b.</td>
<td>Control the speed limit for all motor vehicles coming to or leaving the construction site</td>
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<tr>
<td>c.</td>
<td>Train all workers on the management of air pollution from vehicles and machinery</td>
<td></td>
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<tr>
<td>d.</td>
<td>Prohibit engine idling and over revving of construction vehicles and machinery to minimise emissions</td>
<td></td>
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<tr>
<td>e.</td>
<td>Ensure regular inspection and scheduled maintenance for all construction vehicles and machinery</td>
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<tr>
<td>2.</td>
<td>A Dust Management Plan will be prepared to include measures to reduce dust generated by vehicles moving to and from site. This will include (amongst others):</td>
<td></td>
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<tr>
<td>a.</td>
<td>Sprinkle water (or non-toxic chemicals) at the construction site and on access roads to minimize fugitive dust during dry weather conditions</td>
<td></td>
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<td>b.</td>
<td>Provide workers dust masks at all times when working in dusty conditions</td>
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<tr>
<td>c.</td>
<td>Continuously monitor dust emission levels at construction site</td>
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<tr>
<td>d.</td>
<td>Ensure the vehicles transporting loose materials like soil and cement are properly covered.</td>
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</table>

### Air Quality Monitoring Plan

<p>| | | | | | |</p>
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<tbody>
<tr>
<td><strong>A1</strong></td>
<td><strong>A2</strong></td>
<td><strong>A3</strong></td>
<td></td>
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</tr>
</tbody>
</table>
### ANNEX 1: ESMP FOR THE PRECONSTRUCTION AND CONSTRUCTION PHASE

<table>
<thead>
<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
<th>Proposed Mitigation Measures</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| A4 Surface Water Drainage / Soil Erosion and Sediment Loading | 1. Reduce erosion by scheduling construction activities to avoid heavy rainfall periods and high winds.  
2. A Drainage Design Plan is to be prepared to intercept run-off from the Project area and direct it to an appropriate settlement pond/wetland constructed for that purpose.  
3. The route of the access tracks is to be optimized to reduce the need for cut-and-fill material and run-off and erosion control features are to be incorporated in designs.  
4. To reduce the potential for erosion of drainage channels during road construction, routes will be selected to avoid ephemeral drainage channels.  
5. A buffer distance of 50m is to be applied to hydrological features.  
6. The pond located adjacent to the western boundary of the site will be fenced out of the Project area and will not be used by the Project.  
7. Culverts or other drainage control features are to be installed where crossings of drainage routes are unavoidable.  
8. Reduce soil erosion by contouring and minimizing length and steepness of slopes.  
9. Provide adequate road drainage based on road width, surface material, compaction and maintenance.  
10. Ensure that drainage channels are vegetated with native grasses as soon as is practically possible following initial construction to stabilize areas of bare earth.  
11. Reduce off-site sediment transport through use of settlement ponds, silt fences.  
12. Salvage and store topsoil and subsoil before areas are excavated, with topsoil stripped and stockpiled separately.  
13. Segregate excavated soils into stockpiles dependent on material type and provide erosion control while stockpiled.  
14. On completion of earthworks, backfill material in the same stratigraphic sequence.  
15. Once construction and road building are complete, scarify all areas compacted by off-road vehicle / equipment movements and establish native grasses.  
16. Confin e all vehicles and equipment to the roadway and, to extent possible, minimize activities during wet conditions. When activities must occur in wet conditions, control stormwater by using fabric, straw bales and other measures to impede storm water flow and prevent erosion.  
17. When damage to wet soil occurs, repair once dry conditions return.  
18. Native grassland seeding should be undertaken following completion of construction across the site where vegetation has been lost. Once established, vegetation should be maintained and managed throughout the operational period to ensure that re-vegetation is appropriately established and erosion is minimised. A strategy for landscaping and associated management will be established prior to operations commencing. | Drainage Design Plan | Contractor | Inspections | Continuous |
|-----------------------------------------|-------------------------------|---------------------------------|----------------------------------------------------|------------------|----------|
| A5 Pollution of Water Bodies | 1. Establish a designated and secure storage area for fuels, oil and chemicals.  
2. Establish a designated storage area with an impervious base and impermeable bund walls, and protected from precipitation.  
3. Capacity must be sufficient to contain the full volume within a bund.  
4. Use impervious surfaces for refuelling areas and other fluid transfer areas.  
5. Fuel pumps and similar items to be placed on drip trays to collect minor spillages. Trays to be checked regularly and any accumulated oil removed.  
6. Ensure that workers are trained on the correct transfer and handling of fuels and chemicals and the response to spills.  
7. Hoses and valves on fuel storage infrastructure are to be checked regularly for signs of wear. Ensure they are turned off and securely locked when not in use.  
8. Ensure that construction vehicles are not left unattended during refuelling.  
9. Provide portable spill containment and clean-up containment (spill kits) at all relevant locations (e.g. fuel stores and refuelling areas) and ensure that any spills are reported to the site manager immediately and clean-up completed. Any fuel contaminated spill kit materials are to be disposed of appropriately, i.e., as hazardous waste.  
10. Spill incidents are to be documented and investigated. | Staff training records  
Spill incident records  
Number of completed inspection missions  
Number of spill kits onsite | Contractor  
Proponent  
Proponent | Regular inspections of fuel/chemical storage areas  
Regular inspections of spill kits  
Spill incident investigation and corrective action reports | Continuous |
| A6 Solid Wastes | 1. Develop and implement a Solid Waste Management Plan before commencement of construction activities in line with the governing regulations.  
2. Train workers on proper solid waste management practices.  
3. Segregate all solid wastes at source.  
4. Re-use, re-cycle or reduce solid waste generation onsite to the extent possible.  
5. Dispose of all construction wastes that cannot be recycled or reused to an approved licensed solid waste disposal site within LGA using a licensed refuse handler.  
6. Provide facilities for proper handling and storage of wastes at designated points.  
7. Do not leave wastes on site at the end of the work.  
8. Provide adequate number of properly contained litter bins and containers properly marked with type of waste. | Solid Waste Management Plan  
Quantity of solid waste generated  
Number of solid waste storage facilities on site  
Quantity of solid waste correctly disposed to approved disposal sites  
Number of completed inspection missions | Contractor  
Proponent  
Proponent  
Contractor | Solid Waste Management Plan  
Regular inspection  
Solid Waste Manifest | Continuous |
<table>
<thead>
<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
<th>Proposed Mitigation Measures</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| A7 Hazardous Wastes                      | 1. Develop and implement Hazardous Waste Management Plan in line with the governing regulations   
2. Train site workers on proper hazardous waste management   
3. Segregate site wastes by separating hazardous waste from non-hazardous waste   
4. Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow   
5. Ensure that hazardous materials are stored in proper areas, where they cannot reach land in case of any spillage   
6. Incorporate dripping pans at machinery, equipment and area prone to contamination by leakage of hazardous materials such as oil and fuel   
7. Regular maintenance of all equipment and machines used onsite so as to minimize leakage of hazardous materials   
8. Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations   
9. Undertake regular inspection of hazardous waste management practices onsite.   
10. Strictly prohibit illegal disposal of hazardous wastes onsite   
11. Store hazardous materials in designated areas secured with a fence | Hazardous Waste Management Plan developed and implemented Number of Trained Workers on Hazardous Waste Management Amount of Hazardous Waste Segregated Quantity of accidental hazard spillage Quantity of hazardous correctly disposed Number of completed inspection missions | Contractor   
Proponent   
Licensed hazardous waste transporter | Inspection Reports   
Hazardous Waste Management Plan and Inventory | Continuous   | Continuous |
| A8 Security Concerns                     | 1. Develop and implement a Site Security Plan   
2. Train workers on the importance of site security   
3. Employ a day and a night time security guards for the solar farm.   
4. Fence the entire solar farm to restrict entrance to the site   
5. Train the onsite guards to adequately handle trespass incidents   
6. Inspect the fence around the facility regularly and seal all loopholes   
7. Ensure adequate lighting within and around the solar farm   
8. Regularly check and maintain security lights at the site | Site Security Plan developed and implemented Number of Security personnel employed Site Fence Trained workers on site security Number of inspection missions | Contractor   
Proponent   
Security Personnel | Inspection Security reports and intelligence | Continuous |
| A9 Noise and Vibration                   | 1. Restrict all construction activities to daytime during normal working hours.   
2. Conduct construction activities within the maximum permitted noise levels.   
3. Provide prior information to the community of any planned noisy activity that is likely to exceed the permitted noise levels.   
4. Where possible, re-locate noise sources (i.e., construction equipment) to less sensitive areas to take advantage of distance and shielding, taking advantage of the natural topography as a noise buffer.   
5. Routinely Project construction traffic through community areas is to be minimised whenever possible.   
6. Strictly ensure the use of protective personal equipment at all times while on site and noise reduction techniques such as silencers and ear mufflers to employees   
7. Regularly monitor noise levels to comply with permitted maximum levels   
8. Inspection of activities during decommissioning by carrying out regular Noise level test.   
9. Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite.   
10. Undertake regular inspection and scheduled maintenance program for all vehicles and machineries on site   
11. Adopt and follow best practicable means to ensure that the quietest available plant and construction techniques are used | Noise monitoring devises procured and installed on site Levels of noise and vibration produced at the site Number of PPE procured and being used by workers Number of Noise complaints received Maintenance procedure for vehicles and machinery Number of inspection missions completed | Contractor   
Proponent   
NEMA | Noise Monitoring Reports   
Inspections | Continuous |
| A10 Archaeology and National Heritage    | 1. Develop provisions for managing chance finds through a Chance Find Procedure. which will be applied should cultural heritage features be discovered during construction activities.   
2. Employ an archaeologist during top soil tripping (trenching) to monitor for chance find archaeological remains.   
3. In case of chance find, the work should be halted, the area protected, and the matter reported immediately to the relevant authority for appropriate action.   
4. Ensure that workers are provided with training on the Chance Find Procedure.   
5. Conduct toolbox talks during construction to ensure that workers will be alert to any signs of past cultural activity in the area. | Chance Find Plan and Procedure Number of recorded chance finds Number of inspections mission on site | Contractor   
Proponent   
National Museum of Nigeria | Chance find procedure and reports   
Inspections | Continuous |
<table>
<thead>
<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
<th>Proposed Mitigation Measures</th>
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<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| A11 Visual and Landscape                 | 1. Develop and implement a site rehabilitation and landscaping plan to restore the site to a better visual state after construction  
  2. Restore natural vegetation through planting of indigenous species  
  3. Ensure proper storage, regular collection and disposal of waste streams generated.  
  4. Carry out the facility inspection work on regular basis  
  5. Minimize the use project construction signage.  
  6. Necessary signage should be made of non-glare materials and unobtrusive colours.  
  7. Remove in a timely manner all the construction machinery, equipment and vehicles that are not in use and keep them in specific locations within the project site.  
  8. Ensure proper storage, collection and disposal of waste streams generated.  
  9. Undertake regular inspection of site construction activities.  
  10. Send and record all incidences of accidents or near misses and keep proper records of the actions taken.  
  11. Use of speed control devices (governors) on trucks and remote monitoring of driver actions.  
  12. Ensure all drivers are licensed and provide additional training (e.g. advanced driver training), where required.  
  13. Provide appropriate traffic safety training to all drivers (employees and contractors) as part of their induction and on an ongoing basis.  
  14. Conduct regular inspections of site operations.  
  15. Use of speed limits and other means to monitor driver conduct.  
  17. Mind PPE procured and being used by the workers.  
  18. Fire extinguishing equipment on site.  
  19. Provision of sanitary facilities on site, including water for drinking and bathing, at all times.  
  20. Site rehabilitation and landscaping plan developed and implemented. | Site rehabilitation and landscaping plan developed and implemented  
  2. Waste management plan developed and implemented  
  3. Site inspection missions completed  
  4. Records of road safety briefings which will be given to all staff and contractors.  
  5. Records of road safety complaints received.  
  6. Number of driving speed violations.  
  7. Number of drivers to receive advanced driver training.  
  8. Number of road safety briefings provided.  
  9. Number of inspection missions completed.  
  10. Inspection reports.  
  11. Corrective Action Reports.  | Contractor  
  12. Contractor  
  13. NEMA  
  14. Proponent  
  15. Proponent  
  16. Proponent  
  17. Proponent  
  18. Proponent  
  19. Proponent  
  20. Proponent | Waste Management Plan  
  1. Inspection reports.  
  2. Record of accidents and near misses.  | Continuous  
  12. Continuous  
  13. Continuous  
  14. Continuous  
  15. Continuous  
  16. Continuous  
  17. Continuous  
  18. Continuous  
  19. Continuous  
  20. Continuous | **Transport Management Plan**  
  1. Number of drivers to receive advanced driver training.  
  2. Number of road safety briefings provided.  
  3. Number of road safety complaints received.  
  4. Number of driving speed violations.  | Continuous  
  12. Continuous  
  13. Continuous  
  14. Continuous  
  15. Continuous  
  16. Continuous  
  17. Continuous  
  18. Continuous  
  19. Continuous  
  20. Continuous | Proponent  
  12. Proponent  
  13. NEMA  
  14. Proponent  
  15. Proponent  
  16. Proponent  
  17. Proponent  
  18. Proponent  
  19. Proponent  
  20. Proponent | Continuous | Continuous |

**ANNEX 1: ESMP FOR THE PRECONSTRUCTION AND CONSTRUCTION PHASE**
## ANNEX 1: ESMP FOR THE PRECONSTRUCTION AND CONSTRUCTION PHASE

<table>
<thead>
<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
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<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| A14 Local Populations and Economy        | 1. Develop and implement a Stakeholder Engagement Plan to ensure that adequate and timely information is provided to local communities.  
   2. Mitigation measures to reduce the potential impacts of community disappointment regarding availability of jobs may include:  
      a. Communicate employment estimates, timeframes and skills requirements clearly to the community.  
      b. Develop, in conjunction with local government authorities and other companies in the area, a Population Influx Framework to address potential indirect impacts of the Project on the local community, including on community infrastructure such as water supply, public health infrastructure and waste water treatment.  
   3. Invest in skills training to enable greater employment of local population throughout Project life, to start as early as possible ensuring maximum employment during construction.  
   4. Implement a Local Hiring Plan in consultation with the community, taking into account the relatively low skill base of the local population when it comes to solar power related jobs.  
   5. Implement a compulsory Code of Conduct for construction workers coming into the area during construction of the Project.  
   6. Enhancement measures to expand the positive, long-term, impacts of Project employment:  
      a. Work with local vocational training schools to develop curricula which will qualify local students to better meet the needs to the developing renewable energy industry locally.  
      b. Invest in capacity building for small businesses to enable them to meet standards for procurement required by the company.  
      c. Based on data from future hydro-geological studies, specific mitigations may include: (1) constructing new wells, (2) improving existing wells to reach greater depths, and (3) restricting Project access to community wells.  
   7. To mitigate the potential economic and physical displacement impacts from the Project, the following measures will be implemented:  
      a. Further hydro-geological studies will be conducted to understand the extent of water availability in the affected area and associated economic displacement as a result of impacts to community wells.  
   8. Local Hiring Plan:  
   9. Emphasize on proper sanitation during operation phase of the project.  
   10. Develop and implement Liquid Waste Management Plan in line with the governing regulations  
   11. Train employees on the importance of proper liquid waste management and water resource management  
   12. Reduce, reuse or re-cycle all liquid waste generated onsite to the extent possible  
   13. Dispose all liquid wastes that cannot be recycled or reused to approved liquid waste disposal facilities a licensed transporter  
   14. Prohibit illegal disposal of wastewater into waste resources.  
   15. Conduct inspection of wastewater management practices to check for compliance  
   16. Emphasize on proper sanitation during operation phase of the project. | Stakeholder Engagement Plan  
Population Influx Framework  
Local Hiring Plan  
Code of Conduct  
Number of skills training schemes  
Number of local sourcing and procurement contracts | Proponent  
Local Government Authorities  
Local Hiring Plan  
Code of Conduct  
Training records | Continuous |

### Indicators

#### Number of Audits completed

<table>
<thead>
<tr>
<th>Proponent</th>
<th>NEMA</th>
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<tbody>
<tr>
<td>Waste Management Plan and Inventory</td>
<td>Continuous</td>
</tr>
<tr>
<td>Inspection reports</td>
<td>Audit Reports</td>
</tr>
</tbody>
</table>
## ANNEX 2: ESMP FOR THE OPERATIONAL PHASE

### Solid Wastes

1. Develop and implement **Solid Waste Management Plan** for the operation phase in line with the governing regulations
2. Train employees on the importance of proper solid waste management
3. Reduce, reuse or re-cycle all solid waste generated to the extent possible
4. Dispose all solid wastes that cannot be recycled or reused to approved solid waste disposal sites in LGA using a licensed refuse handler
5. Maintain proper records of solid wastes to know the quantity of wastes generated on site
6. Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes
7. Perform regular inspection of waste management practices onsite

### Visual Impacts

1. Develop and implement a **site rehabilitation and landscaping plan** to restore the site to a better visual state
2. Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm.
3. Restore natural vegetation through planting of indigenous trees
4. Ensure proper storage, regular collection and disposal of waste streams generated.
5. Carry out the facility inspection work on regular basis

### Hazardous Wastes

1. Develop and implement **Hazardous Waste Management Plan** in line with the governing regulations
2. Train employees on Hazardous waste management
3. Segregate waste by separating hazardous waste from non-hazardous waste
4. Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations
5. Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow
6. Prohibit illegal disposal of hazardous wastes on the solar farm during solar farm maintenance exercise.
7. Store hazardous materials in designated areas secured with a fence
8. Undertake regular inspection of hazardous waste management practices onsite.

### Occupational Health and Safety

1. Develop and implement an **Occupational Health and Safety Plan**
2. Train employees on the importance of occupational health and safety
3. Ensure compliance with the governing regulations
4. Install a fence regularly by netting breakages in order to prevent accidents involving local inhabitants or wildlife
5. Fence the entire solar farm to prohibit unauthorized persons from accessing the site
6. Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls.
7. Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning
8. Regular medical checks
9. Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing
10. Put clear signage to restricted areas in Hausa, English and local language to reduce risk of accidents
11. Undertake regular inspection of the plant
12. Promote HIV/AIDS Awareness

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<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
<th>Proposed Mitigation Measures</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| O2 Solid Wastes                          | 1. Develop and implement **Solid Waste Management Plan** for the operation phase in line with the governing regulations  
2. Train employees on the importance of proper solid waste management  
3. Reduce, reuse or re-cycle all solid waste generated to the extent possible  
4. Dispose all solid wastes that cannot be recycled or reused to approved solid waste disposal sites in LGA using a licensed refuse handler  
5. Maintain proper records of solid wastes to know the quantity of wastes generated on site  
6. Provide adequate waste bins and containers at specific places and ensure they are properly marked with type of wastes  
7. Perform regular inspection of waste management practices onsite | Solid Waste Management Plan developed and implemented  
Quantity of solid waste generated  
Number of solid waste storage facilities at the plant  
Quantity of solid waste correctly disposed to Approved disposal sites  
Number of completed inspection missions  
Annual audits | Proponent  
Licensed hazardous Waste transporter | Inspection Reports  
Audit Reports | Continuous |
| O3 Visual Impacts                        | 1. Develop and implement a **site rehabilitation and landscaping plan** to restore the site to a better visual state  
2. Maintain the existing vegetation around the perimeter of the solar farm to reduce the direct view of the solar farm.  
3. Restore natural vegetation through planting of indigenous trees  
4. Ensure proper storage, regular collection and disposal of waste streams generated.  
5. Carry out the facility inspection work on regular basis | Site rehabilitation and landscaping plan developed and implemented  
Waste management plan developed and implemented  
Site inspection missions completed  
Annual audits | Proponent  
Proponent | Inspection Reports  
Grievance Reports  
Audit Reports | Continuous |
| O4 Hazardous Wastes                      | 1. Develop and implement **Hazardous Waste Management Plan** in line with the governing regulations  
2. Train employees on Hazardous waste management  
3. Segregate waste by separating hazardous waste from non-hazardous waste  
4. Containers for storing hazardous waste including used oil should be securely bundled, labelled and disposed in line with the governing regulations  
5. Ensure the hazardous waste collection containers are emptied at appropriate intervals to prevent overflow  
6. Prohibit illegal disposal of hazardous wastes on the solar farm during solar farm maintenance exercise.  
7. Store hazardous materials in designated areas secured with a fence  
8. Undertake regular inspection of hazardous waste management practices onsite. | Hazardous Waste Management Plan developed and implemented  
Number of Trained Workers on Hazardous Waste Management  
Amount of Hazardous Waste segregated  
Quantity of accidental hazard spillage  
Quantity of hazardous waste correctly disposed  
Number of completed inspection missions | Proponent  
Licensed hazardous Waste transporter | Inspection Reports  
Hazardous Waste Management Plan and Inventory | Audit Reports | Continuous |
| O5 Occupational Health and Safety        | 1. Develop and implement an **Occupational Health and Safety Plan**  
2. Train employees on the importance of occupational health and safety  
3. Ensure compliance with the governing regulations  
4. Install a fence regularly by netting breakages in order to prevent accidents involving local inhabitants or wildlife  
5. Fence the entire solar farm to prohibit unauthorized persons from accessing the site  
6. Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear mufflers and overalls.  
7. Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning  
8. Regular medical checks  
9. Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing  
10. Put clear signage to restricted areas in Hausa, English and local language to reduce risk of accidents  
11. Undertake regular inspection of the plant  
12. Promote HIV/AIDS Awareness | Occupational Health and Safety Plan developed and implemented  
Number of employees trained on occupational health and safety  
PPE procured and being used by the employees  
Fire extinguishing facilities at the plant  
First aid kit on site  
Signage installed at the plant  
Number of inspection missions competed  
Annual Audits | Proponent | Inspection reports  
Record of accidents and near misses  
Corrective Action Reports | Continuous |
<table>
<thead>
<tr>
<th>Anticipated Environmental &amp; Social Impact</th>
<th>Proposed Mitigation Measures</th>
<th>Monitoring &amp; Reporting Indicators</th>
<th>Implementation Plan &amp; Institutional Responsibilities</th>
<th>Monitoring Means</th>
<th>Frequency</th>
</tr>
</thead>
</table>
| D1 Solid Wastes                          | 1. Develop and implement a Solid Waste Management Plan (SWMP) before decommissioning commencement in line with the governing regulations.  
2. The waste streams generated should be re-used, re-cycled and reduced to the extent possible.  
3. Dispose all demolition waste that cannot be recycled or reused to a licensed waste disposal site using a licensed waste handler.  
5. Rehabilitate the site as appropriate using indigenous vegetation species for landscaping to restore biodiversity.                                                                 | Solid Waste Management Plan  
Quantity of solid waste generated  
Number of solid waste storage facilities on site  
Quantity of solid waste correctly disposed to NEMA Approved disposal sites  
Number of completed inspection missions | Contractor  
Proponent  
Licensed hazardous Waste transporter | Solid waste management Plan and inventory  
Inspection Reports                                                                                       | Continuous |
2. Train employees on the importance of occupational health and safety.  
3. Provide workers with appropriate personal protective clothing such as helmets, safety boots, gloves, dust masks, ear muffs and overalls.  
4. Strictly enforce the use of the Personal Protective Equipment to minimise the accidents during decommissioning.  
5. Regular medical checks.  
6. Provide fully equipped First Aid Kit and sanitary facilities on site, including water for drinking and bathing.  
7. Put clear signage to restricted areas in Kiswahili, English and local language.  
8. Prohibit unauthorized persons at the site during decommissioning.  
Number of workers trained on occupational health and safety  
PPE procured and being used by the workers  
First aid kit on site  
Signage installed on site  
Number of completed inspection missions | Contractor  
Proponent | Inspection reports  
Record of accidents and near misses  
Corrective Action Reports | Continuous |
| D3 Change in Ambient Air Quality         | 1. Train all workers on the management of air pollution from vehicles and machinery.  
2. Strictly control the speed limit for all motor vehicles during the demolition exercise.  
3. Sprinkle water on dusty places onsite and on dust to reduce fugitive dust emissions.  
4. Provide workers with dust masks.                                                                 | Number of Vehicles on site  
Quantity of dust emitted  
Quantity of emissions emitted  
Workers trained on air quality management  
Number of completed inspection missions | Contractor  
Proponent | Air Quality Monitoring Reports  
Inspection reports                                                                                       | Continuous |
| D4 Noise Impact                          | 1. All the decommissioning activities will be done during daytime.  
2. The contractor will be kept informed by the community of any noise or vibration complaints.  
3. Conduct demolition activities in line with the maximum permitted noise levels.  
4. Inspection of activities during decommissioning by carrying out regular Noise level test.  
5. Emphasize on the use of noise reduction techniques such as silencers and ear mufflers to employees while onsite.  
6. Develop a regular inspection and scheduled maintenance program for vehicles and machineries in order to abate the noise produced.                                                                 | Noise monitoring device procured and installed on site  
Levels of noise and vibration produced at the site.  
Number of PPE procured and being used by workers  
Number of Noise complaints received  
Maintenance procedure for vehicles and machinery  
Number of completed inspection missions | Contractor  
Proponent | Noise Monitoring Reports  
Inspections                                                                                               | Continuous |
## ANNEX IV: ENVIRONMENTAL & SOCIAL MONITORING PROGRAMME

<table>
<thead>
<tr>
<th>Monitoring Component</th>
<th>Project Phase</th>
<th>Project Activity</th>
<th>Key Performance Indicator</th>
<th>International best practice (IFC EHS Guidelines and AfDB guidelines)</th>
<th>Proposed Monitoring Location</th>
<th>Monitoring Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>M1 Ambient air quality</strong></td>
<td>Construction</td>
<td>Earthwork and removal of vegetation cover</td>
<td>Fugitive dust and particles (SPM, PM10) Greenhouse gas (CO2 emission)</td>
<td>PM10: 50 μg/m3 (24-hours);</td>
<td>Along the roadways Construction areas</td>
<td>Once per construction season</td>
<td>EPC Contractor</td>
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<td></td>
<td>Decommissioning</td>
<td>Transportation of materials, equipment, and employee commuting</td>
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<td>Storage of chemicals, materials, and waste on site</td>
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<td>Other indirect supply chain activities</td>
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<td></td>
<td>Operation</td>
<td>Plant operation</td>
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<tr>
<td><strong>M2 Ambient noise and vibration level</strong></td>
<td>Construction</td>
<td>Earthwork and site preparation</td>
<td>Observed sound levels in Leq dBA for day and night time against nature and recipient</td>
<td></td>
<td>Along the roadway Substation Location of identified sensitive receptors</td>
<td>Once per construction Season Annual or 6 monthly independent audit Following any complaint</td>
<td>EPC Contractor</td>
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<td></td>
<td>Transportation of materials, equipment, and employee commuting</td>
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<td>Earthwork Daily observation</td>
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<td>Operation</td>
<td>Plant operation</td>
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<tr>
<td><strong>M3 Surface and groundwater quality</strong></td>
<td>Pre-construction</td>
<td>Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site</td>
<td>pH (SI), Temperature (°C), Conductivity (μS/cm), TDS (mg/L) TSS (mg/L), DO (mg/L), BOD (mg/L), ORP (mV), E-coli (cfu), Major Cations and Anions (mg/L) and Hydrocarbons (mg/L)</td>
<td>International best practice on protecting surface and groundwater</td>
<td>At any groundwater supply wells constructed prior to construction / operation.</td>
<td>Once</td>
<td>EPC Contractor</td>
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<tr>
<td></td>
<td>Construction</td>
<td>Transportation of oil, lubricating materials, chemicals, and other computations Earthwork</td>
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<td>Operation</td>
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<td>Decommissioning</td>
<td>Earthwork</td>
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<tr>
<td><strong>M4 Soil quality and erosion</strong></td>
<td>Construction</td>
<td>Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site</td>
<td>Erosion rate Soil contamination against International standards</td>
<td>International best practice on protecting surface and groundwater</td>
<td>Across the entire site All areas affected by earthwork, construction equipment, and workers</td>
<td>Once</td>
<td>EPC Contractor</td>
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<td></td>
<td>Operation</td>
<td>Transportation of oil, lubricating materials, chemicals, and other chemical products Earthwork</td>
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<td></td>
<td>Decommissioning</td>
<td>Earthwork</td>
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<tr>
<td><strong>M5 Flora protection</strong></td>
<td>Construction</td>
<td>Earthwork</td>
<td>Loss rate</td>
<td>International best practice on restoring degraded land and re-establishing grassland vegetation relevant to construction, operation, and decommission activities</td>
<td>Soil monitoring and sampling locations</td>
<td>Before construction and after construction season (reclamation)</td>
<td>O &amp; M Contractor</td>
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<tr>
<td></td>
<td>Operation</td>
<td>Transportation</td>
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<tr>
<td><strong>M6 Occupational and public health and safety</strong></td>
<td>Construction</td>
<td>All construction activities</td>
<td>Noise, fire safety, hazardous Materials registrar, solid and sanitary</td>
<td>International best practice on restoring degraded land and re-establishing grassland vegetation relevant to construction, operation, and decommission activities</td>
<td>Entire site and construction camp</td>
<td>To be determined</td>
<td>EPC Contractor</td>
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</table>
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<td>Safety</td>
<td>Operational site</td>
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<td>O &amp; M Contractor</td>
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<td>waste, PPE use</td>
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<td>Training, Traffic, safety,</td>
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<td>Grievances, Other workplace inspections</td>
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<td>M7 Socio-economic conditions</td>
<td>Preconstruction</td>
<td>All project activities</td>
<td>Baseline social economic condition</td>
<td>Safety</td>
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<td>records (wage rate, unemployment rate, local government annual budget, contracts with local service)</td>
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<td>O &amp; M Contractor</td>
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<tr>
<td>M8 Safety and Security</td>
<td>Construction</td>
<td>All pre-construction and construction related activities</td>
<td>Number of security Personnel employed</td>
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<td>Number of inspection missions</td>
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<td>Construction areas and boundary</td>
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<td>EPC Contractor</td>
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