



FINAL REPORT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR THE FEDERAL UNIVERSITY OYE-EKIT INTERCONNECTED SOLAR- HYBRID PROJECTS UNDER THE NIGERIA DISTRIBUTED ACCESS THROUGH RENEWABLE ENERGY SCALE-UP (DARES) - REA- NEP/DARES/C/CQS/071/2025

Submitted



***Federal Ministry of Environment
Mabushi, FCT, Abuja.***

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FINAL ESMP REPORT

**Of the Proposed Solar Power Plant and Associated Infrastructure at the Federal University of Oye-
Ekiti, Ekiti State**

Under the Nigeria Distributed Access Through Renewable Energy Scale-up (DARES)

Submitted
Federal Ministry of Environment
Mabushi, FCT, Abuja.

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EXECUTIVE SUMMARY

ES01 INTRODUCTION

The Federal Government of Nigeria (FGN) has over the past decade, prioritized expanding access to electricity as a critical driver of economic growth, social inclusion, and sustainable development. In 2018, this commitment materialized through the Nigeria Electrification Project (NEP), financed by concessional funding from the World Bank and the African Development Bank. The NEP was designed as a flagship off-grid electrification initiative to bridge the energy access gap in rural and underserved communities. Implemented by the Rural Electrification Agency (REA), the project successfully deployed mini-grids and standalone solar systems, delivering clean and reliable electricity to over seven million Nigerians, while stimulating private sector participation through results-based financing mechanisms.

The Rural Electrification Agency (REA) is a Nigerian government agency responsible for ensuring electricity reaches every part of the country. REA focuses on rural electrification projects, providing power solutions for on-grid and off-grid areas with an emphasis on renewable energy. As the Implementing Agency of the Federal Government of Nigeria, the team at REA is tasked with the electrification of rural and unserved communities across Nigeria.

Project Specific Activities

This component of the project will involve activities undertaken during the various implementation phases of the project as follows; the activities will be separated with respect to their various phases.

- Site clearing;
- Civil, mechanical and electrical works;
- Installation of PV panels and associated plant facilities;
- Construction of training center;
- Installation of streetlights as well as underground armored cable for power evacuation;
- An upgrade of some of the existing power distribution infrastructure within the University will be carried out;
- Testing and checking individual equipment/system, as well as the associated infrastructure to ensure they have been installed correctly and can be handed over for use;
- Generation and distribution of electricity to different sections of the University campus;
- Operation of the renewable energy training center to support learning and capacity development in clean energy technologies;
- Preventive and corrective maintenance aimed at maintaining optimal system performance throughout the plant's lifespan;
- Periodic cleaning of photovoltaic (PV) panels to maintain their efficiency;
- Regular safety inspections and implement measures aimed at preventing accidents, injuries, and occupational health risks;
- Wastes management

Objectives of the ESMP

The purpose of the Environmental and Social Management Plan (ESMP) is to ensure that Environmental and Social impacts identified during the ESMP process are effectively addressed during the construction,

operation and closure of the project. The ESMP specifies the mitigation and management measures to which the proponent is committed and shows how the project will mobilize organizational capacity and resources to implement these measures. The ESMP will be a living document and will continue to develop during the design and construction phases to enable continuous improvement of the Project's environmental performance.

The specific objectives of the ESMP are to:

- Promote effective environmental and social management, communicate the objectives and requirements of the ESMP.
- Ensure compliance with applicable environmental and social laws, regulations, permit conditions, and Project commitments.
- Define clear roles, responsibilities, and accountability for implementing environmental and social measures.
- Integrate environmental and social considerations into Project planning, design, construction, and operation.
- Apply the mitigation hierarchy by avoiding, minimizing, restoring, and, where necessary, compensating for adverse impacts.
- Enhance positive environmental, social, and economic benefits generated by the Project.
- Serve as an action plan for implementing environmental and social management measures.
- Provide a framework for implementing and monitoring mitigation and enhancement measures identified in the ESMP.
- Support continual improvement through monitoring, reporting, and corrective actions.

Rationale for ESMP

The rationale for an Environmental and Social Management Plan (ESMP) is rooted in the necessity to bridge the gap between environmental policy and project implementation. In the context of large-scale development, the ESMP acts as the primary mechanism for ensuring that the findings of an Environmental and Social Impact Assessment (ESMP) are not merely academic but are integrated into the daily operational workflow of a project.

Scope of the ESMP

The scope of the ESMP includes;

- Project Lifecycle Integration.
- Institutional and Regulatory Boundaries
- Environmental and Social Receptors
- Mitigation and Monitoring Protocols

Work Execution Plan/Methodology

This ESMP has been prepared in accordance with standard procedures for Environmental Assessment, including other applicable World Bank safeguard policies and Nigerian policy guidelines. The baseline status of the project area was obtained through consultations with the relevant stakeholders, a review of relevant literature as well as field studies. Environmental data acquisition involved a multidisciplinary approach and was conducted in line with regulatory requirements and best international practices. This approach includes literature desktop review, designing and development of field sampling strategy; confirmation of the sampling design and locations, pre-mobilization activities (job hazard analysis, sampling equipment/materials calibrations, checks and mobilization to the field; community consultations,

sample collection, handling, documentation, storage protocols and demobilization from the field, transfer of sample custody to the laboratory for analysis.

ES02 Project Description

Key Components of DARES are:

Component 1: Solar Hybrid Mini Grids for Rural Economic Development: \$410 million IDA commitment to deploy mini-grids for rural economic growth.

Component 2: Stand-alone Solar Systems for Homes and MSMEs: \$300 million IDA commitment to provide solar systems for households and micro, small, and medium-sized enterprises

Component 3: Technical Assistance: \$40 million IDA commitment for technical support and capacity building.

The Rural Electrification Agency (REA) is implementing DARES through its existing Project Management Unit (PMU). The project has already shown significant progress, with over 200 mini grids delivered nationwide. REA has also signed grant agreements with eight renewable energy companies to deploy solar home systems and mini grids, aiming to electrify underserved communities and drive economic growth.

Description of Project Intervention

The project is being implemented under the Distributed Access through Renewable Energy Scaleup (DARES) programme, which serves as a scale-up initiative from the Nigeria Electrification Project (NEP). Given that this is an Energy-as-a-Service (EaaS) model, the same Energy Service Company (ESCO) responsible for the design and construction of the project will also manage its operations and maintenance (O&M) throughout the service period. This arrangement promotes lifecycle accountability because the ESCO has a direct incentive to ensure that the system is designed for reliability, efficiency, maintainability, and long-term performance. Its O&M responsibilities will typically include routine inspections, preventive and corrective maintenance, fault response, equipment replacement, spare-parts management, performance monitoring, and compliance with agreed service-level requirements and key performance indicators (KPIs).

The project intervention for a utility-scale solar photovoltaic (PV) plant involves a multi-phase transformation of land to harness solar irradiance for electrical power generation. The intervention begins with site preparation, which necessitates the clearing of vegetation and the leveling of terrain to accommodate the mounting structures. This phase is critical as it alters the local topography and drainage patterns, requiring careful management to prevent soil erosion and sedimentation.

The core of the intervention involves the installation of PV modules, which are typically arranged in arrays mounted on steel or aluminum racking systems. These systems may be fixed-tilt or utilize single-axis tracking mechanisms to optimize the angle of incidence, thereby maximizing energy yield.

The electrical infrastructure component includes the installation of inverters to convert direct current (DC) to alternating current (AC), transformers to step up the voltage for grid transmission, and a network of underground or overhead cabling. The intervention also requires the construction of access roads, perimeter fencing, and an operations and maintenance (O&M) building. The total land footprint is a function of the power capacity and the technology employed, often requiring significant spatial allocation.

to minimize inter-row shading. The intervention concludes with the grid interconnection, which links the facility to the regional transmission network, marking the transition from the construction phase to the operational phase.

Project Schedule

The project is scheduled to last till the last quarter of 2028, starting from the second quarter of 2026 (see **Table 2.1** in Chapter 2 of the report).

ES03 Relevant Policies, Legal and Administrative Framework

The project shall ensure compliance with the relevant and applicable local and international regulations, policies, and standards throughout its life cycle.

Policy Framework

- National Environmental Policy/ National Policy on the Environment (Revised 2016)
- Social Protection Policies
- National Policy on Climate Change/ National Climate Change Policy for Nigeria 2021-2030
- The National Electric Power Policy (NEPP), 2001
- The National Energy Policy (NEP) 2013
- The National Energy Efficiency Action Plans of Nigeria

National Legal Framework

- The Environmental Impact Assessment Act No. 86, 1992/Environmental Impact
- Assessment Act Cap E12 LFN 2004
- Electricity Act, 2023
- Energy Commission of Nigeria Act CAP 109 LFN 1990
- Land Use Act, Cap. L5, Laws of the Federation of Nigeria (LFN) 2004
- The Nigerian Urban and Regional Planning Act CAP N138, LFN 2004
- Harmful Waste (Special Criminal Provisions) ACT CAP H1, LFN 2004
- The Endangered Species Act, CAP E9, LFN 2004
- Inland Fisheries Act, Cap I10, LFN 2004
- The Factories Act, 1987 (Factory Act cap 126, LFN, 1990)
- Wages Boards and Industrial Councils Act, Cap W1, LFN 2004
- Employees' Compensation Act, 2010 (ECA 2010)
- National Environmental Standards & Regulations Enforcement Agency (NESREA) Act, 2007
- National Environmental Regulations:
- EIA Procedural Guidelines:
- EIA Sectoral Guidelines (Infrastructures):
- FMEnv ESMP Guidelines for Solar Mini-Grid Projects in Nigeria

International Legislation

The International Conventions to which Nigeria is a signatory, relevant to this programme are as follows:

- African Convention on the Conservation of Nature and Natural Resources
- Convention on Biological Diversity
- Endangered Species (Control of International Trade and Traffic)

- Conservation of Migratory Species of Wild Animals 1973
- Framework Convention on Climate Change 1992
- Convention to Combat Desertification 1994
- Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)
- Human and Peoples' Rights on the Rights of Women in Africa 2005
- Civil and Political Rights Covenant
- Economic, Social and Cultural Rights Covenant
- Convention on the Elimination of All Forms of Violence Against Women
- Convention on the Rights of the Child

Institutional Framework

This section highlights the relevant institutions through which the planning and implementation of the program will be affected. Several institutions have been identified and will be involved in the overall implementation of this programme. These include:

- The Federal Government of Nigeria (FGN)
- Federal Ministry of Power
- Transmission Company of Nigeria (TCN)
- Federal Ministry of Environment (FMEnv)
- Nigerian Electricity Regulatory Commission (NERC)
- National Environmental Standards and Regulatory Enforcement Agency (NESREA)
- National University Commission (NUC)
- Relevant State Agencies: State Ministry of Lands, State Ministry of Environment and State Environmental Protection Agencies
- Local Government Authority (LGA)

ES04 Baseline Condition of the Project Area

Climate and Meteorology

Oye Ekiti, located in Ekiti State in southwestern Nigeria, experiences a tropical wet-and-dry climate. The town is generally warm throughout the year, with average temperatures ranging between 26°C and 28°C. The hottest months are usually February and March, while cooler conditions are experienced during the rainy season.

Rainfall is an important feature of the climate in Oye Ekiti. The rainy season begins around March or April and lasts until October, with heavy rainfall commonly occurring between June and September. The dry season starts in November and continues until February. During this period, the Harmattan wind from the Sahara Desert brings dry, dusty, and cooler weather conditions.

Humidity is usually high during the rainy season because of moist winds from the Atlantic Ocean. The climate is mainly influenced by two air masses: the tropical maritime air mass, which brings rainfall, and the tropical continental air mass, which causes dry conditions. These climatic conditions support farming activities such as the cultivation of yam, cassava, maize, and cocoa.

Agriculture in Oye Ekiti depends heavily on climatic conditions because most farming activities are rain-fed. The fertile land and adequate rainfall support the cultivation of crops such as yam, cassava, maize, cocoa, and vegetables. However, changes in rainfall patterns, prolonged dry spells, or excessive rainfall

can negatively affect agricultural productivity. In recent years, concerns about climate change have increased due to irregular rainfall, rising temperatures, flooding, and soil erosion observed in many parts of Ekiti State.

The wind pattern in Ekiti State changes according to the wet and dry seasons. During the rainy season, moist south-west winds from the Atlantic Ocean blow across the state. These winds bring heavy rainfall, cloudy weather, and high humidity between March and October. During the dry season, especially from November to February, the north-east trade wind known as the Harmattan becomes dominant. The Harmattan wind is dry, dusty, and cooler, reducing humidity and rainfall across the state. This period is usually characterized by dry weather, hazy skies, and cooler mornings. Wind patterns in Ekiti State influence rainfall distribution, temperature, humidity, and agricultural activities. The seasonal movement of winds helps determine the beginning and end of the rainy season in the region. The biophysical and physico-chemical properties of the proposed project's environment were adequately studied (see Chapter 4).

Socio-economic and Health Study

This section presents the results and analysis of the survey questionnaire conducted as part of the Environmental and Social Impact Assessment (ESMP) for the proposed hybrid solar power plant at Federal University, Oye-Ekiti in Ikole LGA of Ekiti State. A total of 40 respondents completed and submitted the questionnaire, providing comprehensive information on socioeconomic and demographic characteristics, health status, standard of living, gender-based violence concerns, environmental and cultural resources, project impact perceptions, and grievance redress mechanisms.

The data collected has been analyzed and presented using various visualization techniques including pie charts and bar charts to facilitate better understanding of the survey findings. The results are organized according to the survey sections: Household Data, Health Status, Standard of Living, Gender-Based Violence/Sexual Exploitation and Abuse, Resources/Cultural Property, Project Activities Impact Evaluation, Grievance Redress Mechanism, and World Bank Environmental and Social Standards (ESS).

ES05 Description of Environmental and Social Impacts

The basis for identification of potential environmental and social impacts that may be associated with the proposed Solar Power project was formed during field inspections and observations, issues arising from stakeholder consultations as well as project description and designs.

Highlights of the ESMP as the primary instrument for ensuring that a project's commitment to sustainability is maintained throughout its lifecycle, bridging the gap between theoretical impact prediction and practical field execution is presented here. By establishing a rigorous system of governance, the ESMP ensures that project activities remain in strict alignment with national regulatory requirements, international lending standards, and the fundamental principles of corporate social responsibility. It provides a systematic blueprint for the mitigation of environmental and social risks as well delineates the institutional framework, clearly assigning roles and responsibilities to project developers, contractors and environmental consultants to ensure accountability at every stage of development. It also integrates specific mitigation measures, monitoring protocols, and reporting requirements designed to protect natural ecosystems, minimize pollution, and safeguard the well-being of local communities.

Evaluation of impacts

Positive Impacts: The anticipated positive impacts of the proposed solar power project have been rated as either major or moderate which include;

- Independent and reliable power supply to FUOYE through solar energy sources and thus, improve the quality of education and other services within the institution as there will be longer hours available with better illumination for studying. Reduced noise and pollutants from generator sets, and natural habitats and human health will be protected from pollution arising from the use of fossil fuels.
- The renewable energy training center constructed during the project implementation will provide capacity development through learning renewable energy technologies and practices in the University and consequently the certification of trained individuals.
- The installation of streetlights as part of the proposed Project will improve safety by reducing hazards associated with flammable fuels, candles and enhance security within the school.
- Improve social cohesion and community development, generate new income as it would stimulate economic activities and offer new opportunities for small businesses in the University premises.
- The employment opportunities for skilled, semi-skilled, and unskilled labour associated with the project will multiply job creation, especially during construction to facilitate overall socioeconomic development.

Negative Impacts: Anticipated negative impacts of the proposed project have been rated as major, moderate, minor or even negligible and could include the following:

- Loss of terrestrial floral and faunal population during site clearing
- Disturbance of soil formation during excavation
- Particulate matter in form of dust, and NO_x, CO, Total Suspended Particulates (TSP), SO_x from combustion engines of the earth-moving equipment that will be used for clearing will likely impact on air quality.
- Intermittent noise emissions could also occur from the operation of the machinery.
- Injury and accidents may occur especially when those involved are unskilled

ES06 Environmental and Social Mitigation and Management Plan

The ESMP also incorporates the actions needed to implement these measures, including the following features:

- Mitigation measures based on the potential environmental and social impacts describing with technical details each mitigation measure;
- The ESMP also includes monitoring objectives that specifies the type of monitoring activities that will be linked to the mitigation measures. Specifically, the monitoring section of the ESMP provides:
 - ✓ A specific description, and technical details, of monitoring measures that includes the parameters to be measured, frequency of measurements and definition of thresholds that will signal the need for corrective actions;
 - ✓ Monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures, to furnish information on the progress and results of mitigation.
- The ESMP provides a description of institutional arrangements i.e. who is responsible for carrying out the mitigation and monitoring measures (for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training);

- Additionally, the ESMP includes an estimate of the costs of the measures and activities recommended; and
- The ESMP is required all through the implementation stage of the project or sub-project.

Mitigation/Action Plan

Mitigation and management measures for the significant adverse impacts (rated as moderate or major) identified from the analysis and evaluation of the potential impacts from the proposed project activities are provided in **Table 6.1** of the report

Environmental and Social Monitoring

Environmental and Social monitoring is an important aspect of an ESMP during project implementation. It is a way of systematically monitoring both effects and compliance of the proposed project to existing regulations throughout the entire life cycle and shall oversee the effectiveness of impact mitigation measures, including the extent to which mitigation measures are successfully implemented. This is presented in **Table 6.2** of this report.

Capacity Building for Implementation of ESMP and Permit Conditions

All staff employed will be trained in the following:

- General operation of the plant.
- Environmental management.
- Specific job roles and procedures.
- Occupational health and safety; and
- Contingency plans and emergency procedures. Training will include:
- Induction training on appointments.
- Specialist training (as required for specific job roles); and
- Refresher training as required.

The capacity building plan proposed to achieve this is provided in **Table 6.3** of the report.

Roles, Responsibilities and Accountabilities

The Rural Electrification Agency Project Management Unit (REA-PMU) supervises the implementation of the ESMP throughout the project life span while conformance with the mitigation measures will be ensured by the Engineering, Procurement and Construction (EPC) contractor during the construction phase and by the operations and maintenance (O&M) contractor during the operational phase of the project. This is presented in **Table 6.4** of this report.

Estimated Budget for ESMP Implementation

Table 6.5 of this report provides a summary of the cost estimate required to effectively and efficiently implement the recommended mitigation measures and management plans required to address the potential and associated impacts of the proposed project. The total cost of implementing the ESMP is estimated at US\$ **57,300** with the current Naira value of 3500 to 1 dollar.

ES07 Incident Reporting and Emergency Response Plan

The primary objective of the ERRP is to establish a clear protocol for the identification, notification, and mitigation of emergencies. The plan must be structured around a tiered response system.

ES08 Remediation and Abandonment Plan

The average life span of the solar Photovoltaic (PV) power plant to be provided as part of the proposed Project is 25years (which can be extended through regular maintenance), while the training center can last for 40 years or more. Even after 25 years, the PV panels can still generate up to 90% of the design capacity. Site abandonment shall be preceded by the following practices:

- Identification of the components of the power plant that will be abandoned and/or removed;
- The proposed methods for abandonment or re-use of the plant equipment/material are applicable;
- Processes put in place to mitigate potential environmental impacts associated with the abandonment process; and
- Appropriate site rehabilitation programs (including re-vegetation of the site with native plant species) to return the Project site to its original status (as much as possible).

ES09 Stakeholder Engagement and Grievance Redress Mechanism

All consultation activities were properly documented, including relevant data, supporting evidence, participant lists with contact information, and photographic records. Information disclosure complied with the provisions of national regulations, including the EIA Act No. 86 of 1992 (as amended under Cap E12 LFN 2004), as well as the World Bank's Environmental and Social Safeguards Standards (ESSS).

The stakeholders were identified based on the direct project beneficiaries, adversely impacted groups, project supporters/proponents, regulatory/planning, However, the stakeholders covered are;

- Rural Electricity Agency (REA)
- Federal Ministry of Environment (FMEnv)
- Ekiti State Ministry of Environment
- Ikole Local Government Area
- Federal University of Oye-Ekiti community

Key feedback received during Stakeholder Consultations are presented in **Table 9.1** of the report

Grievance Redress Mechanism

The GRM serves as a structured framework that enables stakeholders to lodge complaints, track their progress, and receive timely feedback on resolutions. It ensures that grievances are handled in a fair, consistent, and efficient manner, thereby strengthening accountability and trust between project implementers and host communities. The mechanism covers a wide range of issues, including environmental impacts, social concerns, land-related matters, and labor issues. Clear procedures are established for receiving, recording, assessing, and resolving grievances, with defined timelines and responsibilities at each stage.

To ensure effectiveness, the GRM will be widely communicated to all stakeholders throughout the project lifecycle. This includes raising awareness during consultations, community meetings, and through information disclosure channels. Stakeholders will be informed about how to access the mechanism, the types of grievances that can be reported, and the expected timelines for resolution. In addition, a grievance register will be maintained to document all complaints received, actions taken, and outcomes achieved, ensuring transparency and enabling continuous improvement of the system.

The GRM will remain operational throughout the entire project lifecycle, ensuring that stakeholders have continuous access to a reliable platform for raising concerns and seeking redress, thereby contributing to the overall sustainability and social acceptability of the project.

ES10 Conclusion and Recommendations

The Environmental and Social Management Plan (ESMP) for the proposed solar power plant at the Federal University, Oye-Ekiti, Ikole LGA in Ekiti State was prepared to comply with applicable government policies, regulatory requirements, financiers' standards, and stakeholder expectations. The objective is to ensure that proactive environmental and social considerations are integrated into the project design and implementation. This study was carried out in accordance with Nigeria's regulatory framework for environmental and social management, particularly the Nigerian EIA Act Cap E12 LFN 2004, which mandates EIAs for projects with the potential to cause significant environmental impacts.

The ESMP study recommends the following:

- Ensure full implementation of the Environmental and Social Management Plan (ESMP) throughout the project lifecycle.
- Conduct regular environmental monitoring for air quality, noise, groundwater, and waste management.
- Maintain continuous stakeholder engagement and effective community communication.
- Prioritize local employment, capacity building, and renewable energy training opportunities.
- Implement strong occupational health and safety measures, including emergency response systems.
- Establish and maintain an efficient Grievance Redress Mechanism (GRM) for timely resolution of complaints.
- Promote proper waste management, including safe disposal of hazardous and electronic waste.
- Ensure compliance with regulatory requirements through continuous oversight by the Rural Electrification Agency and relevant authorities.

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CHAPTER ONE

INTRODUCTION

1.1 Background

The Federal Government of Nigeria (FGN) has, over the past decade, prioritized expanding access to electricity as a critical driver of economic growth, social inclusion, and sustainable development. In 2018, this commitment materialized through the Nigeria Electrification Project (NEP), financed by concessional funding from the World Bank and the African Development Bank. The NEP was designed as a flagship off-grid electrification initiative to bridge the energy access gap in rural and underserved communities. Implemented by the Rural Electrification Agency (REA), the project successfully deployed mini-grids and standalone solar systems, delivering clean and reliable electricity to over seven million Nigerians, while stimulating private sector participation through results-based financing mechanisms.

The Rural Electrification Agency (REA) is a Nigerian government agency responsible for ensuring electricity reaches every part of the country. REA focuses on rural electrification projects, providing power solutions for on-grid and off-grid areas with an emphasis on renewable energy. As the Implementing Agency of the Federal Government of Nigeria, the team at REA is tasked with the electrification of rural and unserved communities across Nigeria.

1.2 Project Specific Activities

This component of the project will involve activities undertaken during the various implementation phases of the project as follows; the activities are separated in Section 5.3 of this of the report.

- Site clearing
- Civil, mechanical and electrical works
- Installation of PV panels and associated plant facilities
- Construction of training center
- Installation of streetlights as well as underground armored cable for power evacuation
- An upgrade of some of the existing power distribution infrastructure within the University will be carried out.
- Testing and checking individual equipment /system, as well as the associated infrastructure to ensure they have been installed correctly and can be handed over for use.
- Generation and distribution of electricity to different sections of the University campus
- Operation of the renewable energy training centre to support learning and capacity development in clean energy technologies
- Preventive and corrective maintenance aimed at maintaining optimal system performance throughout the plant's lifespan
- Periodic cleaning of photovoltaic (PV) panels to maintain their efficiency
- Regular safety inspections and implement measures aimed at preventing accidents, injuries, and occupational health risks
- Wastes management

1.3 Objectives of the ESMP

The purpose of the Environmental and Social Management Plan (ESMP) is to ensure that Environmental and Social impacts identified during the ESMP process are effectively addressed during the construction, operation and closure of the project. The ESMP specifies the mitigation and management measures to which the Proponent is committed and shows how the Project will mobilize organizational capacity and resources to implement these measures. The ESMP will be a living document and will continue to develop during the design and construction phases to enable continuous improvement of the Project's environmental performance.

The specific objectives of the ESMP are to:

- Promote effective environmental and social management, communicate the objectives and requirements of the ESMP.
- Ensure compliance with applicable environmental and social laws, regulations, permit conditions, and Project commitments.
- Define clear roles, responsibilities, and accountability for implementing environmental and social measures.
- Integrate environmental and social considerations into Project planning, design, construction, and operation.
- Apply the mitigation hierarchy by avoiding, minimizing, restoring, and where necessary, compensating for adverse impacts.
- Enhance positive environmental, social, and economic benefits generated by the Project.
- Serve as an action plan for implementing environmental and social management measures.
- Provide a framework for implementing and monitoring mitigation and enhancement measures identified in the ESMP.
- Support continual improvement through monitoring, reporting, and corrective actions.

1.4 Rationale for ESMP

The rationale for an Environmental and Social Management Plan (ESMP) is rooted in the necessity to bridge the gap between environmental policy and project implementation. In the context of large-scale development, the ESMP acts as the primary mechanism for ensuring that the findings of an Environmental and Social Impact Assessment (ESMP) are not merely academic but are integrated into the daily operational workflow of a project.

The fundamental rationale for the ESMP is the mitigation of uncertainty. During the planning phase, environmental impacts are often predicted through modeling and baseline studies. The ESMP provides a structured, iterative process to verify these predictions and manage unforeseen impacts as they arise during construction and operation. By establishing a formal management system, the ESMP ensures that the project developer fulfills their "duty of care" toward the environment and local communities, thereby reducing the risk of legal liability, project delays, and reputational damage.

Furthermore, ESMP is essential for the allocation of resources. It defines the institutional framework, assigning specific roles and responsibilities to contractors and environmental managers, which prevents the diffusion of accountability. From a financial perspective, international lending institutions—such as those

adhering to the Equator Principles—require an ESMP as a condition for project financing. The rationale here is to ensure that the project meets international environmental and social performance standards, which serves to protect the lender’s investment by minimizing the risk of environmental litigation or social unrest

1.5 Scope of the ESMP

The scope of the ESMP includes;

1. The ESMP will address the distinct environmental challenges associated with each phase. During construction, the scope focuses on site-specific impacts such as erosion, dust, noise, and waste management. During operation, the scope shifts toward long-term monitoring of emissions, resource consumption, and ongoing community engagement.
2. The scope defines the limits of responsibility for the project developer, contractors, and subcontractors. It establishes the legal and administrative framework within which all project personnel must operate to ensure adherence to environmental permits and licenses.
3. The plan also covers a wide array of receptors, including physical (air, water, soil), biological (flora, fauna, ecosystems), and social (local communities, cultural heritage, public health) elements. The scope is defined by the spatial and temporal boundaries established during the ESMP, ensuring that all areas directly or indirectly affected by the project are managed.
4. The scope includes the development of specific procedures for incident reporting, emergency response, and training. It mandates the use of quantitative benchmarks, where the effectiveness of management is evaluated against established quality standards.

1.6 Work Execution Plan/Methodology

This ESMP has been prepared in accordance with standard procedures for Environmental Assessment, including other applicable World Bank safeguard policies and Nigerian policy guidelines. The baseline status of the project area was obtained through consultations with the relevant stakeholders, a review of relevant literature as well as field studies. Environmental data acquisition involved a multidisciplinary approach and was conducted in line with regulatory requirements and best international practices. This approach includes literature desktop review, designing, and development of field sampling strategy; confirmation of the sampling design and locations, pre-mobilization activities (job hazard analysis, sampling equipment/materials calibrations and checks and mobilization to the field; community consultations, sample collection, handling, documentation, and storage protocols and, and demobilization from the field, transfer of sample custody to the laboratory for analysis. A summary of field sampling methods is discussed in the sub-sections below.

1.6.1 Daily Toolbox Meeting

A daily toolbox meeting was held before work to ensure that team members understood the work plan of the day and the security and safety tips. These are geared toward achieving a successful data-gathering exercise and zero incidents.

1.6.2 Data collection and information gathering

Data gathering for the biophysical and social components of the project environment was undertaken from 13th to 19th February 2026 (dry season) and 2nd to 5th April 2024. The study team was accompanied by the representatives of the Federal Ministry of Environment and the State Counterparts.

1.6.3 Sampling Design/ Protocol

Sampling maps were designed to provide spatial distributions of the sampling points within the study area.

Table 1.1 List of Geographical Coordinates

Federal University of Oye Ekiti		
Sample ID	Latitude	Longitude
SS/AQ1	7°48'16.97"N	5°29'37.32"E
SS/AQ2	7°48'23.93"N	5°29'38.33"E
SS/AQ3	7°48'21.46"N	5°29'46.92"E
SS/AQCTRL	7°48'34.57"N	5°29'56.97"E

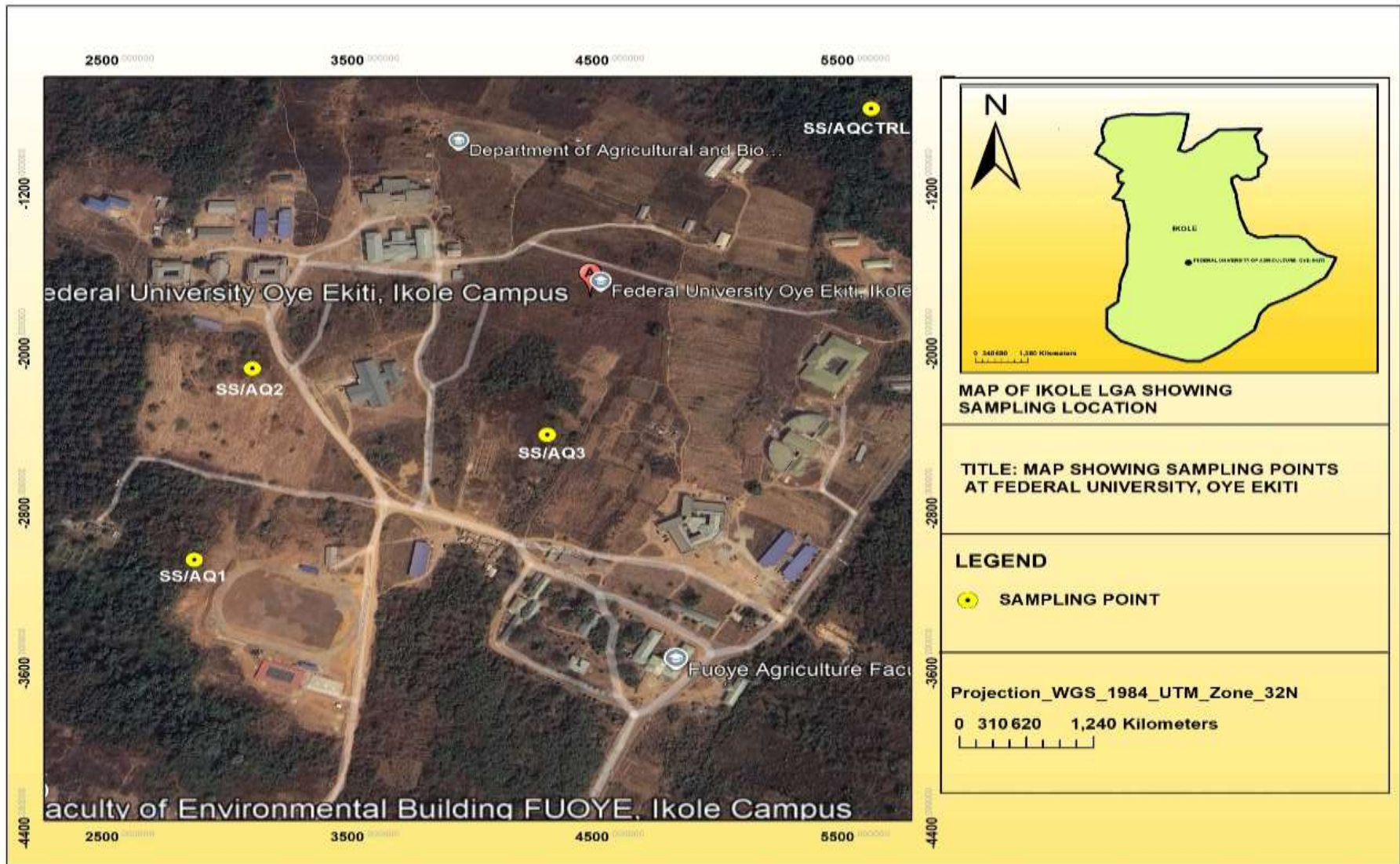


Figure 1.1: The Project Area

1.6.4 Field Sampling Equipment and Methods

1.6.4.1 Meteorology/Air Quality and Noise Measurements

Meteorological elements, namely wind, speed, wind direction, humidity, and temperature, were measured during the fieldwork from 4 predetermined locations (See Sampling Map – Figure 1.1). Each sampling location was adequately georeferenced with a GPS. Ekitimax Gas Meter with Model No.2750 was used for the measurement of the following parameters: Carbon Monoxide (CO), Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Carbon Dioxide (CO₂), and Hydrogen Sulphide (H₂S). Particulate Meter (PM) with Model No. DT-9880 was used to measure suspended particulate matter (SPM). The Noise levels at each point were measured with an Extech Noise Meter (Model No.407722). The sensor of the noise meter was directed toward the source of noise and the average reading over a period of three minutes was taken to be the Noise level at each point.

1.6.4.2 Soil Sampling

Topsoil (0-15cm) and bottom soil (15-30cm) samples were collected from 3 points and 1 control using a hand auger. Two (2) auger bores were homogenized to form a composite sample. Samples for microbiology were taken in 25 ml sterilized vials. Samples for physico-chemical parameters were collected in pre-cleaned 250ml amber bottles. The samples were properly labeled and preserved in ice chests at 4°C.

1.6.4.3 Vegetation and Wildlife Studies

The vegetation survey was carried out along designated sampling transects/sub-transects. The location of each sampling point was confirmed using GPS. Vegetation was studied in sampling quadrats measuring 20 m x 20 m. For each sampling point, information on habitat, vegetation structure and species were recorded. Habitat data included vegetation description, latitude, longitude, and signs of wildlife. Plant species were categorized into trees (4m or more), shrubs (0.5m to 4m), and herbs (less than 0.5m). Dendrometry parameters recorded included height (m), diameter (cm) and number of trees. A pair of binoculars (Model: Helios Fieldmaster 8x40) were employed to aid in the field identification of trees. Plants were also observed for any disease symptoms/conditions. Field observations were made at each sampling location for evidence of vertebrate wildlife. Hideouts such as crevices, leaf litter, logs etc. were probed with props to root out any hidden animals. Tree canopies were observed by birds and other arboreal animals such as squirrels and snakes. The indirect count method was employed, particularly for animals that do not readily offer themselves for observation.

1.6.5 Quality Assurance/Quality Control

Standard methods and procedures were strictly adhered to during this study. The quality assurance program covers all aspects of the study, including sample collection, handling, laboratory analysis, data coding, statistical analysis, presenting and communicating results. Chain of custody procedures including sample handling, transportation, logging and cross-checking in the laboratory were also implemented. Trip blanks were used to assess the quality assurance/quality control of sample preservation, packaging, shipping, and storage.

The following precautions were also observed:

- Samples were collected in bottles that have been thoroughly washed with detergent (nutrient-free) and rinsed thoroughly;

- All sampling equipment is properly protected and maintained in accordance with manufacturers' manuals;
- Sampling bottles were adequately labeled with masking tapes and indelible markers to avoid mistaken identity;
- Only analytical grade (Analar) chemicals were used and where applicable, redistilled.
- Automated equipment is calibrated prior to field sampling.

Where samples were sent to another laboratory for analysis, a duplicate copy of the samples' information was sent along with the sample to the laboratory, independent of the sample. All movements of the samples were included in the sample record. Basic information was recorded together with the results of the analysis, in a sample registry. With proper, sustained calibration of the instrument and the use of standardized observational procedures, equipment errors were brought to an acceptable minimum.

1.6.5.1 Sample Handling and Preservation

All the samples collected during the fieldwork were labeled clearly and secured in easily identifiable containers. Each label contained the following Information:

- Date and/or time of sampling
- Sample name and number
- Type of sample
- Type of preservative used if any.

1.6.6 Laboratory Analysis

After the fieldwork exercises, study samples were transported to Tudaka Analytical Nigeria Ltd, Warri Delta State, Nigeria (accredited by FMEnv) for analysis. Samples brought to the laboratory were analyzed using standard analytical methods. The synoptic description of the laboratory methods and procedures employed for the various physical, chemical, and biological parameters, as well as the detection limits of these parameters in water and sediment samples.

1.6.7 Stakeholders Consultation

A process of continual consultation and involvement of the public in the project was initiated which involved various discussions with the REA as well as other vital stakeholders such as the Federal Ministry of Environment, Federal Ministry of Women Affairs and Social Development, Federal Ministry of Power, Ekiti State Ministry of Environment, Ekiti State Ministry of Women Affairs and Social Development, NERC, TCN, NUC and other relevant stakeholders such as the village heads of the various communities in the project area.

CHAPTER TWO

PROJECT DESCRIPTION

2.1 Project overview

Federal University Oye-Ekiti (FUOYE) is located in Oye-Ekiti, within the Ikole Local Government Area of Ekiti State, Nigeria. The university's main campus is situated along Aare Afao Road in Oye-Ekiti, while an additional campus is located in Ikole-Ekiti. Strategically positioned in the heart of Ekiti State, FUOYE benefits from a region widely recognized for its strong educational tradition, peaceful atmosphere, and rich cultural heritage.

Oye-Ekiti, the host community of the university, is a historic town characterized by rolling hills, lush vegetation, and a serene natural environment that supports academic activities and research. The area experiences a tropical climate with distinct wet and dry seasons, moderate temperatures, and fertile soil that sustain extensive agricultural activities. These environmental characteristics contribute to a calm and healthy learning atmosphere conducive to intellectual development and innovation.

The university environment is further enhanced by its proximity to notable cultural and natural landmarks such as the Oore of Oye's Palace and the famous Arinta Waterfalls in nearby Ipole-Iloro. The surrounding landscape features forests, rocky outcrops, and streams that add to the ecological beauty of the region. Ekiti State is also known for its relatively low level of industrial pollution, making the area environmentally friendly and suitable for sustainable development initiatives and environmental research.

2.2 Project Components

There are three key components of the project, and the specific activities under these components are discussed below:

Component One: The deployment of Solar Hybrid Mini-Grids which represents a transformative approach to rural electrification, particularly in regions where traditional grid extension is economically unfeasible. The World Bank's International Development Association (IDA) has committed \$410 million to scale these projects, recognizing that reliable electricity is a fundamental catalyst for rural economic growth. By integrating solar photovoltaic (PV) arrays with battery energy storage systems (BESS) and often a secondary power source—such as a diesel generator or wind turbine—these hybrid systems provide a stable, 24/7 power supply that supports local businesses, agricultural processing, and essential community services. The economic impact of these mini grids is measured by their ability to foster "productive use of energy" (PUE), which allows rural entrepreneurs to transition from manual labor to mechanized processes.

Component Two: The deployment of stand-alone solar systems, often referred to as Solar Home Systems (SHS), represents a critical strategy for bridging the energy access gap for households and Micro, Small, and Medium-sized Enterprises (MSMEs). Supported by a \$300 million commitment from the International Development Association (IDA), these systems provide decentralized power solutions that bypass the need for expensive and time-consuming grid infrastructure expansion. By utilizing individual photovoltaic panels, charge controllers, and battery storage, these systems enable users to power essential lighting, communication devices, and small-scale business equipment, thereby fostering immediate economic activity in off-grid areas.

To ensure reliability, the system must be sized to account for "days of autonomy," which refers to the number of consecutive days the battery can power the load without sufficient solar input. For MSMEs, these systems are often modular, allowing businesses to scale their energy capacity as their operational needs grow. The IDA funding is instrumental in lowering the barrier to entry for these technologies through innovative financing mechanisms, such as pay-as-you-go (PAYG) models, which allow low-income users to pay for their systems in affordable installments rather than a large upfront capital expenditure. This approach not only enhances the financial viability of the projects but also ensures the long-term sustainability of the energy assets by integrating maintenance and service support into the business model.

Component Three: The \$40 million IDA commitment for Technical Assistance (TA) and capacity building serves as the foundational pillar for ensuring the long-term success and sustainability of solar energy interventions. While hardware deployment provides immediate access, technical assistance addresses the "soft" infrastructure—policy frameworks, regulatory clarity, and local expertise—required to maintain these systems. This funding is specifically designed to bridge the gap between international standards and local implementation capabilities, ensuring that projects are not merely installed but are effectively managed and integrated into the national energy strategy.

The assistance is to institutionalize best practices in project management, grid integration, and environmental compliance. This includes training local technicians in the operation and maintenance (O&M) of solar hybrid mini-grids and stand-alone systems, which is critical for reducing the Mean Time to Repair (MTTR) and ensuring system longevity. Furthermore, the TA program facilitates the development of standardized procurement guidelines and quality assurance protocols, which help mitigate the risks associated with low-quality equipment. By investing in human capital, the IDA commitment ensures that the technical capacity to manage energy assets remains within the host country, fostering a self-sustaining ecosystem for renewable energy development. This capacity building often utilizes a "train-the-trainer" model, where local engineers are equipped with the skills to perform complex system diagnostics, such as analyzing the performance ratio of a plant.

The Rural Electrification Agency (REA) is implementing DARES through its existing Project Management Unit (PMU). The project has already shown significant progress, with over 200 mini grids delivered nationwide. REA has also signed grant agreements with eight renewable energy companies to deploy solar home systems and mini grids, aiming to electrify underserved communities and drive economic growth.

2.3 Description of Project Intervention

The project is being implemented under the Distributed Access through Renewable Energy Scaleup (DARES) programme, which serves as a scale-up initiative from the Nigeria Electrification Project (NEP). Given that this is an Energy-as-a-Service (EaaS) model, the same Energy Service Company (ESCO) responsible for the design and construction of the project will also manage its operations and maintenance (O&M) throughout the service period. This arrangement promotes lifecycle accountability because the ESCO has a direct incentive to ensure that the system is designed for reliability, efficiency, maintainability, and long-term performance. Its O&M responsibilities will typically include routine inspections, preventive and corrective maintenance, fault response, equipment replacement, spare-parts management, performance monitoring, and compliance with agreed service-level requirements and key performance indicators (KPIs).

The project intervention for a utility-scale solar photovoltaic (PV) plant involves a multi-phase transformation of land to harness solar irradiance for electrical power generation. The intervention begins with site preparation, which necessitates the clearing of vegetation and the leveling of terrain to accommodate the mounting structures. This phase is critical as it alters the local topography and drainage patterns, requiring careful management to prevent soil erosion and sedimentation.

The core of the intervention involves the installation of PV modules, which are typically arranged in arrays mounted on steel or aluminum racking systems. These systems may be fixed-tilt or utilize single-axis tracking mechanisms to optimize the angle of incidence, thereby maximizing energy yield.

The electrical infrastructure component includes the installation of inverters to convert direct current (DC) to alternating current (AC), transformers to step up the voltage for grid transmission, and a network of underground or overhead cabling. The intervention also requires the construction of access roads, perimeter fencing, and an operations and maintenance (O&M) building. The total land footprint is a function of the power capacity and the technology employed, often requiring significant spatial allocation to minimize inter-row shading. The intervention concludes with the grid interconnection, which links the facility to the regional transmission network, marking the transition from the construction phase to the operational phase.

2.4 Project Schedule

The proposed Project is planned to be operational by the fourth quarter (Q4) of 2028. The tentative Project schedule is provided in **Table 2.1**

Table 2.1: Tentative Project Schedule

Project Schedule	Timeline											
	2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Site allocation												
Energy demand audit												
Front-End Engineering Design												
ESMP study and Approval												
Selection of EPC Contractor and contract signing												
Civil, electrical, and mechanical design												
Procurement (manufacturing and transportation)												
Preconstruction and construction Phase Activities												
Commissioning												
Commencement of operation												

CHAPTER THREE

RELEVANT POLICIES, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Introduction

The proposed project is part of the Federal Government of Nigeria's Energizing Education Programme, a component of the Nigeria Electrification Project being implemented by the Rural Electrification Agency. Several laws and regulations apply to the energy sector in Nigeria. In addition to the above, several laws, regulations, policies, and instruments have been established to support environmental and social management and the EIA process in Nigeria. This section provides an overview of the relevant statutory regulations, legislation, and guidelines for the proposed Project and the ESMP study. The project shall ensure compliance with the relevant and applicable local and international regulations, policies, and standards throughout its life cycle.

3.2 Policy and Legal Framework

3.2.1 FGN Requirements and Relevant Legislation

The Constitution of the Federal Republic of Nigeria (1999), as the national legal order, recognizes the importance of improving and protecting the environment and makes provision for it. The relevant sections are:

- **Section 20** makes it an objective of the Nigerian State to improve and protect the air, land, water, forest, and wildlife of Nigeria.
- **Section 12** establishes, though impliedly, that international treaties (including environmental treaties) ratified by the National Assembly should be implemented as law in Nigeria; and
- **Sections 33 and 34**, which guarantee fundamental human rights to life and human dignity, respectively, have also been argued to be linked to the need for a healthy and safe environment to give these rights effect.

The Policy, Legal, and Institutional Framework guiding the Environmental and Social Impact Assessment (ESMP) for the proposed project is anchored on applicable national policies, laws, and institutional arrangements, as well as relevant international standards. At the national level, the framework is defined by the Federal Ministry of Environment (FMEnv) regulations, including the Environmental Impact Assessment Act Cap E12 LFN 2004, FMEnv Procedural Guidelines (2017), and other sectoral environmental, social, health, and safety regulations. The assessment also aligns with the objectives of the Nigeria Electrification Project and the Rural Electrification Agency's implementation framework. At the international level, the ESMP is guided by the African Development Bank Integrated Safeguards System, alongside international good practice such as the IFC Performance Standards and relevant ISO standards, ensuring that the project complies with both national regulatory requirements and global environmental and social sustainability benchmarks.

3.2.2 Policy Framework

3.2.2.1 National Environmental Policy/ National Policy on the Environment (Revised 2016)

The national environmental policy launched by Government in November 1989 revised in 2016, prescribed guidelines for achieving sustainable development in fourteen vital sectors of the nation's economy, namely: Human Population; Land Use and Soil Conservation; Water Resources Management; Forestry, Wildlife and Protected Natural Areas; Marine and Coastal Area Resources; Sanitation and Waste Management; Toxic and Hazardous Substances; Mining and Mineral Resources; Agricultural Chemicals; Energy Production; Air Pollution; Noise in the Working Environment; Settlements; Recreational Spaces, Green Belts, Monuments, and Cultural Property.

It also contains Nigeria's commitment to ensuring that the country's natural and built environment is safeguarded for the use of present and future generations. This commitment demands that efficient resource management and minimization of environmental impacts be the core requirements of all development activities. Accordingly, this Policy seeks to promote good environmental practices through environmental awareness and education. The goal of the National Policy on the Environment is to 'ensure environmental protection and the conservation of natural resources for sustainable development'. Its strategic objective is to coordinate environmental protection and natural resources conservation for sustainable development.

3.2.2.2 Social Protection Policies

Social protection policy has been on the agenda since 2004, when the National Planning Commission, supported by the international community, drafted a social protection strategy. More recently, the National Social Insurance Trust Fund (NSITF) drafted a social security strategy. The social protection policy approached social protection using a life cycle and gender lens, recognizing both economic and social risks, including, for example, job discrimination and harmful traditional practices. The policy was organized around four main themes: social assistance, social insurance, child protection and the labour market.

However, only a few of the instruments of this approach were adopted in the national implementation plan, most notably the provision of specific and limited social assistance, social insurance (such as expanding national health insurance to the informal sector) and labour market programmes (such as developing labour-intensive programmes). Moreover, in practice, programmes to date have been focused largely on conditional cash transfers and two health financing mechanisms driven by the federal government with little inter-sectoral or state-federal coordination. A significant number of actors are involved in funding and implementing social protection, including those from government, donors, international non-governmental organizations, and civil society. Federal government-led social protection includes three main programmes:

- The conditional cash transfer in Care of the People (COPE) (funded initially through the debt relief gains (DRG fund) targeted at households with specific social categories (those with children of school-going age that are female-headed or contain members who are elderly, physically challenged, or are fistula or HIV/ AIDS patients).
- The health fee waiver for pregnant women and children under five (financed through the debt relief gains (DRG fund); and
- The community-based health insurance scheme was redesigned in 2011 because the previous scheme had design challenges.

Other social assistance programmes are implemented in an ad hoc manner by various government ministries, departments and agencies at state level, and some are funded by international donors. These include conditional cash transfer programmes for girls' education (in three states), child savings accounts, disability grants, health waivers, education support (such as free uniforms) and nutrition support. HIV and AIDS programming at state level also include social protection sub-components (although not as the primary objective), including nutrition, health and education support. Labour market programmes include Federal and State level youth skills and employment programmes, and Nigeria also has agricultural subsidies/inputs.

3.2.2.3 National Policy on Climate Change/ National Climate Change Policy for Nigeria 2021-2030

Given Nigeria's status as a fossil-fuel dependent economy with a large climate sensitive agricultural sector, the development of a climate change policy and response strategy is critical, as climate change presents a serious threat to poverty eradication and sustainable development in general. One of the key pillars of Vision 20:2020 is investment in low-carbon fuels and renewable energy. Achieving the goal of low carbon, high-growth and resilient socio-economic system for equitable and sustainable socio-economic and environmental development faces some challenges which include stability and sustainability of the enabling environment, adequate institutional and human resource capacity and availability of adequate resources to address mitigation and adaptation initiatives to address climate change. Thus, the Government needs to ensure that economic growth, resource management and climate change mitigation and adaptation can all happen simultaneously if this will be done effectively (Department of Climate Change 2017).

The National Climate Change Policy for Nigeria 2021-2030 was established to promote a low-carbon, climate-resilient and gender-responsive sustainable socio-economic development. The revised National Policy on Climate Change was to define a new holistic framework to guide the country's response to the development challenge of climate change.

3.2.2.4 The National Electric Power Policy (NEPP), 2001

In order to ensure a safe, steady, reliable and progressively improved electric power sector in Nigeria, the Electric Power Reform Implementation Committee (EPIC) was inaugurated by the BPE and resulted in Federal Executive Council (FEC) of Nigeria approving the National Electric Power Policy in September 2001, which recommended, amongst others: establishment of the electric power sector regulator and the privatisation of the electric power sector. The National Electric Power Policy (NEPP), 2001 outlines the realization of an adequate and reliable supply of electricity in three phases - the privatization of the state-owned utility NEPA and the introduction of the Independent Power Producers (IPPs); increasing the competition between market participants, partial removal of subsidies, and sale of excess power to distribution companies (DISCOs); and the freedom to select suppliers by large consumers and the creation of a fully liberalized and competitive market.

In 2004, the National Integrated Power Project (NIPP) was initiated to boost power supply by the launch of gas-powered stations. The National Electric Power Policy (NEPP) of 2001 resulted in the Electric Power Sector Reform (EPSRA) Act of 2005, establishing the Nigerian Electricity Regulatory Commission (NERC). The EPSRA provided the statutory basis for the privatization of the power sector.

3.2.2.5 The National Energy Policy (NEP) 2013

The National Energy Policy (NEP) 2013 is a revised version of the NEP 2003, emphasizes the effective and efficient use of energy and proposes major areas to be considered for energy efficiency and conservation including amongst others: transportation, services/commercial sector, and energy efficient building designs.

3.2.2.6 The National Energy Efficiency Action Plans of Nigeria

The first version of the National Energy Efficiency Action Plans (NEEAP) for Nigeria (2015-2030) was approved on July 14, 2016, by the National Council on Power (NACOP). It has been formulated within the framework of United Nations' Sustainable Energy for All (SE4All) and adopted by the Inter-Ministerial Committee on Renewable Energy and Energy Efficiency (ICREEE). The NEEAP includes

baseline data and information on energy efficiency activities and programmes in Nigeria, barriers to the development and promotion of energy efficiency in the country and suggested achievable energy efficiency targets, including gender disaggregated indicators, based on national potentials and socio-economic assessments. The implementation of the NEEAP is being monitored by the Federal Ministry of Power.

3.3 National Legal Framework

3.3.1 The Environmental Impact Assessment Act No. 86, 1992/Environmental Impact

Assessment Act Cap E12 LFN 2004

The EIA Act makes it mandatory for any person, authority, corporate body private or public, to conduct EIA before the commencement of any new major development or expansion that may likely have significant effects on the environment. The Act sets out the EIA objectives and the procedures for consideration of EIA of certain public or private projects. The programme is a minor development, which is expected to have minimum impact on the environment. Hence, the programme is categorized as Category II (B) EIA. The EIA guidelines (procedural and sectoral) issued by the FMEnv derive from this Act and the programme proponents shall conduct their activities in conformance with these guidelines.

3.3.2 Electricity Act 2023

It is more accurate to refer to the Electricity Act 2023 as the replacement Act, rather than simply calling it an amendment to the EPSRA. The 2023 Act expressly repealed the EPSRA 2005 and established a more comprehensive framework governing generation, transmission, system operation, distribution, supply and trading of electricity, as well as consumer rights and renewable energy.

One of its most important changes is decentralisation. States can now establish and regulate their own intrastate electricity markets, while NERC continues to regulate matters involving interstate electricity, the national grid, transmission, system operation and other federally regulated activities.

3.3.3 Energy Commission of Nigeria Act CAP 109 LFN 1990

The Act was promulgated to create the Energy Commission of Nigeria (ECN) with responsibility for coordinating and general surveillance over the systematic development of the various energy resources of Nigeria. Subject to this Act, the ECN is charged with responsibility for the strategic planning and co-ordination of national policies in the field of energy in all its ramifications. The mandates of ECN include statistical analysis of Electricity Generation, Transmission and Distribution.

3.3.4 Land Use Act of 1978 and Resettlement Procedures

The Land Use Act (Cap 202, 1990), now Cap L5 Laws of the Federation of Nigeria 2004, is the key legislation that has direct relevance to this project. Relevant sections of these laws that may relate to this project with respect to land ownership and property rights, resettlement, and compensation are summarized in this section.

The Land Use Act is the applicable law regarding ownership, transfer, acquisition, and all such dealings on Land. The provisions of the Act are vast on every parcel of Land, in every State of the Federation, under the Executive Governor of the State. He holds such parcels of land in trust for the people and government of the State.

The Act categorized the land in a state into urban and non-urban or local areas. The administration of the urban land is vested in the Governor, while the latter is vested in the Local Government Councils.

At any rate, all land, irrespective of the category, belongs to the State, while individuals only enjoy a right of occupancy as contained in the Certificate of Occupancy, or where the grants are “deemed”.

The concept of ownership of land as known in the Western context is varied by the Act. The Governor administers the land for the common good and the benefit of all Nigerians. The law makes it lawful for the Governor to grant statutory rights of occupancy for all purposes, grant easements appurtenant to statutory rights of occupancy, and to demand rent. The Statutory Rights of Occupancy are for a definite time (the limit is 99 years) and may be granted subject to the terms of any contract made between the state Governor and the Holder.

The Local Government Councils may grant customary rights of Occupancy for agriculture (including grazing and ancillary activities), residential and other purposes. But the limit of such grants is 500 hectares for agricultural purposes and 5,000 for grazing, except with the consent of the Governor. The local Government, under the Act, is allowed to enter, use, and occupy for public purposes any land within its jurisdiction that does not fall within an area compulsorily acquired by the Government of the Federation or of the relevant State, or subject to any laws relating to minerals or mineral oils.

The State is required to establish an administrative system for the revocation of the rights of occupancy and payment of compensation for the affected parties. So, the Land Use Act provides for the establishment of a Land Use and Allocation Committee in each State that determines disputes as to compensation payable for improvements on the land (Section 2 (2) (c)).

In addition, each Local Government is required to set up a Land Allocation Advisory Committee to advise the Local Government on matters related to the management of land. The holder or occupier of such revoked land is entitled to the value of the unexhausted development as at the date of revocation. (Section 6) (5). Where land subject to customary rights of Occupancy and used for agricultural purposes is revoked under the Land Use Act, the local government can allocate alternative land for the same purposes (section 6) (6).

If Local Government refuses or neglects, within a reasonable time, to pay compensation to a holder or occupier, the Governor may proceed to effect assessment under section 29 and direct the Local Government to pay the amount of compensation to the holder or occupier. (Section 6) (7).

Where a right of occupancy is revoked on the ground that the land is required by the Local, State or Federal Government for public purposes or for the extraction of building materials, the holder and the occupier shall be entitled to compensation for the value at the date of revocation of their unexhausted improvements. Unexhausted improvement has been defined by the Act as:

“anything of any quality permanently attached to the land directly resulting from the expenditure of capital or labour by any occupier or any person acting on his behalf, and increasing the productive capacity the utility or the amenity thereof and includes buildings plantations of long-lived crops or trees, fencing walls, roads and irrigation or reclamation works, but does not include the result of ordinary cultivation other than growing produce.”

Developed Land is also defined in the generous manner under Section 50(1) as follows: land where there exists any physical improvement in road development services, water, electricity, drainage, building, structure or such improvements that may enhance the value of the land for industrial, agricultural or residential purposes.

It follows from the foregoing that compensation is not payable on vacant land on which there exist no physical improvements resulting from the expenditure of capital or labour. The compensation payable is the estimated value of the unexhausted improvements at the date of revocation.

Payment of such compensation to the holder and the occupier as suggested by the Act may appear confusing, as it raises the following question: Does it refer to the holder in physical occupation of the land or two different parties entitled to compensation, perhaps in equal shares?

The correct view appears to follow from the general tenor of the Act.

First, the presumption is more likely to be the owner of such unexhausted improvements. Secondly, the provision of section 6 (5) of the Act, which makes compensation payable to the holder and the occupier according to their respective interests, gives a pre-emptory directive as to who shall be entitled to what.

Again, the Act provides in section 30 that where any dispute arises as to the amount of compensation calculated in accordance with the provisions of section 29, such disputes shall be referred to by the appropriate Land Use and Allocation Committee. It is clear from section 47 (2) of the Act that no further appeal will arise from the decision of such a committee. If this is so, then the provision is not only retrospective but also conflicts with the fundamental principle of natural justice, which requires that a person should not be a judge in his own cause.

The Act must, in making this provision, have proceeded on the basis that the committee is a distinct body quite different from the Governor or the Local Government. It is submitted, however, that it will be difficult to persuade the public that this is so since the members of the committee are all appointees of the Governor. Where a right of occupancy is revoked for public purposes within the state of the Federation, or on the grounds of the land for the extraction of building materials, the quantum of compensation shall be as follows:

- *In respect of the land, an amount equal to the rent, if any, paid by the occupier during the year in which the right of occupancy was revoked.*
- *In respect of the building, installation or improvements therein, for the amount of the replacement cost of the building, installation or improvements to be assessed based on the prescribed method of assessment as determined by the appropriate officer, less any depreciation, together with interest at the bank rate for delayed payment of compensation. With regards to reclamation works, the quantum of compensation is such cost as may be substantiated by documentary evidence and proof to the satisfaction of the appropriate officer.*
- *In respect of crops on land, the quantum of compensation is an amount equal to the value as prescribed and determined by the appropriate officer.*

Where the right of occupancy revoked is in respect of a part of a larger portion of land, compensation shall be computed in respect of the whole land for an amount equal in rent, if any, paid by the occupier during the year in which the right of occupancy was revoked less a proportionate amount calculated in relation to the area not affected by the revocation; and any interest payable shall be assessed and computed in the like manner.

Where there are any building installations or improvements or crops on the portion revoked, the quantum of compensation shall follow that outlined in paragraph (ii) above, and any interest payable shall be computed in like manner.

3.3.5 The Nigerian Urban and Regional Planning Act CAP N138, LFN 2004

The Urban and Regional Planning Act is aimed at overseeing realistic, purposeful planning of the country to avoid overcrowding and poor environmental conditions. In this regard, the following sections are relevant:

- **Section 30 (3)** requires a building plan to be drawn by a registered architect or town planner.
- **Section 39 (7)** establishes that an application for land development would be rejected if such development would harm the environment or constitute a nuisance to the community.
- **Section 59** makes it an offence to disobey a stop-work order. The punishment under this section is a fine not exceeding ₦10,000 (Ten thousand naira) and in the case of a company, a fine not exceeding ₦50,000.
- **Section 72** provides for the preservation and planting of trees for environmental conservation.

3.3.6 Harmful Waste (Special Criminal Provisions) ACT CAP H1, LFN 2004

The Harmful Waste Act prohibits, without lawful authority, the carrying, dumping or depositing of harmful waste in the air, land or waters of Nigeria. The following sections are notable:

- **Section 6** provides for a punishment of life imprisonment for offenders as well as the forfeiture of land or anything used to commit the offence.
- **Section 7** makes provision for the punishment accordingly of any conniving, consenting or negligent officer where the offence is committed by a company.
- **Section 12** defines the civil liability of any offender. He would be liable to people who have suffered injury as a result of his offending act.

3.3.7 The Endangered Species Act, CAP E9, LFN 2004

This Act focuses on the protection and management of Nigeria's wildlife and some of their species in danger of extinction because of overexploitation. These sections are noteworthy:

- **Section 1** prohibits, except under a valid license, hunting, capture or trade in animal species, either presently or likely, in danger of extinction.
- **Section 5** defines the liability of any offender under this Act.
- **Section 7** provides for regulations to be made necessary for environmental prevention and control as regards the purposes of this Act.

Most of the proposed program locations are on virgin land that serves as wildlife habitats, which will be impacted by the programme. Hence, the programme activities shall be carried out to comply with the relevant provisions.

3.3.8 Inland Fisheries Act, Cap I10, LFN 2004

The Inland Fisheries focused on the protection of the water habitat and its species. The following section is relevant:

Section 6 prohibits the taking or destruction of fish by harmful means. This offence is punishable with a fine of ₦3,000 or an imprisonment term of 2 years, or both. One of the integral components of solar hybrid systems is battery storage. During the operational phase of the project, there may be the possibility of battery leakages, which may leach into water bodies for project locations with flowing rivers. The chemical contents of these batteries are toxic to aquatic life (fisheries), which necessitates the relevance of this Act.

3.3.9 National Commission for Museums and Monuments Act, Cap. N19, LFN 2004

The Act provides for the dissolution of both the Antiquities Commission and the Federal Department of Antiquities and to create a National Commission for Museums and Monuments, with the responsibilities to establish and administer national museums, antiquities and monuments, including antiquities, science and technology, warfare, African, Black and other antiquities, arts and crafts, architecture, natural history and educational services among others. Sections 12 to 18 provide the process/steps for the declaration of antiquities as national monuments, while section 19 deals with the restriction of excavations for the purpose of finding antiquities as well as the issuance of permits and section 20 deals with accidental discoveries. In case of any accidental find, the Commission shall be notified within seven (7) days.

3.3.10 The Factories Act, 1987 (Factory Act cap 126, LFN, 1990)

The Factories Act, as contained in the Laws of the Federation of Nigeria 1990, seeks to legislate and regulate the conduct of health and safety in the Nigerian work environment. It was enacted in June 1987 with the objective of protecting the workers and other professionals against exposure to occupational hazards. The Director of Factories at the Federal Ministry of Employment, Labour and Productivity is responsible for the administration of the provisions or requirements of this Act. Section 13 allows an inspector to take emergency measures or request that emergency measures be taken by a person qualified to do so, in cases of pollution or nuisances. This Act deals with working conditions at work sites, including construction sites, such as those to be undertaken under the EEP III. Hence, the occupational requirements applicable to construction sites, as well as other work sites to be used by the program, shall be subject to the provisions of this Act.

3.3.11 Labour Act, Cap. L1, LFN 2004

This Act deals with labour issues, including payment of wages, recruitment, discipline, employee welfare, employment of women and child labour. Sections 54 to 58 which deal with employment of women, prescribed period of absence from work for nursing mothers and allows her half an hour twice a day during her working hours to attend to the baby for a period of up to six months after she resumes work. Section 55 also exempted women from night work, except when they are employed as nurses. Sections 59-64 deal with the employment of young adults.

3.3.12. Wages Boards and Industrial Councils Act, Cap. W1, LFN 2004

Wages Boards and Industrial Councils Act, Cap. W1, LFN 2004 – provides the legal framework for establishing wages boards and industrial councils to regulate wages and conditions of employment and promote orderly employer–employee relations in Nigeria.

The Act provides for the establishment of a National Wages Board and Area Minimum Wages Committee for States and for Joint Industrial Councils for particular industries. It empowers the Minister to order or direct that an industrial wages board be established to perform, in relation to the workers described in the order and their employers, the functions specified in the provisions of this Act, including the minimum wage. The minimum wage is currently ₦100,000.00 per month, and all individuals contracted/employed in relation to this programme shall not earn less than the minimum wage.

3.3.13. Employees' Compensation Act, 2010

The Employees' Compensation Act, 2010 establishes a more comprehensive compensation scheme for employees who suffer work-related injuries, occupational diseases, disabilities or death arising out of or in the course of employment. It also provides benefits for dependants of deceased employees and is administered through the Nigeria Social Insurance Trust Fund (NSITF).

3.3.14 National Environmental Standards & Regulations Enforcement Agency (NESREA) Act, 2007

Administered by the Ministry of Environment, the National Environment Standards and Regulations Enforcement Agency (NESREA) Act of 2007, replaced the Federal Environmental Protection Agency (FEPA) Act. It is the embodiment of laws and regulations focused on the protection and sustainable development of the environment and its natural resources. The following sections are worth noting:

- **Section 7** provides authority to ensure compliance with environmental laws, local and international, on environmental sanitation and pollution prevention and control through monitoring and regulatory measures.
- **Section 8 (1)(K)** empowers the Agency to make and review regulations on air and water quality, effluent limitations, control of harmful substances, and other forms of environmental pollution and sanitation.
- **Section 27** prohibits, without lawful authority, the discharge of hazardous substances into the environment. This offence is punishable under this section, with a fine not exceeding 1,000,000 (One Million Naira) and an imprisonment term of 5 years. In the case of a company, there is an additional fine of ₦50,000 for every day the offence persists.

3.3.15 National Environmental Regulations:

Section 34 of the NESREA Act, 2007, empowers the Minister of Environment to make regulations for a safe and sustainable environment. In exercise of this power, the minister issued the national environmental regulations covering various environmental components and sectors of development. The regulations relevant to the programme are as follows:

- National Environmental (Energy Sector) Regulations, 2014. S.I. 63.
- National Environmental (Electrical/Electronic Sector) Regulations, 2011, S.I. No. 23
- National Environmental (Wetlands, Riverbanks and Lake Shores) Regulations, 2009. S. I. No. 26.
- National Environmental (Sanitation and Wastes Control) Regulations, 2009. S. I. No. 28.
- National Environmental (Watershed, Mountainous, Hilly and Catchment Areas) Regulations, 2009. S. I. No. 27.
- National Environmental (Sanitation and Wastes Control) Regulations, 2009. S. I. No. 28.
- National Environmental (Noise Standards and Control) Regulations, 2009. S. I. No. 35.
- National Environmental (Air Quality Control) Regulations, 2013, S. I. No. 64,
- National Environmental (Soil Erosion and Flood Control) Regulations, 2010. S. I. No. 12.
- National Environmental (Surface and Groundwater Quality Control) Regulations, 2010. S. I. No. 22.
- National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations, 2010. S. I. No. 20.

3.3.16. EIA Procedural Guidelines:

This procedure prescribes the steps to be followed in the EIA process from project conception to commissioning and post-commissioning impact mitigation to ensure that the program is implemented

with maximum consideration of environmental factors. This ESMP study will be conducted in compliance with this guideline.

3.3.17 EIA Sectoral Guidelines (Infrastructures):

This provides general guidelines for EIA of projects in the infrastructure sectors of Nigeria, with specific details for sub-sectors.

3.3.18. FMEnv ESMP Guidelines for Solar Mini-Grid Projects in Nigeria

The ESMP Guidelines for Solar Mini-Grid Projects in Nigeria was developed as an abridged form of the EIA Procedures Guidelines with the aim of simplifying the method of preparing ESMPs for proposed solar mini-grid projects. The simplified method is to also optimize the mini-grid projects EIA timeline and the cost of development.

3.4 International Legislation

The International Conventions, to which Nigeria is a signatory, relevant to this programme are as follows:

- African Convention on the Conservation of Nature and Natural Resources
- Convention on Biological Diversity
- Endangered Species (Control of International Trade and Traffic)
- Conservation of Migratory Species of Wild Animals 1973
- Framework Convention on Climate Change 1992
- Convention to Combat Desertification 1994
- Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)
- Human and Peoples' Rights on the Rights of Women in Africa 2005
- Civil and Political Rights Covenant
- Economic, Social and Cultural Rights Covenant
- Convention on the Elimination of All Forms of Violence Against Women
- Convention on the Rights of the Child

3.5 Institutional Framework

This section highlights the relevant institutions through which the planning and implementation of the program will be affected. Several institutions have been identified and will be involved in the overall implementation of this programme. These include:

- The Federal Government of Nigeria (FGN)
- Federal Ministry of Power
- Transmission Company of Nigeria (TCN)
- Federal Ministry of Environment (FMEnv)
- Nigerian Electricity Regulatory Commission (NERC)
- National Environmental Standards and Regulatory Enforcement Agency (NESREA)
- National University Commission (NUC)
- Relevant State Agencies: State Ministry of Lands, State Ministry of Environment and State Environmental Protection Agencies
- Local Government Authority (LGA)

The responsibilities and roles of each of the institutions are discussed below.

3.5.1 The Federal Government of Nigeria

Section 20 of the Constitution of Nigeria makes it an objective of the Nigerian State to improve and protect the air, land, water, forest and wildlife of Nigeria. Sections 33 and 34 which guarantee fundamental human rights to life and human dignity, respectively, can also be linked to the need for a healthy and safe environment to give these rights effect. The Executive Council of the Federation approves all national policies including the National Policy on Environment.

3.5.2 Federal Ministry of Environment

The Federal Ministry of Environment is responsible for the overall environmental policy of the country. It has the responsibility for EIA implementation, approval and issuance of certificates. It has developed certain guidelines and regulations to protect the environment and promote sustainable development. It will monitor the implementation of mitigation measures when the project commences. They can also issue directives to the project on specific actions related to the environment in the project area. The Ministry normally involves the states and sometimes local governments in this responsibility depending on the specific activity.

3.5.3 The National Environment Standards and Regulations Enforcement Agency (NESREA):

The National Environment Standards and Regulations Enforcement Agency (NESREA) ensure the embodiment of laws and regulations focused on the protection and sustainable development of the environment and its natural resources are monitored and complied with. NESREA ensures that the operational phase of the solar power system Mini grid project complies with national environmental standards and regulations.

3.5.4 The National Universities Commission

The National Universities Commission (the Commission) was established in 1974 by the National Universities Commission Act CAP N81 to advise the Federal and state governments of all aspects of university education and the general development of universities in Nigeria. It is the dynamic regulatory agency acting as a catalyst for positive change and innovation for the delivery of quality university education in Nigeria. It is also the agency for channeling all external aid to the universities in Nigeria; To receive block grants from the Federal Government and allocate them as appropriate.

3.5.5 The Federal Ministry of Power

The Federal Ministry of Power is the policy-making arm of the Federal Government with the responsibility for the provision of power in the country. The Ministry is guided by the provisions of the Electricity Act No 28 of 1988, the National Electric Power Policy, 2001, the Electric Power Sector Reform Act, 2005, the Roadmap for Power Sector Reform, 2010, and the National Energy Policy, 2013 as described earlier in section 1.6.4. The following parastatals are under the ministry: Energy Commission of Nigeria (ECN) Nigerian Electricity Regulatory Commission (NERC) Power Holding Company of Nigeria (PHCN) Rural Electrification Agency (REA). The responsibilities of the Federal Ministry of Power are as follows:

- Initiating and formulating broad policies and programmes on the development of the power sector Initiating concessions in the power sector Licensing of electrical contractors and electric generating sets of 1MW capacity and below
- Conducting investigation on electrical accidents and to ensure safety in the electricity industry in Nigeria
- Conducting statutory tests and certification of electric poles (concrete, wooden, steel etc.) and other major electrical materials before they are used on the grid and networks in Nigeria

- Implementing renewable energy programmes/ initiatives (solar, wind, biomass, small hydro etc.) Coordinating activities of the power sector
- Handling policy matters relating to research and development in the power sector
- Promoting the development of hydro power plants through public-private partnership (PPP), participating in bilateral and multilateral relations affecting the power sector
- Facilitating the overall coordination of the activities of the parastatals under their supervision

3.5.6 Nigerian Electricity Regulatory Commission (NERC)

The Nigerian Electricity Regulatory Commission (NERC) is an independent regulatory agency. NERC was established in 2005 as part of the economic reform agenda of the Obasanjo administration. The Electric Power Sector Reform Act of 2005 was the legislation that led to the establishment of NERC.

The Commission is required to carry out the following, amongst others:

- i. Monitor and regulate the activities of the electricity industry in Nigeria.
- ii. Issue licenses to market participants; and
- iii. Ensure compliance with market rules and operating guidelines.

In order to create an enabling investment climate for rural electrification projects, NERC established the Mini-Grid Regulation in 2016; regulatory guidelines for mini-grids less than 100 kW and a light-handed regulation for mini-grids between 100 kW and 1 MW.

3.5.7 Transmission Company of Nigeria (TCN)

TCN emerged from the defunct National Electric Power Authority (NEPA) as a product of the merger of the Transmission and Operations sectors on April 1, 2004. TCN was incorporated in November 2005. Being one of the 18 unbundled Business Units under the Power Holding Company of Nigeria (PHCN), TCN was issued a transmission License on 1st July 2006. It was subsequently issued two licenses on June 10, 2013, for electricity transmission and system operations.

3.5.8 Rural Electrification Agency

The Rural Electrification Agency was set up by Section 88 of the Electric Power Sector Reform Act 2005 as the Implementing Agency of the FGN tasked with the electrification of rural and unserved communities. The mission is to provide access to a reliable electric power supply for rural dwellers irrespective of where they live and what they do, in a way that would allow for a reasonable return on investment through an appropriate tariff that is economically responsive and supportive of the average rural customer.

3.5.9 Federal Ministry of Women Affairs and Social Development

Promote actions to achieve the National Gender Policies and a gender budget among policymakers. The goals of the gender policy, among others, include:

- Eliminate cultural/religious gender-based biases and harmful cultural and religious practices which rise to inequalities in gender-role relations in Nigerian society. A culture that is amenable to development must be dynamic.
- Tap the potential of women for development.
- Eliminate all forms of gender-based violence.
- Ensure equal access to women, boys and girls to both formal and informal education. Women's education is a priority because it is the key to gender equity, justice, and poverty reduction,

improved skills and technological knowledge, as well as the general socioeconomic development of the nation.

3.5.10 State Institutions

Ekiti State Ministry of Environment

The Ministry of Environment is currently responsible for environmental service matters and resources in the state. Other objectives include initiating formulation, execution, and monitoring of all issues relating to all environmental matters, solid waste management, and mineral resources. A recent law passed established the Ekiti State Environmental Law 2021.

Ekiti State Ministry of Women Affairs and Social Development

The ministry seeks to empower women and youth, promote the participation of women in governance, pay attention to women in rural areas, enhance the economic self-reliance of women, create awareness, and campaign against gender-based violence, etc.

Ekiti State Lands and Survey

This Ministry was created for the purpose of overseeing the land resources in the state. They are also charged with the responsibility to plan, devise and implement the state policies on land and its resources.

3.6 Funding Agency Requirements

This programme is funded by the World Bank. Therefore, the World Bank Environmental and Social safeguard Standards will be integrated in the project cycle as well as other national and international environmental and social protection requirements, to comply with the best international practices. Both the main environmental and social requirements that the project needs to comply with are described in the following sections.

3.6.1 The World bank Environmental and Social Safeguard Standards

The World Bank policies on the environmental and social safeguard are the fulcrum of its support towards sustainable poverty reduction, particularly in developing countries. The policies aimed at preventing and mitigating undue harm to the people ESMP of the proposed Solar Hybrid Power Plant and Associated Infrastructure in FUOYE. As indicated in **Table 1.1**, the compliance status of the proposed along the various phases are presented below.

The framework was developed in alignment with applicable national environmental regulations and relevant Environmental and Social Framework (ESF) Environmental and Social Standards (ESS), particularly ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS2 (Labour and Working Conditions), ESS3 (Resource Efficiency and Pollution Prevention and Management), ESS4 (Community Health and Safety), and ESS10 (Stakeholder Engagement and Information Disclosure).

3.7 Institutional Arrangements for Environmental and Social Management

REA is for selecting Engineering, Procurement and Construction (EPC) contractor (through competitive process) to build, operate and maintain the proposed power plant, and also build and equip the associated training center. The selected EPC will also be considered for a ten-year operation and maintenance (O&M) contract for the power plant. In the long run, the University will be responsible for operating and maintaining the Project responsible. REA has established a Project Management Unit (PMU) which includes experienced Environmental and Social Safeguard Specialists. The REA-PMU

will provide oversight functions for the management of potential environmental and social issues associated with the Project throughout its life cycle. The PMU, in conjunction with the University's Department of Works and Physical Planning, will monitor the hired contractor's E&S performance. The implementation of mitigation measures for potential environmental and social impacts associated with the Project (at various stages) will also be monitored by FMEnv, NESREA, Ekiti State Ministry of Environment and other relevant regulatory agencies, as part of their statutory responsibilities. In addition, the World Bank will provide overall supervision, facilitation and coordination of the Project, and monitor Project performance indicators.

Table 3.1: Safeguards compliance Matrix for the Power Project

Pre-construction Phase

Aspect	Nigeria Legal Requirements	World Bank Standards triggered	International Agreements	Key Compliance Actions
Environmental Assessment	EIA Act (Cap E12 LFN 2004)	ESS1: Assessment of Environmental & Social Risks	Paris Agreement	Conduct EIA/ESMP; obtain approval from the Federal Ministry of Environment
Land Acquisition	Land Use Act (1978)	ESS5: Land Acquisition & Resettlement	International Labour Organization (land & livelihood rights)	Secure land titles; compensate affected persons
Stakeholder Engagement	National environmental guidelines	ESS10: Stakeholder Engagement	Aarhus Convention (principles)	Public consultations; disclosure of project info
Biodiversity Screening	NESREA Act	ESS6: Biodiversity Conservation	Convention on Biological Diversity	Identify sensitive habitats; avoid critical areas
Permits & Licensing	NERC mini-grid regulation	ESS1 compliance	NA	Obtain generation/distribution permits

Construction Phase

Aspect	Nigeria Legal Requirements	World Bank Standards triggered	International Agreements	Key Compliance Actions
Occupational Health & Safety	Factories Act; Labour Act	ESS2: Labor & Working Conditions	International Labour Organization conventions	Provide PPE; enforce safety procedures
Waste Management	NESREA Regulations	ESS3: Resource Efficiency & Pollution Prevention	Basel Convention	Proper disposal of hazardous waste (e.g., batteries)
Community Health & Safety	Public Health Act	ESS4: Community Health & Safety	WHO guidelines	Traffic management; site safety measures
Noise & Air Pollution	NESREA Air Quality Regulations	ESS3: Resource Efficiency & Pollution Prevention	Paris Agreement	Control emissions, dust, and noise

Cultural Heritage	National Commission for Museums Act	ESS8: Cultural Heritage	UNESCO conventions	Chance finds procedures in place
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Operation and Maintenance Phase

Aspect	Nigeria Legal Requirements	World Bank Standards triggered	International Agreements	Key Compliance Actions
Energy Efficiency	National Energy Policy	ESS3: Resource Efficiency	Paris Agreement	Optimize system performance; reduce losses
Waste (Batteries, Panels)	NESREA e-waste regulations	ESS3: Resource Efficiency	Basel Convention	Safe recycling/disposal systems
Labor Conditions	Labour Act	ESS2: Labor & Working Conditions	International Labour Organization	Fair wages, worker rights compliance
Community Relations	Local governance laws	ESS10: Stakeholder Engagement	NA	Maintain grievance redress mechanism
Safety & Risk Management	Nigerian Electricity Safety Code	ESS4: Community Health & Safety	NA	Routine inspection and maintenance

Decommissioning Phase

Aspect	Nigeria Legal Requirements	World Bank Standards triggered	International Agreements	Key Compliance Actions
Environmental Restoration	EIA Act (closure requirements)	ESS1: Assessment of Environmental & Social Risks	Convention on Biological Diversity	Site rehabilitation and restoration
Waste Disposal	NESREA Regulations	ESS3: Resource Efficiency	Basel Convention	Dispose of solar panels, batteries safely
Worker Safety	Labour Act	ESS2: Labor & Working Conditions	International Labour Organization	Safe dismantling procedures
Community Safety	Public Health Act	ESS4: Community Health & Safety	NA	Secure site; prevent hazards post-closure
Asset Removal & Land Return	Land Use Act	ESS5: Land Acquisition & Resettlement	NA	Restore land to its original or agreed condition

CHAPTER FOUR

BASELINE CONDITION OF THE PROJECT AREA

4.1 Overview of Project Environment

4.1.1 Climate and Meteorology

Oye Ekiti, located in Ekiti State in southwestern Nigeria, experiences a tropical wet-and-dry climate. The town is generally warm throughout the year, with average temperatures ranging between 26°C and 28°C. The hottest months are usually February and March, while cooler conditions are experienced during the rainy season.

Rainfall is an important feature of the climate in Oye Ekiti. The rainy season begins around March or April and lasts until October, with heavy rainfall commonly occurring between June and September. The dry season starts in November and continues until February. During this period, the Harmattan wind from the Sahara Desert brings dry, dusty, and cooler weather conditions.

Humidity is usually high during the rainy season because of moist winds from the Atlantic Ocean. The climate is mainly influenced by two air masses: the tropical maritime air mass, which brings rainfall, and the tropical continental air mass, which causes dry conditions. These climatic conditions support farming activities such as the cultivation of yam, cassava, maize, and cocoa.

Agriculture in Oye Ekiti depends heavily on climatic conditions because most farming activities are rain-fed. The fertile land and adequate rainfall support the cultivation of crops such as yam, cassava, maize, cocoa, and vegetables. However, changes in rainfall patterns, prolonged dry spells, or excessive rainfall can negatively affect agricultural productivity. In recent years, concerns about climate change have increased due to irregular rainfall, rising temperatures, flooding, and soil erosion observed in many parts of Ekiti State.

The wind pattern in Ekiti State changes according to the wet and dry seasons. During the rainy season, moist south-west winds from the Atlantic Ocean blow across the state. These winds bring heavy rainfall, cloudy weather, and high humidity between March and October. During the dry season, especially from November to February, the north-east trade wind known as the Harmattan becomes dominant. The Harmattan wind is dry, dusty, and cooler, reducing humidity and rainfall across the state. This period is usually characterized by dry weather, hazy skies, and cooler mornings. Wind patterns in Ekiti State influence rainfall distribution, temperature, humidity, and agricultural activities. The seasonal movement of winds helps determine the beginning and end of the rainy season in the region.

4.1.2 The Local Geology

Oye-Ekiti is underlain predominantly by Precambrian Basement Complex rocks, which are among the oldest rock formations in Nigeria. The local geology consists mainly of granite, gneiss, quartzite, and schist formations that belong to the crystalline rock units of southwestern Nigeria. These rocks are highly resistant and contribute to the rugged and undulating topography characteristic of the area.

The Basement Complex rocks in Oye-Ekiti have undergone extensive weather over time, resulting in the formation of lateritic soils and sandy clay deposits suitable for construction and agricultural activities. The granitic and gneissic rocks commonly outcrop in several locations, forming rocky hills and ridges within the environment. Structurally, the area is stable with low seismic activity, making it favorable for infrastructural development. Geology also supports good groundwater potential in

fractured and weathered zones, which serve as important sources of water supply through boreholes and wells.

4.1.3 The Topography

The topography of Ekiti State is predominantly characterized by undulating uplands, rolling hills, and rugged terrain. The state lies within the Yoruba Highlands of southwestern Nigeria and is marked by elevated landscapes with heights ranging from about 250 to 600 meters above sea level. Ekiti is drained by several rivers and streams, including the Ose, Ero, and Elemi rivers, which contribute to its fertile valleys and agricultural productivity. The terrain is interspersed with granitic rock outcrops, ridges, and inselbergs that enhance the scenic beauty of the state. This distinctive topography supports a cool and conducive environment for agriculture, settlement, and academic activities.

4.1.4 Project Location from Flood Level

Oye-Ekiti is located in the northern part of Ekiti State, southwestern Nigeria, within a region characterized by undulating terrain and gently sloping uplands. The town experiences a tropical climate with distinct wet and dry seasons, receiving moderate to high annual rainfall, especially between April and October.

In terms of flood level, Oye-Ekiti is generally considered to have a relatively low to moderate flood risk compared to many low-lying urban areas in Nigeria. The elevated topography and natural drainage pattern of the area help reduce the occurrence of severe flooding. However, localized flooding may occur during periods of intense rainfall due to poor drainage systems, blocked waterways, and increased surface runoff associated with urban development.

The project location benefits from well-drained soils and a landscape that supports effective surface water flow. Nevertheless, flood control measures such as proper drainage channels, culverts, erosion control structures, and adequate site grading should be incorporated into project planning and development to minimize the impact of seasonal rainfall and prevent waterlogging.

4.2 Description of Physical Environment

4.2.1 Air Quality and Noise Level

Baseline ambient air quality monitoring carried out within the Project area indicates that the environmental conditions are generally within the permissible limits established by the Federal Ministry of Environment (FMEnv). Variations observed between the dry and wet seasons are mainly influenced by climatic conditions, including Harmattan dust, rainfall intensity, temperature, humidity, and wind movement. Hour standards of ambient air quality are shown in **Table 4.1** while **Table 4.2** shows the air quality data obtained during field survey.

Table 4.1: Hour Standards of Ambient Air Quality

Contaminant	Concentrations (ppm)	
	FMENV (FEPA, 1991)	World Bank (1999)
CO	10	-
NO _x	0.04 – 0.06	0.08
SO ₂	0.01	-
NH ₃	0.28	-

PM ₁₀	-	80 µg/m ³
TSP	250 µg/m ³	80 µg/m ³

Table 4.2: Air Quality Around the Project Area (Dry and Wet Seasons)

Parameters/ Unit	Units	Dry Season Range	Dry Season Control	Wet Season Range	Wet Season Control	FMENV Limits (8 hr Avg.)
Noise Level	dB(A) Day	55.7 – 68.2	63.4	55.1 – 67.2	68.0	90
SO _x	µg/m ³	0.01	0.01	0.01	0.01	26
NO _x	µg/m ³	0.01	0.01	0.01	0.01	75 – 113
SPM	µg/m ³	19 – 38	25.8	28 – 39	35.2	250
VOC	µg/m ³	0.01	0.01	0.01	0.01	60
CO	µg/m ³	0.2 – 2.7	1.5	0.3 – 1.8	1.4	11.4
O ₃	µg/m ³	4 – 16	4.0	1.2 – 2.2	0.4	NA
CO ₂	µg/m ³	50 – 170	52.6	68 – 104	30.42	NA
H ₂ S	µg/m ³	0.01	0.01	0.01	0.01	0.01
Air Temperature	°C	31.5 – 32.8	32.6	32.5 – 32.8	32.7	NA
Wind Speed	m/s	0.7 – 1.0	0.21	0.6 – 1.6	0.9	NA
Humidity	%	70 – 78	71.5	72 – 84	73.8	NA

Field work 2026

Noise levels recorded during the dry season ranged from 55.7–68.2 dB(A), while wet season values ranged from 55.1–67.2 dB(A). These values are below the FMENV permissible limit of 90 dB(A), indicating that the area experiences moderate environmental noise levels that are unlikely to pose significant health risks. All values remained below the FMENV limit of 90 dB(A), suggesting acceptable ambient noise conditions (see **Table 4.3**).

Table 4.3: Nigeria's Standard Noise Levels (FEPA, 1991)

Duration per Day, hour	Permissible Exposure Limit, dB (A)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25 or less	115

The concentrations of gaseous pollutants such as sulphur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC), hydrogen sulphide (H₂S), and carbon monoxide (CO) were generally very low and remained within acceptable regulatory standards. The recorded SO_x and H₂S values were

consistently at 0.01 $\mu\text{g}/\text{m}^3$, reflecting minimal industrial or combustion-related emissions within the area. Similarly, NO_x concentrations remained significantly below the FMENV limit of 75–113 $\mu\text{g}/\text{m}^3$, indicating good ambient air quality.

Suspended particulate matter (SPM) values ranged from 19–38 $\mu\text{g}/\text{m}^3$ during the dry season and 28–39 $\mu\text{g}/\text{m}^3$ during the wet season. These values are far below the FMENV threshold of 250 $\mu\text{g}/\text{m}^3$, suggesting low particulate pollution and limited dust generation within the environment. Carbon monoxide concentrations also remained low, with recorded values well below the FMENV limit of 11.4 $\mu\text{g}/\text{m}^3$.

Ozone (O₃) and carbon dioxide (CO₂) concentrations showed slight seasonal variations but remained within environmentally acceptable levels. The absence of prescribed FMENV limits for some parameters indicates that the measured concentrations mainly serve as baseline environmental indicators for the study area.

Meteorological parameters revealed average air temperatures ranging between 31.5°C and 32.8°C, reflecting the tropical climatic condition of the area. Wind speed values were generally low to moderate, ranging from 0.6–1.6 m/s, which may influence the slow dispersion of airborne pollutants. Relative humidity values were relatively high in both seasons (70–84%), consistent with the humid tropical environment of Ekiti State.

4.2.2 Soil Quality

4.2.2.1 Physicochemical Parameters

Baseline ambient soil sampling carried out within the project area indicates that the environmental conditions are generally within the data obtained within the control area. The results are presented in **Tables 4.4 - 4.6**. The soil physicochemical characteristics showed clear variations between the dry and wet seasons as well as between sampled locations and control sites. Seasonal changes were mainly influenced by rainfall, soil moisture dynamics, decomposition processes, and nutrient mobility within the soil profile.

Table 4.4: Physicochemical Characteristics of Soil Quality Around the Project Area (Wet and Dry Season)

Parameter	Unit	Dry Season (0–15 cm)	Dry Season (15– 30 cm)	Control Mean (0–15 cm)	Control Mean (15–30 cm)	Wet Season (0– 15 cm)	Wet Season (15– 30 cm)	Control (0–15 cm)	Control (15–30 cm)
pH	-	6.2 – 6.5	5.4 – 6.5	6.8	6.5	6.7 – 6.9	6.6 – 6.9	6.9	6.9
Electrical Conductivity (EC)	µS/cm	145 – 228	240 – 366	139	176	126 – 208	170 – 262	149	157
Temperature	°C	32.0 – 36.5	32.8 – 34.9	31.7	31.9	31.1 – 32.3	30.9 – 31.7	30.4	30.8
Nitrate	mg/kg	0.05 – 0.68	0.10 – 0.51	0.01	0.01	0.15 – 1.24	0.10 – 1.40	0.92	0.81
Ammonia	mg/kg	0.41 – 1.12	0.12 – 1.57	1.15	1.16	1.40 – 2.20	1.20 – 2.15	1.95	1.76
Phosphate	mg/kg	1.2 – 1.4	0.8 – 1.7	1.2	1.6	1.6 – 2.4	1.6 – 1.15	1.2	1.8
Sulphate	mg/kg	1.5 – 2.3	0.3 – 1.4	0.5	0.8	0.6 – 2.5	0.9 – 1.1	0.5	0.8
Chloride	mg/kg	0.8 – 1.9	1.0 – 2.5	0.4	0.1	1.5 – 1.2	1.0 – 1.8	1.4	0.12
Total Organic Carbon (TOC)	%	0.25 – 0.74	0.18 – 0.37	1.2	0.06	0.75 – 1.25	0.10 – 1.30	1.01	0.11
Moisture Content	%	4.8 – 7.5	5.2 – 7.2	7.3	5.1	6.5 – 12.2	1.1 – 15.6	12.3	13.1

Source Data: Field work, 2026

The soil physicochemical analysis conducted in Oye-Ekiti revealed noticeable seasonal variations between the dry and wet seasons at depths of 0–15 cm and 15–30 cm. These variations are largely influenced by rainfall intensity, soil moisture dynamics, organic matter decomposition, and nutrient mobility within the soil profile.

The soil pH values during the dry season ranged from slightly acidic to moderately acidic (5.4–6.5), while wet season values showed a slight increase (6.6–6.9), indicating near-neutral soil conditions during periods of higher rainfall. The increase in pH during the wet season may be attributed to enhanced dilution and leaching of acidic components, resulting in more favorable conditions for nutrient availability and plant growth.

Electrical conductivity (EC) values were generally higher during the dry season than the wet season. Dry season EC ranged from 145–366 $\mu\text{S}/\text{cm}$, whereas wet season values ranged from 126–262 $\mu\text{S}/\text{cm}$. The elevated dry season conductivity likely resulted from increased concentration of dissolved salts due to evaporation and reduced soil moisture. During the wet season, rainfall infiltration and leaching processes reduced the accumulation of soluble ions in the soil.

Soil temperature also exhibited seasonal differences. Higher temperatures were observed during the dry season (32.0–36.5°C) compared to the wet season (30.9–32.3°C). This reflects increased solar radiation and reduced cloud cover during the dry period, while rainfall and increased soil moisture during the wet season contributed to cooler soil conditions.

Nutrient parameters such as nitrate, ammonia, phosphate, sulphate, and chloride generally record higher concentrations during the wet season. Wet season nitrate values increased to as much as 1.40 mg/kg compared to the dry season maximum of 0.68 mg/kg. Similarly, ammonia and phosphate concentrations were higher during the wet season. This increase may be linked to enhanced microbial activity, decomposition of organic matter, and nutrient release facilitated by higher soil moisture conditions.

Sulphate and chloride concentrations also showed moderate seasonal increases during the wet season, likely due to improved mineral dissolution and nutrient transport within the soil matrix. These nutrients are essential for plant metabolism and indicate active biogeochemical processes during wetter conditions.

Total Organic Carbon (TOC) values were generally higher during the wet season, particularly in the topsoil layer (0.75–1.25%), compared to the dry season (0.25–0.74%). The increase in TOC during the wet season may result from greater accumulation and decomposition of organic residues under moist conditions, which enhances soil fertility and microbial activity.

Moisture content showed the most pronounced seasonal variation. Dry season values ranged from 4.8–7.5%, whereas wet season values increased significantly to as high as 15.6%. This difference reflects the direct influence of rainfall infiltration and water retention during the rainy season. Higher moisture content during the wet season promotes nutrient mobility, microbial activity, and overall soil productivity.

Table 4.5: Major Cations

Parameter	Unit	Dry Season (0–15 cm)	Dry Season (15–30 cm)	Control Mean (0–15 cm)	Control Mean (15–30 cm)	Wet Season (0–15 cm)	Wet Season (15–30 cm)	Control (0–15 cm)	Control (15–30 cm)
Magnesium	mg/kg	0.2 – 1.1	0.5 – 1.2	0.3	0.1	1.1 – 3.6	2.4 – 4.5	3.1	2.4
Potassium	mg/kg	0.1 – 2.5	2.6 – 5.1	3.2	2.2	2.8 – 3.7	2.5 – 4.8	0.7	4.3
Sodium	mg/kg	5.7 – 10.9	5.2 – 7.5	4.8	5.6	11.4 – 14.7	12.9 – 18.7	14.9	11.9

Table 4.6: Heavy Metals

Parameter	Unit	Dry Season (0–15 cm)	Dry Season (15–30 cm)	Control Mean (0–15 cm)	Control Mean (15–30 cm)	Wet Season (0–15 cm)	Wet Season (15–30 cm)	Control (0–15 cm)	Control (15–30 cm)
Copper	mg/kg	0.1 – 0.3	0.2 – 0.4	0.9	0.8	2.4 – 4.6	3.0 – 5.2	3.6	4.1
Iron	mg/kg	105 – 112	102 – 115	103	110	110 – 115	115 – 108	108	100
Lead	mg/kg	0.05 – 0.12	0.10 – 0.15	0.13	0.11	0.30 – 0.82	0.05 – 0.16	0.18	0.11
Zinc	mg/kg	1.5 – 0.8	0.2 – 0.5	0.4	0.4	0.9 – 1.6	0.8 – 2.4	0.7	1.3
Manganese	mg/kg	0.4 – 1.5	0.9 – 1.8	1.3	1.4	1.2 – 1.7	1.6 – 3.1	2.4	1.8

Cations

Magnesium concentrations during the dry season ranged from 0.2–1.1 mg/kg at the 0–15 cm depth and 0.5–1.2 mg/kg at the 15–30 cm depth. These values were generally lower than those recorded during the wet season, where Mg increased substantially to 1.1–3.6 mg/kg and 2.4–4.5 mg/kg for the respective depths. The control soils also showed comparatively high Mg values, particularly during the wet season (3.1 mg/kg at 0–15 cm and 2.4 mg/kg at 15–30 cm).

Potassium values during the dry season ranged from 0.1–2.5 mg/kg at the surface layer and 2.6–5.1 mg/kg at the subsurface layer. The control means for the dry season were 3.2 mg/kg and 2.2 mg/kg for the respective depths. During the wet season, potassium concentrations ranged between 2.8–3.7 mg/kg (0–15 cm) and 2.5–4.8 mg/kg (15–30 cm). Control values were 0.7 mg/kg and 4.3 mg/kg, respectively.

Sodium concentrations were relatively higher than those of Mg and K across all sampling periods. During the dry season, Na ranged from 5.7–10.9 mg/kg at 0–15 cm and 5.2–7.5 mg/kg at 15–30 cm, with control means of 4.8 mg/kg and 5.6 mg/kg, respectively. Wet season concentrations increased markedly to 11.4–14.7 mg/kg and 12.9–18.7 mg/kg, while the control soils recorded 14.9 mg/kg and 11.9 mg/kg.

Heavy Metals

The concentrations of copper (Cu), iron (Fe), lead (Pb), zinc (Zn), and manganese (Mn) varied with season and soil depth. Generally, higher concentrations were recorded during the wet season, indicating the influence of rainfall on metal mobility and distribution in the soil.

Copper concentrations were low during the dry season but increased considerably in the wet season, ranging from 2.4–4.6 mg/kg at 0–15 cm and 3.0–5.2 mg/kg at 15–30 cm. This increase may be due to enhanced mineral dissolution and leaching under wet conditions. Higher values at deeper depths suggest downward movement of Cu through the soil profile.

Iron recorded the highest concentration among all the metals analyzed, with values remaining relatively stable across seasons and depths. This suggests that Fe is naturally abundant in the soil parent material. Slight increases during the wet season may be linked to increased weathering and soil moisture.

Lead concentrations were generally low during the dry season but increased at the surface soil during the wet season (0.30–0.82 mg/kg). The higher surface concentration may indicate anthropogenic inputs such as waste disposal or atmospheric deposition. Lower values at deeper depths suggest limited mobility of Pb in the soil.

Zinc concentrations showed moderate variation, with higher values recorded during the wet season, especially at 15–30 cm depth (0.8–2.4 mg/kg). This may result from increased solubility and leaching caused by rainfall. Zinc remains an essential micronutrient for plant growth when present in moderate amounts.

Manganese concentrations also increased during the wet season, particularly in the subsurface soil (1.6–3.1 mg/kg). The increase may be associated with enhanced weathering and reduction processes in moist soils, which improve Mn mobility.

The soil pH shows a clear seasonal variation across both depths. In the dry season, pH ranges from 5.4–5.67 (0–15 cm) and 4.5–5.65 (15–30 cm), indicating moderately acidic conditions. In the wet season, pH increases to 5.7–6.69 (0–15 cm) and 5.6–6.79 (15–30 cm), showing a shift toward near-neutral conditions. This suggests that soil is less acidic during the wet season compared to the dry season.

Electrical conductivity (EC) is lower in the dry season, ranging from 78–98 $\mu\text{S}/\text{cm}$ (0–15 cm) and 113–125 $\mu\text{S}/\text{cm}$ (15–30 cm), while in the wet season, it increases to 143–162.76 $\mu\text{S}/\text{cm}$ (0–15 cm) and shows wider variability at depth (44.56–1220.4 $\mu\text{S}/\text{cm}$). This indicates higher dissolved ion concentration and greater variability during the wet season.

Temperature remains fairly consistent throughout the seasons. In the dry season, it ranges from 32.5–33.4°C (0–15 cm) and 31–32.2°C (15–30 cm), while in the wet season, it is slightly higher at the surface (32.8–34.63°C) and 32.5–34.32°C at depth, indicating minimal seasonal variation.

For nutrients, nitrate in the dry season ranges from 0.1–0.38 mg/kg (0–15 cm) and 0.11–0.7 mg/kg (15–30 cm), while in the wet season it increases to 0.4–0.63 mg/kg and 0.3–0.46 mg/kg, showing higher availability during the wet season. Ammonia also increases significantly from 0.2–0.8 mg/kg (dry surface) and 0.5–0.97 mg/kg (dry depth) to 1.9–2.13 mg/kg (wet surface) and 1.3–2.57 mg/kg (wet depth), indicating enhanced nitrogen presence in the wet season.

Phosphate shows low surface values in the dry season (0.1–0.56 mg/kg) but much higher values at depth (5.9–7.23 mg/kg). In the wet season, it increases to 0.8–1.14 mg/kg (surface) and 7.9–12.5 mg/kg (depth), confirming greater accumulation and mobility during the wet period. Sulphate ranges from 9.1–12.11 mg/kg (surface) and 0.0–0.12 mg/kg (depth) in the dry season, increasing to 12.7–14.04 mg/kg (surface) and 0.5–1.95 mg/kg (depth) in the wet season. Chloride also rises from 0.7–0.87 mg/kg and 0.79–0.8 mg/kg (dry) to 0.9–1.7 mg/kg and 2.1–3.11 mg/kg (wet), particularly at deeper levels.

Total Organic Carbon (TOC) increases slightly from 0.5–0.63% (dry surface) and 0.6–0.69% (dry depth) to 0.7–0.87% (wet surface) and 0.4–0.85% (wet depth), indicating improved organic matter during the wet season. Moisture content is lower in the dry season (5.7–6.74% surface; 5.4–6.37% depth) compared to the wet season (0.8–7.73% surface; 5.4–7.64% depth), showing greater variability and generally higher moisture during the wet period.

For cations, magnesium ranges from 12.9–22.75 mg/kg (dry surface) and 17.9–19.09 mg/kg (dry depth), increasing in the wet season to 12.9–31.59 mg/kg and 24.9–29.63 mg/kg. Potassium rises from 1.4–2.43 mg/kg and 1.5–2.75 mg/kg (dry) to 2.2–5.33 mg/kg and 4.3–5.41 mg/kg (wet). Sodium also increases from 4.4–9.1 mg/kg and 6.7–8.81 mg/kg (dry) to 9.1–12.25 mg/kg and 9.8–11.98 mg/kg (wet), indicating higher ion mobility in the wet season.

Among heavy metals, copper increases from 1.9–3.44 mg/kg (dry surface) and 1.4–3.63 mg/kg (dry depth) to 3.7–4.19 mg/kg and 2.4–3.98 mg/kg in the wet season. Iron shows a significant rise from 56.0–97.18 mg/kg and 78.9–94.62 mg/kg (dry) to 121.0–170.59 mg/kg and 153–160.41 mg/kg (wet). Lead increases slightly from 0.1–0.84 mg/kg and 0.8–0.89 mg/kg to 0.7–1.35 mg/kg and 0.9–1.38 mg/kg. Zinc rises from 4.2–5.17 mg/kg and 4.7–5.13 mg/kg (dry) to 4.6–7.05 mg/kg and 6.5–7.2 mg/kg (wet). Manganese also shows an increase from 0.1–1.3 mg/kg and 0.5–1.21 mg/kg to 0.7–1.97 mg/kg and 0.5–1.99 mg/kg.

4.3 Vegetation Studies

A major floristic survey conducted on the Oye campus documented approximately 150 angiosperm species belonging to 47 families and 112 genera (see **Table 4.7**). The vegetation included herbs, shrubs, climbers, creepers, lianas, geophytes, and trees. Shrubs were the dominant growth form, accounting for about 36.7% of the total species identified. The most dominant plant families recorded were:

- Euphorbiaceae
- Asteraceae
- Fabaceae

These families are common in disturbed tropical ecosystems and secondary vegetation communities. Their dominance suggests active ecological succession and adaptation to anthropogenic disturbance within the study area. The study area around FUOYE is located within a landscape of gently undulating terrain with patches of marshy environments and regenerating forest vegetation. The vegetation pattern reflects continuous human activities such as:

- Construction of roads and buildings

- Farming activities
- Bush clearing
- Collection of medicinal plants
- Urban expansion

These activities contribute to habitat fragmentation and loss of biodiversity. The study observed that continued infrastructural development threatens several indigenous plant species within the campus environment. As a result, the establishment of an arboretum or botanical garden was recommended for the conservation of plant genetic resources and biodiversity protection.

Table 4.7: Vegetation Type and Conservation Status

Vegetation / Plant Species	Vegetation Type	Conservation Status
<i>Daniellia oliveri</i>	Indigenous savanna tree	Least Concern
<i>Gmelina arborea</i>	Exotic plantation tree	Least Concern
<i>Azadirachta indica</i> (Neem)	Exotic ornamental/shade tree	Least Concern
<i>Parkia biglobosa</i>	Indigenous savanna woodland tree	Vulnerable (locally threatened due to exploitation)
<i>Vitellaria paradoxa</i> (Shea tree)	Indigenous savanna tree	Vulnerable
<i>Mangifera indica</i> (Mango)	Cultivated fruit tree	Least Concern
<i>Tectona grandis</i> (Teak)	Plantation forest tree	Least Concern
<i>Khaya senegalensis</i>	Indigenous savanna woodland tree	Vulnerable
<i>Acacia</i> spp.	Savanna shrub/tree	Least Concern
<i>Eucalyptus</i> spp.	Exotic plantation tree	Least Concern
Tall savanna grasses (<i>Andropogon</i> spp., <i>Pennisetum</i> spp.)	Guinea savanna grassland	Not Evaluated
Shrub vegetation	Secondary regrowth vegetation	Not Evaluated

Ecological Observations

The study area in Oye-Ekiti exhibited typical Guinea savanna ecological characteristics, marked by the presence of grasses, shrubs, and scattered trees adapted to the tropical climatic conditions of the region (see **Table 4.8**). Vegetation growth was more pronounced during the wet season due to increased rainfall, soil moisture availability, and favorable nutrient conditions, whereas the dry season was characterized by reduced plant vigor, sparse ground cover, and relatively higher temperatures.

Soil conditions within the area were generally suitable for plant growth and microbial activities, thereby supporting nutrient cycling and ecological productivity. Human activities such as construction, small-scale farming, bush burning, and indiscriminate waste disposal were moderately evident within the environment and may contribute to habitat disturbance, soil degradation, and gradual biodiversity loss if not properly managed.

Despite these disturbances, the presence of birds, insects, and other small fauna suggests that the ecosystem still retains a certain degree of ecological balance and biological diversity. Furthermore, tree planting, landscaping, and other environmental beautification practices observed within parts of the area indicate ongoing efforts toward environmental conservation, ecological sustainability, and improved environmental management in Oye-Ekiti.

Table 4.8: Common Plant Pathogens and Their Effects

Pathogen	Type	Disease Caused	Effects on Plants
<i>Fusarium oxysporum</i>	Fungus	Fusarium wilt	Wilting, yellowing, vascular blockage, plant death
<i>Aspergillus flavus</i>	Fungus	Aspergillus rot	Seed spoilage and aflatoxin contamination
<i>Puccinia graminis</i>	Fungus	Stem rust	Reduced photosynthesis and low crop yield
<i>Rhizoctonia solani</i>	Fungus	Root rot	Root decay and seedling death
<i>Colletotrichum gloeosporioides</i>	Fungus	Anthrachnose	Leaf spots, fruit rot, stem lesions
<i>Xanthomonas campestris</i>	Bacterium	Black rot	Leaf yellowing and tissue necrosis
<i>Ralstonia solanacearum</i>	Bacterium	Bacterial wilt	Rapid wilting and crop collapse
<i>Agrobacterium tumefaciens</i>	Bacterium	Crown gall disease	Tumor-like swellings on roots and stems
<i>Pseudomonas syringae</i>	Bacterium	Leaf blight	Water-soaked lesions and leaf death
Tobacco mosaic virus	Virus	Mosaic disease	Leaf mottling and stunted growth
Cassava mosaic virus	Virus	Cassava mosaic disease	Distorted leaves and reduced tuber yield
Maize streak virus	Virus	Maize streak disease	Chlorotic streaks and poor grain production
<i>Meloidogyne incognita</i>	Nematode	Root-knot disease	Root galls and nutrient deficiency
<i>Pratylenchus</i> spp.	Nematode	Root lesion disease	Poor root growth and wilting
<i>Phytophthora infestans</i>	Oomycete	Late blight	Leaf decay and tuber rot
<i>Pythium</i> spp.	Oomycete	Damping-off	Seedling collapse and poor germination

Wildlife and Conservation Status

The wildlife around Federal University Oye-Ekiti reflects the Guinea savanna ecosystem, supporting various species of small mammals, reptiles, birds, and insects adapted to the tropical savanna conditions of the area (see **Table 4.9**). Most of the observed species are currently classified as Least Concern, suggesting relatively stable populations within the environment.

However, some species, including the straw-colored fruit bat and African rock python, may face increasing pressure due to habitat loss, urban expansion, bush burning, agricultural activities, and other forms of human disturbance within and around the university community. These activities can lead to habitat fragmentation, reduction in food sources, and disruption of ecological balance.

Continued habitat conservation practices such as tree planting, environmental landscaping, controlled waste disposal, and the reduction of indiscriminate bush burning and land clearing are therefore important for sustaining biodiversity and maintaining ecological stability within the University of Oye-Ekiti environment.

Table 4.9: Wildlife and Conservation Status

Wildlife Species	Group	Conservation Status*
Grasscutter (<i>Thryonomys swinderianus</i>)	Mammal	Least Concern
African Giant Rat (<i>Cricetomys gambianus</i>)	Mammal	Least Concern
Mona Monkey (<i>Cercopithecus mona</i>)	Mammal	Least Concern
Straw-colored Fruit Bat (<i>Eidolon helvum</i>)	Mammal	Near Threatened
African Civet (<i>Civettictis civetta</i>)	Mammal	Least Concern
Monitor Lizard (<i>Varanus niloticus</i>)	Reptile	Least Concern
Agama Lizard (<i>Agama agama</i>)	Reptile	Least Concern
African Rock Python (<i>Python sebae</i>)	Reptile	Near Threatened
Tree Squirrel (<i>Heliosciurus</i> spp.)	Mammal	Least Concern
Weaver Bird (<i>Ploceus</i> spp.)	Bird	Least Concern
Cattle Egret (<i>Bubulcus ibis</i>)	Bird	Least Concern
Pied Crow (<i>Corvus albus</i>)	Bird	Least Concern
Village Quelea (<i>Quelea quelea</i>)	Bird	Least Concern
Termites (<i>Macrotermes</i> spp.)	Insect	Not Evaluated
Butterflies	Insect	Not Evaluated
Honeybee (<i>Apis mellifera</i>)	Insect	Least Concern

Flora and Fauna of the Project Area

Flora

The flora of the project area is characteristic of the Guinea savanna vegetation zone, consisting mainly of grasses, shrubs, and scattered trees adapted to tropical climatic conditions. Common plant species observed include *Azadirachta indica* (Dogoyaro/Neem), *Daniellia oliveri*, *Gmelina arborea*, *Vitellaria paradoxa*, *Parkia biglobosa*, *Acacia* species, and various savanna grasses such as *Andropogon* and *Pennisetum* species. These plants provide ecological benefits, including shade, erosion control, carbon sequestration, nutrient cycling, and habitat for wildlife. Most species are classified as Least Concern, although some indigenous economic trees, such as the Shea tree and African locust bean, are locally threatened by deforestation, bush burning, and land clearing activities.

Fauna

The fauna of the project area includes a variety of mammals, birds, reptiles, and insects commonly associated with the savanna ecosystem. Wildlife species observed or commonly found in the area include grasscutters (*Thryonomys swinderianus*), African giant rats (*Cricetomys gambianus*), squirrels, monkeys, monitor lizards, agama lizards, snakes, weaver birds, cattle egrets, butterflies, termites, and honeybees. Most of these species are classified as Least Concern according to the International Union for Conservation of Nature conservation categories. However, increasing urbanization, habitat

disturbance, bush burning, and human activities may threaten some wildlife populations over time. The presence of diverse flora and fauna indicates moderate ecological stability within the project area despite ongoing anthropogenic pressures.

Ecological Significance and Conservation Considerations

The project area is ecologically significant because its Guinea savanna vegetation supports biodiversity, soil stability, nutrient cycling, and microclimatic regulation. The grasses, shrubs, and trees provide habitat and food for birds, reptiles, insects, and small mammals, while plant species such as *Azadirachta indica*, *Vitellaria paradoxa*, and *Parkia biglobosa* contribute to erosion control, carbon sequestration, and environmental sustainability. Soil microorganisms and vegetation interactions also help maintain soil fertility through nutrient recycling and organic matter decomposition.

However, the area is exposed to environmental pressures such as land clearing, construction activities, bush burning, farming, and improper waste disposal, which may result in habitat loss, biodiversity decline, and soil degradation. Conservation measures should therefore include protection of vegetation cover, tree planting, proper waste management, controlled land use, and continuous environmental monitoring. These measures are important for maintaining ecological balance and ensuring the long-term sustainability of the project environment.

Wildlife Migration Pathways

Wildlife migration pathways within the project area are generally limited due to the semi-urban nature of the environment and increasing human activities. However, the existing vegetation cover, open grasslands, drainage channels, and scattered tree stands provide temporary movement corridors for small mammals, birds, reptiles, and insects. Species such as squirrels, grasscutters, monkeys, reptiles, and migratory birds may move through these pathways in search of food, water, shelter, and breeding sites, particularly during seasonal changes between the dry and wet seasons.

During the wet season, increased vegetation growth and water availability enhance wildlife movement and habitat utilization, while the dry season may restrict movement due to reduced food and moisture availability. Human activities such as road construction, land clearing, bush burning, and infrastructural development can disrupt these natural movement routes and contribute to habitat fragmentation. Conservation efforts such as preserving green corridors, protecting vegetation cover, and minimizing habitat disturbance are therefore important for maintaining wildlife movement and ecological connectivity within the area.

Bird and Livestock Movement

Bird movement within the project area is influenced by seasonal changes, food availability, vegetation cover, and human activities. During the wet season, increased vegetation growth, insect abundance, and water availability attract a higher number of birds, including weaver birds, cattle egrets, pigeons, and other migratory or resident species. Birds commonly move between trees, grasslands, open fields, and nearby waterlogged areas for feeding, nesting, and shelter. In the dry season, movement may increase over longer distances as birds search for food and water sources. Human activities such as construction, vehicular movement, and noise may temporarily disturb bird movement and nesting behavior.

Livestock movement in the area mainly involves cattle, goats, and sheep grazing within open grasslands and nearby undeveloped lands. Movement patterns are usually controlled by herders and are influenced by pasture availability and water sources, especially during the dry season when forage becomes limited. During the wet season, livestock disperse more widely due to increased pasture growth.

Continuous grazing, trampling, and unrestricted livestock movement may contribute to vegetation loss, soil compaction, and erosion if not properly managed. Proper grazing control and protection of sensitive vegetation areas are therefore important for maintaining ecological balance within the project environment.

4.4 Socio-economic and Health Study

This section presents the results and analysis of the survey questionnaire conducted as part of the Environmental and Social Impact Assessment (ESMP) for the proposed hybrid solar power plant at the University of Oye-Ekiti. A total of 40 respondents completed and submitted the questionnaire, providing comprehensive information on socioeconomic and demographic characteristics, health status, standard of living, gender-based violence concerns, environmental and cultural resources, project impact perceptions, and grievance redress mechanisms.

The data collected has been analyzed and presented using various visualization techniques including pie charts and bar charts to facilitate better understanding of the survey findings. The results are organized according to the survey sections: Household Data, Health Status, Standard of Living, Gender-Based Violence/Sexual Exploitation and Abuse, Resources/Cultural Property, Project Activities Impact Evaluation, Grievance Redress Mechanism, and World Bank Environmental and Social Standards (ESS).

4.4.1 Age Distribution and Marital Status

Gender Distribution

The gender distribution in university admissions in Nigeria has historically varied, but at the Federal University, Oye-Ekiti specifically, female students slightly outnumber their male counterparts with a female-to-male student ratio of 1.1:1. However, out of the 40 respondents sampled, 60% (24 respondents) were male while 40% (16 respondents) were female. The sampling population could have been influenced by the staff and business operators within the university community. **Figure 4.1** shows the gender distribution in the study area.

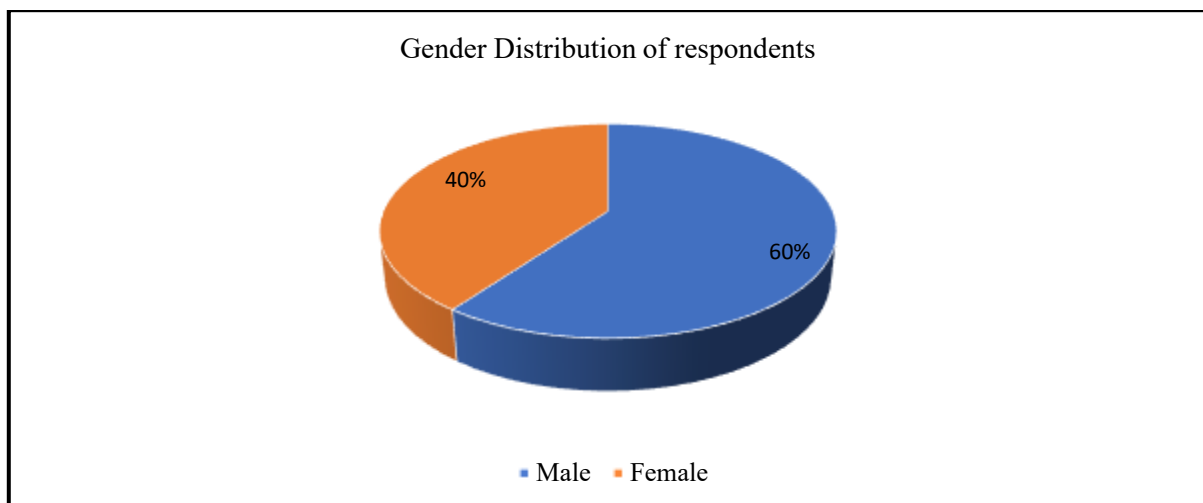


Figure 4.1: Gender Distribution in the Study Area

Age Distribution

The age distribution shows that the majority of respondents (65%) fall within the 18-45 years age bracket, representing 34 individuals. This is followed by 30% in the 46-65 years category (20 respondents), and 5% below 18 years (2 respondents). This distribution indicates a predominantly young to middle-aged population, which is typical for a university community.

Marital Status

Results from **Figure 4.2** reveals that Married respondents account for 42% while single account for 49%. The divorced and widowed respondents amounted to 6% and 3% respectively. This result is reflected thus because of the peculiarity of the university community where youth, majorly students, are preponderant. The results further attest to the fact that the community is a youthful community and needs power supply to meet up with their daily academic and business challenges.

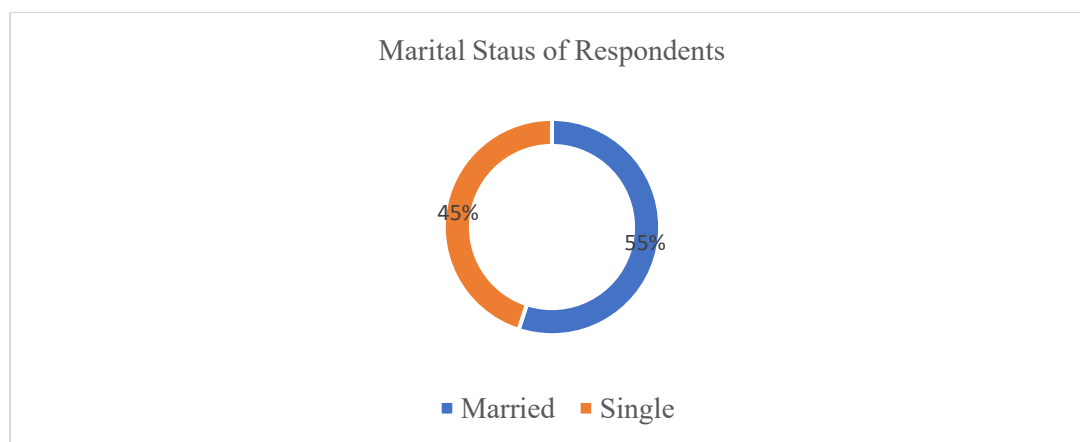


Figure 4.2: Depicts the Marital Status of Respondents

4.4.2 Occupation Distribution

The study area is a university community; thus, it is expected that students would form the bulk of the population of the community. Consequently, in terms of occupation, results from **Figure 4.3** show that students form 38% of the sampled population, being the highest, followed by civil servants with 26%. Traders/businesspeople were 22% of the sampled population, while artisans, farmers and unemployed had a percentage of 8%, 5% and 1% respectively. The civil servants were mainly lecturers (academic staff) and non-academic staff who form small amount of the school's population compared to the students. Traders and businesspersons were also sampled for interviews as they are also critical stakeholders in the power sector of the community. Some farmers were seen in the university community cultivating the land for food production.

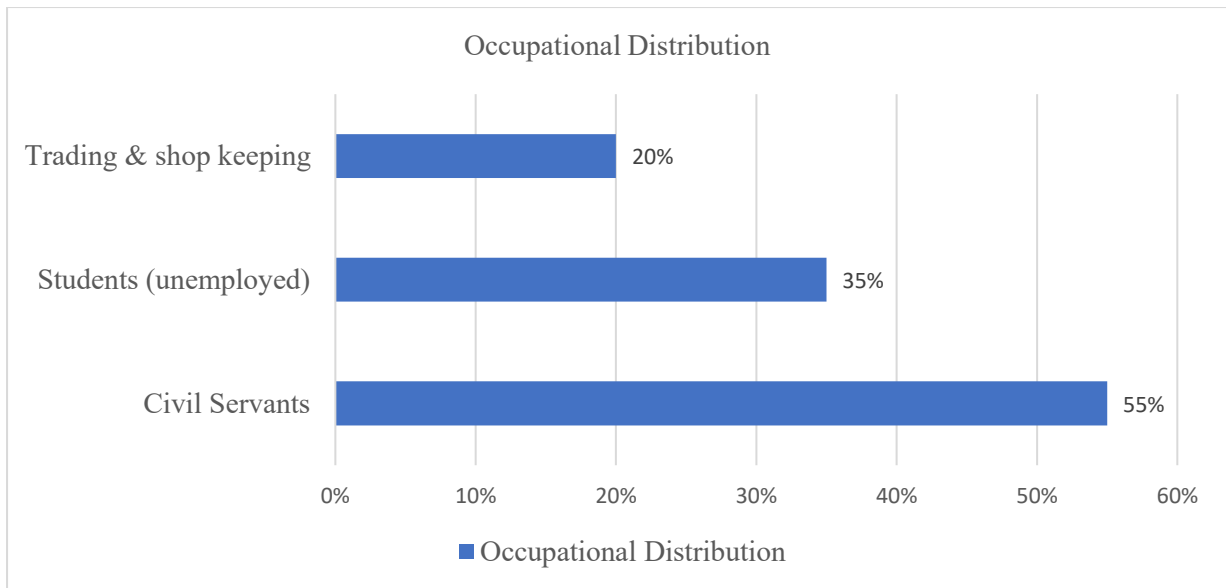


Figure. 4.3: Occupational Distribution of the study area

4.4.3 Residential Status

Residential status distribution was mainly categorized into on-campus and off campus. Results from Figure 4.4 reveal that respondents living on campus formed 38%, while those living off campus were 62%. These results appear so because majority of the students and workers of the university live off campus probably due to the fact that the power supply on campus is so epileptic, and because the hostel accommodation on campus for students is highly inadequate.

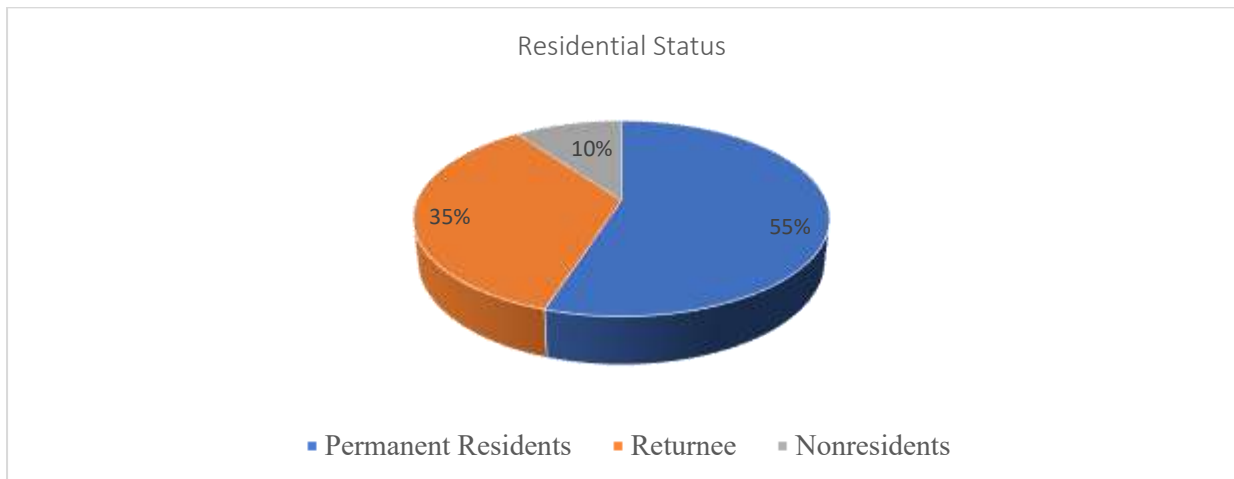


Figure 4.4: Residential Status of Respondents

4.4.6 Relationship to Household Head

Relationship to household head defines a person's familial or functional connection to the primary decision-maker/breadwinner in a household. The relationship with the head of household is such that 45% of the respondents were the actual household head, 20% are spouses of the household head, 35%

are children of the Head of household. This distribution indicates that the survey captured responses from key decision-makers within households.

4.4.7 Household Size

The household size of a typical family is relative, depending on several factors such as income, level of education and religious belief. The household size of the respondents varies between 3 to 8 members, with a mean household size of 6 persons. This household size is typical of Oye, Ekiti State which has an average household size ranging between 6 and 7 persons.

4.4.8 Duration of Living/Working in the Area

The analysis showed that 45% of respondents have lived or worked in the area for 6-9 years, 30% have been there for 10 years or more. 25% of respondents are living and working 3-5 years and below. This data indicates (see **Figure 4.5**) a well-established community with significant institutional memory and long-term stakes in the area's development.

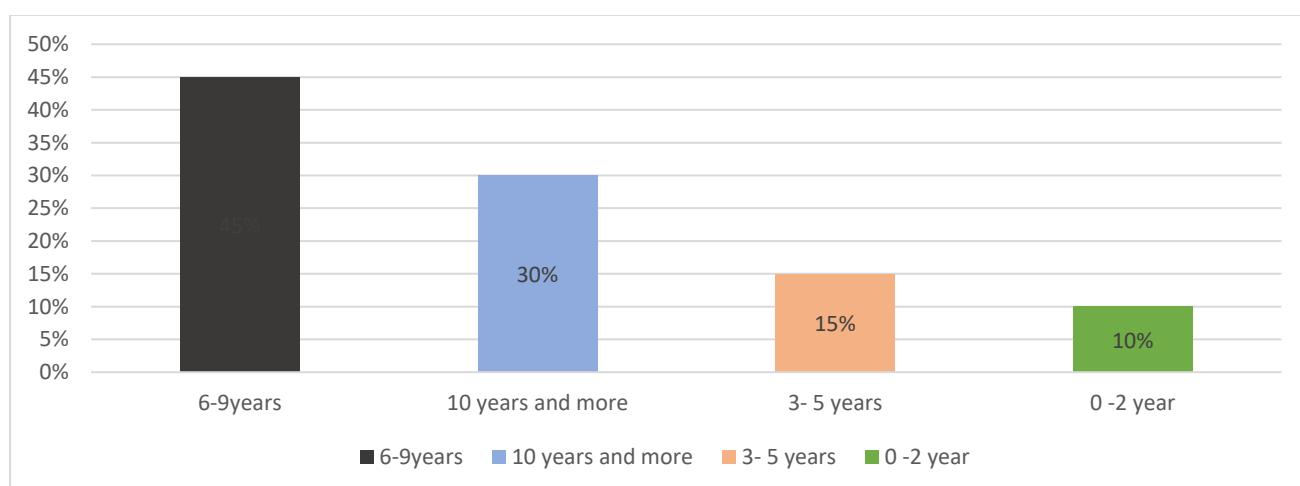


Figure 4.5: Duration of Living/Working in the Area

4.4.9 Educational Level

The study area was a university community and the literacy level in such a community is expected to be on the high side. Results from the field, represented in Figure ... show that 35% of the respondents were undergraduate students at the university, while 10% were postgraduate students. About 23% were university graduates, while OND/HND/NCE represented 20%. Those with secondary education were 12%. The university graduates (22%) were majorly those working as academic and non-academic staff. The traders/business people were majorly those in the HND/OND/NCE category and a few in the university graduate cadre. All the respondents interviewed can read and write. This is expected of a state like Ekiti where education is the major sector in the state. The Ekiti people are vast in education as records have it that they produce the highest number of Professors in the country. The high education level of members of the university community shows that the people will appreciate the proposed power project and they will own the project in terms of safe-guarding it. This high educational level is consistent with the university community context and suggests good capacity for understanding and engaging with the proposed project.

4.5 Health Status

This section examines the health management practices, healthcare access patterns, common ailments, and perceptions about potential health impacts of the proposed infrastructure project.

4.5.1 Health Management Practices

The study shows that most respondents (54%) attend hospitals or clinics when sick, demonstrating good health-seeking behavior. About 25% reported using local herbs and visiting local herb shops for traditional, herbal medications, while about 21% buying drugs from nearby chemists without professional consultation. For respondents not visiting conventional health centers for treatment, they complained about the high cost of seeking such medication. The stress and the high cost of drugs forced them to result to other means of medication as earlier captured. This pattern suggests adequate awareness of the importance of good health in the community.

4.5.2 Hospital/Clinic Visit Frequency

The health care facilities that exist in the study area include the Federal University, oye-Ekiti Teaching Hospital and the University Health Services (Clinic) on campus, which provides medical, nursing, and dental services to the university community. The proximity and access to health facilities is a major driver that influences the frequency of attendance to hospital / clinic. Among those who attend hospitals or clinics, 60% reported visiting within the last six months, while 30% last visited within the past year while 10% of the respondents have not visited hospital for 2 years stretch.

4.5.3 Common Ailments and Sicknesses

The most commonly reported ailments are Malaria (45%) and Typhoid fever (30%), which are endemic diseases in Nigeria. High Blood pressure/ Hypertension (10%), Diarrhea affected 10% and 5% of respondents had Eye pain. These disease patterns are typical of tropical regions and do not indicate any unusual health burden that would be exacerbated by the proposed solar power project. **Figure 4.6** depicts the common ailments and sickness in the study area.

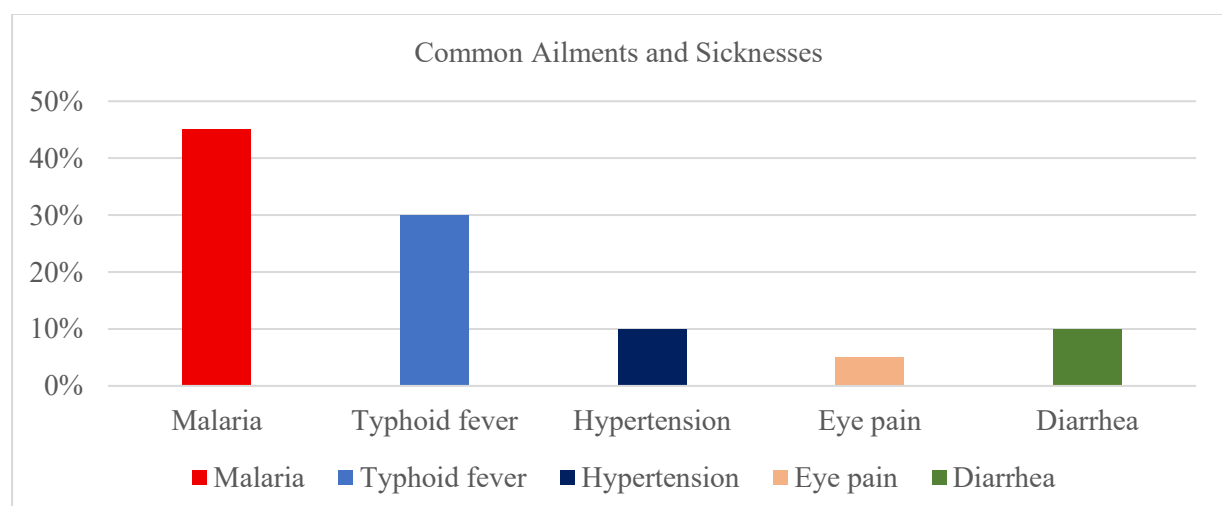


Figure 4.6: Depicts the Common Ailments and sicknesses in the study area

4.5.4 Perceived Health Impact of Proposed Infrastructure

The perception of respondents on the perceived health implication of the proposed solar power plant project was positive. All the respondents indicated that they do not believe their health conditions will be affected by the proposed infrastructure intervention. This unanimous perception suggests strong confidence in the project's safety and minimal anticipated health risks from the solar power installation.

4.6 Standard of Living/Socioeconomic Activities

This section analyzes the living conditions, housing characteristics, utility services, income levels, and perceptions about changes in standard of living among respondents.

4.6.1 Housing Characteristics

Housing types and materials used in building construction are part of the indices on the quality of housing and standard of living within a particular community. The site location is Oye Ekiti which is not the state capital of Ekiti state. It is a typical Nigerian community as an average town. The school FUOYE is located at the center of the town, a semi-urban location. The nature of building types and roof characteristics occupied by the respondents are described in this section. As indicated, all (100%) of the respondents live in cemented block houses. The roofing materials are a mixture of corrugated iron sheets (70%), aluminum (20%) and asbestos roof (10%). The floor of the houses is majorly cemented (60%) while a few used tiles (30%), and the rest were other floor types. Respondents' household number of rooms includes: 1-2 rooms (38%), 3-4 rooms (50%), and above 4 rooms only (12%). Structure types within the project location are buildings, office complex structures, bungalows, shops for stationery and computer services etc. Other structures are temporary like kiosks for (POS), makeshift for local restaurants and petty traders and Umbrella stands for recharge card sellers. Corrugated iron sheets were seen on some roofs around the community for rainwater harvesting. Residents rely mainly of such water as pipe-borne water is mostly found in some specific areas on campus. Other sources of water around the community are streams and rivers. Few residents have boreholes sunk in their houses for water supply.

4.6.2 Sanitation Facilities

Sanitation facilities are systems and infrastructure designed to safely separate human excreta from human contact, preventing disease transmission and ensuring public health. Improved, safe options include flush/pour-flush toilets connected to sewers or septic tanks among others. Water closet toilet facilities are available in 90% of households, demonstrating good sanitation infrastructure. However, 10% use toilet facilities (pit latrine) located outside their dwellings while others engage in open defecation.

4.6.3 Housing and Land Tenure

Housing tenure shows that 65% of respondents rented their accommodation while 25% own their homes while 10% did not indicate their housing tenure. The land tenure distribution mirrors this pattern exactly, with 65% renting and 25% owning land. This split between ownership and rental suggests a mixed community of long-term residents and more transient university staff.

4.6.4 Refuse Disposal Methods

The study area had a mixed household solid waste disposal method, they range from disposal at Community refuse pit/dumpsite, burning, depositing at the backyard of residence, and collection by

waste contractors among others. The predominant solid waste disposal method was by burning which represent 40 %, this was followed by deposition at the backyard which represents 25% and waste collection by registered waste contractors, representing 25%. Dumping at community dumpsite represents 10%. However, within the university community, Solid wastes are collected and disposed of by waste contractors, unfortunately, students engage in indiscriminate dumping of waste behind their hostels. Therefore, it is pertinent that waste segregation at source, reuse and recycling be prioritized in the stud areas.

4.6.5 Source of Lighting

All respondents (100%) indicated access to electricity from the national grid, through the Ibadan Distribution Company (IBDC), although the duration and quality of supply vary due to the Band scheme of IBDC which specify the number of hours of electricity available to users per day. Alternative lighting sources include torchlight/battery (10%), standalone Solar system (35%) candles (10%), and generators (45%) (see **Figure 4.7**). The reliance on multiple backup sources suggests unreliable electricity supply from the national grid, hence the proposed solar power project will mitigate the power gap within the community.

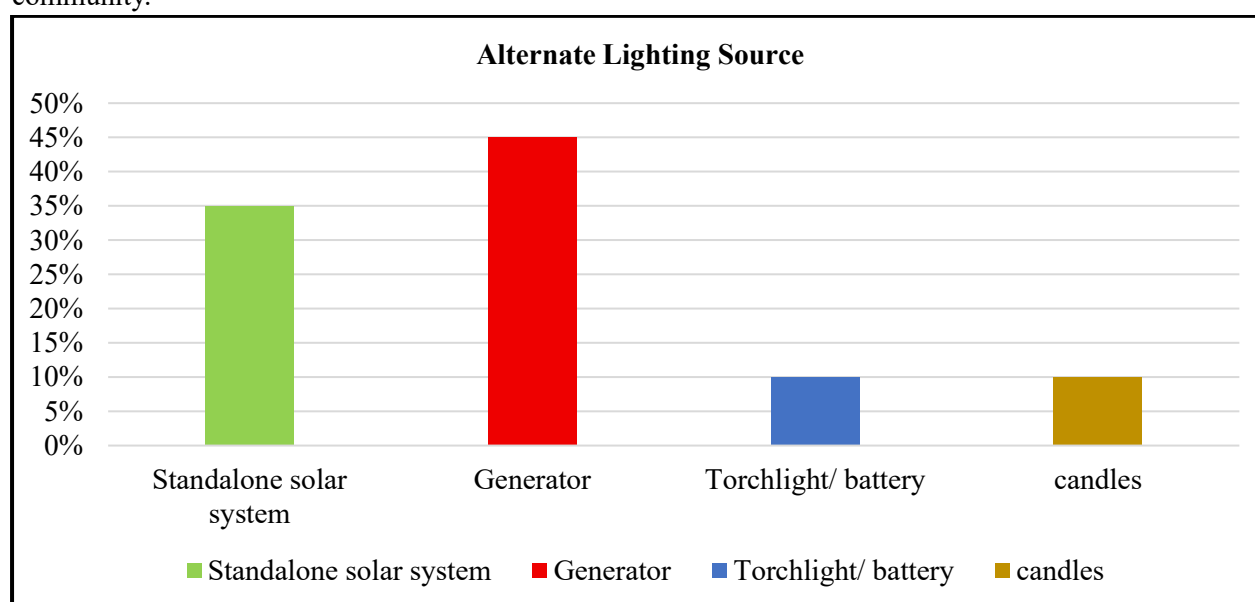


Figure 4.7: Alternative Lighting Source

4.6.6 Electricity's Role in Living Standards

Access to reliable and affordable electricity has a multiplier effect in enhancing economic prosperity and improving the standard of living due to lower cost of generating power individually and spur small and medium scale businesses. However, 35% percent of respondents reported that their standard of living changes positively due to improved electricity supply, while 65% attribute changes to other factors. This indicates that while electricity is important, it is not the sole determinant of living standards in the community.

4.7 Gender-Based Violence/Sexual Exploitation and Abuse

This section examines gender-related issues including restrictions on women's access to services, criminalization of certain acts, safety measures, and gender equity practices in the community.

4.7.1 Provisions Restricting Women's Access to Health Services

The survey showed that there is no restriction on women's access to health and social services requiring male consent for medical treatment, 70% responded yes, 5% no, and 10% did not respond. Regarding parental consent for adolescents' access to contraceptives, 60% responded yes, 10% no, and 30% no response. For medical practitioners refusing services based on conscientious objection, 60% said yes, 10% no, and 25% did not respond. These responses indicate significant awareness of restrictive practices that may affect women's health access.

4.7.2 Criminalization of Acts

Both adultery and prostitution were identified as criminalized acts by all the respondents (100%). Opinions of the respondents were divided over who bears criminal responsibility: This data reflects the legal and social framework regarding these issues in the community.

4.7.3 Measures for Women's Safety

Safety of women and children in any society is of paramount importance. Women in Oye Ekiti face less of safety challenges in public spaces and transportation, driven by poorly maintained infrastructure, long wait times, and risks of harassment. Transportation in the community is not a major issue as the study area is not a cosmopolitan area. This reduces physical discomfort in crowded vehicles, verbal and physical abuse which particularly affect women in some major cities of the country. Nonetheless, In the study area, majority of respondents (69%) indicated there are measures or programs implemented to increase women's safety in public spaces or transportation, (solar street lightening, Gender policy among others) while 31% had no idea.

4.7.4 Training on Gender-Based Discrimination

The university community has its gender policy in. The policy is geared toward preventing and responding to gender-based violence, such as sexual harassment and assault among others. About 88% of respondents indicated that there are specific training programs for medical and legal professionals on gender-based discrimination in health and safety. While 12% were unaware of such training programmes.

4.7.5 Gender Equity in the Community

Nigeria's Constitution (Section 42) guarantees freedom from discrimination on the basis of sex, gender, or religion, providing a legal foundation for equality. Nigeria's primary framework for gender equality is the National Gender Policy (2021–2026), which aims to bridge gender gaps, promote women's empowerment, and achieve 35% affirmative action in political and decision-making roles. In the study area, gender equality is being promoted in line with the University Gender policy.

Results from the field survey on gender equity show that 26% of respondents indicated that Women are elected into public office, 22% indicated that quotas on genders are ensured in leadership of community-based organizations, while 52% of the respondents indicated that females are given equal opportunity and access to education and employment. This suggests that while educational and employment equity exists, political representation and leadership equity remain minimal as seen in **Figure 4.8**

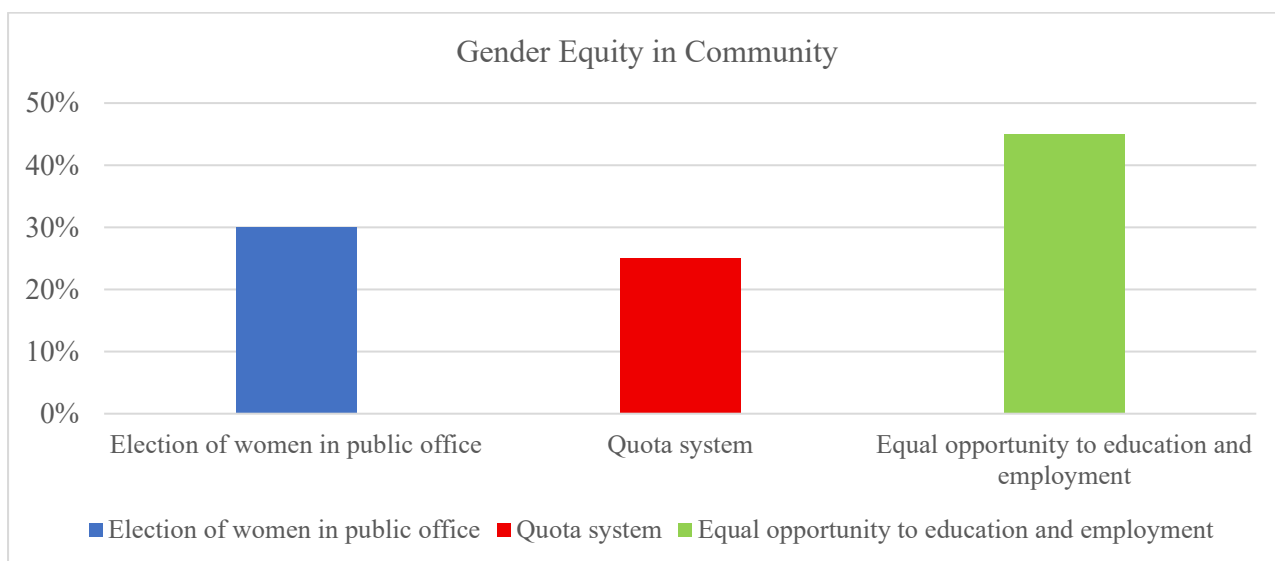


Figure 4.8: Gender Equity in Community

4.7.6 Vulnerable Group

The Vulnerable groups within the University community primarily include students living with disabilities (PLWD) facing accessibility challenges, and economically disadvantaged individuals (urban poor) within and around Oye Ekiti town. These groups encounter significant barriers to education, infrastructure, and resources, requiring specialized support and intervention. The University has a Counselling and Human Development Centre, where counsellors attend to vulnerable group. The center urges students to champion a culture whereby every individual feels physically safe and emotionally included in order to foster a truly thriving academic community. The university has a network of help available.

Dean of Student Affairs' office, and the Counselling and Human Development Centre for psychological and emotional support. The university has a network of help available to vulnerable students, they include the University Security Unit, the University Health Centre, the Dean of Student Affairs' office, and the Counselling and Human Development Centre for psychological and emotional support.

4.8 Resources/Cultural Property

This section assesses environmental challenges in the community and potential impacts of the proposed project on natural and cultural resources.

4.8.1 Current Environmental Problems

Inadequate drainage systems, combined with improper waste disposal, have increased the risk of flooding, particularly in rapidly urbanizing areas around the University community. However, the respondents indicated that poor drainage system represented 40%, bad roads 35% were significant problems in the community. Environmental degradation and waste management were mentioned to represent 20% and 5% contribution respectively. These existing environmental issues provide context for assessing the proposed project's potential impacts.

4.8.2 Expected Environmental Problems from Project Construction

Remarkably, 100% of respondents indicated that they do not expect any of the listed environmental problems (soil infertility, poor drainage, bad roads, low visibility, erosion, flooding, environmental degradation, infrastructure destruction, land encroachment, or pollution) to result from the proposed solar power project during construction. This unanimous perception reflects strong confidence in the project's environmental safety and proper management.

4.8.3 Impact on Valued Cultural/Archaeological Property

All respondents (100%) indicated that the proposed solar power plant infrastructure project at Federal University Oye-Ekiti will not adversely affect any valued environmental resource, cultural heritage site, or archaeological property within the area. Rather, the project is expected to improve the aesthetic appeal and developmental value of the university community and its surrounding environment. This finding is consistent with the fact that the proposed project site is located on a virgin land owned by the university which is presently underutilized and has no known cultural, historical, or archaeological significance. Consequently, the project is not expected to result in the displacement or destruction of culturally important resources within Oye-Ekiti.

4.9 Intervention Project Activities Impact Evaluation

This section evaluates awareness of the proposed solar power project, information sources, potential for community restiveness, expected impacts, and community expectations from the project.

4.9.1 Project Awareness

Project awareness involves educating stakeholders or the public about a project's goals, impact, or existence, crucial for fostering community support, compliance, and successful implementation. Unfortunately, the level of awareness of the proposed intervention was abysmally low, only a handful of persons are aware among the University management team. 10% of respondents indicated awareness of the proposed solar power project, while 90% were not aware. This low awareness level highlights the importance of enhanced stakeholder engagement and communication about the project to ensure community understanding and participation.

4.9.2 Information Sources

Among those aware of the project, 74% learned about it from colleagues in the Works Department, 16% obtained information through management meeting while 10% got informed from stakeholders' engagement. This distribution suggests that informal workplace communication is currently the primary information channel, indicating potential for more systematic communication strategies.

4.9.3 Potential for Community Restiveness

All respondents (100%) indicated that the proposed infrastructure project will not cause restiveness in the community. This unanimous response reflects strong community acceptance and support for the project, as well as confidence in its implementation approach.

4.9.4 Positive Impacts of the Project

Respondents identified multiple positive impacts expected from the project, including constant power supply, increased productivity and efficiency, enhanced research and academic output for lecturers and

students, promotion of economic development and prosperity, and reduction of noise and global warming. No negative impacts were identified by respondents, further demonstrating strong community support.

4.9.5 Community Expectations from the Project

The survey revealed several key expectations from the community. Employment of locals and contracting opportunities during construction was expected by 80% of respondents, capacity building for maintenance during implementation by 90%, and community input into final engineering design by 20%. Additionally, respondents emphasized the importance of durability, proper maintenance, and adequate security to protect against theft and robbery.

4.10 Grievance Redress Mechanism

Grievance Redress Mechanisms

A grievance refers to any complaint, dissatisfaction, or concern raised by an individual (staff or student) regarding issues such as academic matters (e.g., grading, supervision, or examination results), administrative challenges (e.g., delays in processing, misconduct, or poor service delivery), workplace conditions for staff, as well as harassment, discrimination, or unfair treatment within the university community.

The Grievance Redress Mechanism (GRM) at Federal University Oye-Ekiti provides a structured and transparent process through which students and staff can seek resolution whenever they experience unfair treatment, academic disputes, administrative concerns, or other related issues within the institution.

The University ensures that the GRM process is guided by the principles of fairness and impartiality, confidentiality, timely resolution of complaints, non-retaliation against individuals who file genuine complaints, and proper documentation of every stage of the grievance process to promote accountability, transparency, and institutional integrity.

Step-by-Step Process of Grievance Redress at FUOYE

Informal Resolution

The complainant (student or staff) is encouraged to first discuss the issue informally with the person(s) directly involved such as a lecturer, supervisor, or department officer. Many issues can be resolved at this level through communication and clarification.

Departmental / Faculty Level

If the issue is not resolved informally, the complainant submits a written complaint to the Head of Department (HOD) or Dean of Faculty. The HOD/Dean investigates the matter, possibly holding a meeting with all parties involved. A decision or recommendation is then communicated to the complainant.

University Grievance Committee

If the complainant is unsatisfied with the departmental resolution, the case is escalated to the University Grievance Redress Committee. This committee reviews the complaint, conducts hearings if necessary, and ensures due process is followed. Both parties may be invited for clarification or presentation of evidence.

Appeal to the Vice-Chancellor

If the complainant still feels dissatisfied with the outcome, they can appeal to the Vice-Chancellor (VC). The VC reviews the entire process and may make a final decision or direct further investigation.

External Resolution

If internal mechanisms fail, the complainant may seek redress through external bodies such as the National Universities Commission (NUC), the Federal Ministry of Education Or, in exceptional cases, the courts. The university environment, like other community have had its fair share of grievances, emanating from theft of valuables, which were addressed by varying instruments in the past three years. Statistically, 75% of grievances were reported to the university authority for resolution, 15% were reported to the law enforcement agency (Police) while 10% were reported to the landlords/ CDA. Overall, 80% satisfactory grievance resolution rate were reported. This section examines the community's experience with grievances, reporting mechanisms, and satisfaction with resolution processes.

4.10.1 Grievances in the Last Three Years

40% of respondents indicated that they have had grievance issues in the community in the last three years, while 50% reported not to have had any major grievance issues within the community. However, 10% of the respondent did not indicate because they could not remember and did not want to give a misleading view on the question.

4.10.2 Grievance Reporting Channels

The University of Oye-Ekiti utilizes a structured grievance redress mechanism, primarily managed by the Dean of Student Affairs for student-related issues. Complaints are often settled informally, or through formal investigation involving necessary evidence, with results forwarded to the Vice-Chancellor, who may set up committees for resolution. When asked where they would report grievances, 75% indicated they would approach the school authority/management, 10% would go to landlord/ CDA, and 15% would approach the law enforcement agency (see **Figure 4.9**). This distribution shows that the university administration is seen as the primary authority for addressing concerns, which is appropriate given the institutional context.

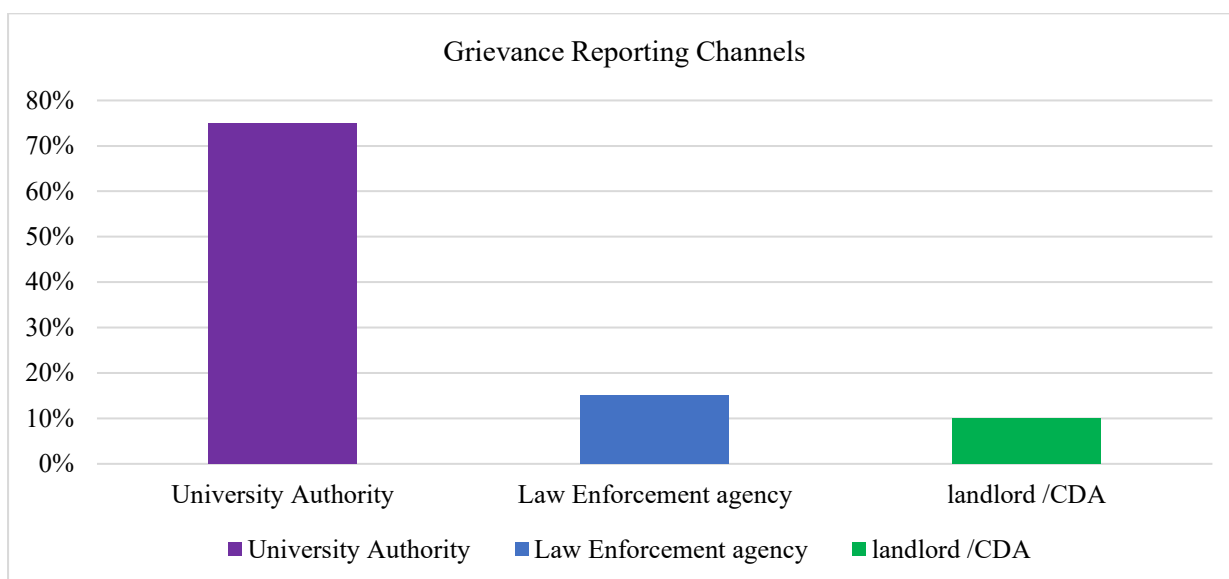


Figure 4.9: Grievances Reporting Channel

4.10.3 Satisfaction with Grievance Resolution

The level of satisfaction derived from grievance resolution mechanism varied in the study area, 80% of respondents indicated that grievances are satisfactorily addressed or resolved by the chosen reporting channels while 20% objected and were dissatisfied with the outcome of the grievance resolution. However, there are opportunities for improvement in the existing redress mechanism.

4.10.4 Specific Concerns About the Project

Concerns and fears about developmental projects are a common part of every development process, often arising from limited knowledge about the project design, scope, and potential impacts. In Oye Ekiti, beneficiaries of the proposed intervention project and respondents expressed specific concerns regarding the sustainability, durability, and proper maintenance of the proposed solar power plant. They emphasized the importance of implementing adequate security measures to safeguard the facility against theft and vandalism, which are considered critical to the long-term success of the project. The age distribution of respondents in Oye Ekiti indicates that the majority (65%) fall within the 18–45 years age bracket, representing 26 individuals. This is followed by 30% within the 46–65 years category (12 respondents), while 5% are below 18 years of age (2 respondents). The distribution reflects a predominantly young to middle-aged population, which is characteristic of a university host community such as Oye Ekiti, home to Federal University Oye-Ekiti.

CHAPTER FIVE

DESCRIPTION OF ENVIRONMENTAL AND SOCIAL IMPACTS

5.1 INTRODUCTION

The basis for identification of potential environmental and social impacts that may be associated with the proposed Solar Power project was formed during field inspections and observations, issues arising from stakeholder consultations as well as project description and designs. Highlights of the ESMP as the primary instrument for ensuring that a project's commitment to sustainability is maintained throughout its lifecycle, bridging the gap between theoretical impact prediction and practical field execution is presented here. By establishing a rigorous system of governance, the ESMP ensures that project activities remain in strict alignment with national regulatory requirements, international lending standards, and the fundamental principles of corporate social responsibility. It provides a systematic blueprint for the mitigation of environmental and social risks and as well delineates the institutional framework, clearly assigning roles and responsibilities to project developers, contractors, and environmental consultants to ensure accountability at every stage of development. It also integrates specific mitigation measures, monitoring protocols, and reporting requirements designed to protect natural ecosystems, minimize pollution, and safeguard the well-being of local communities.

5.2 Project Area of Influence

The immediate geographical area of influence of work for the proposed project is the land area allocated for the project while the larger geographical area of influence covers the Federal University, Oye-Ekiti

5.2.1 Physical Environmental Media Influence

The physical environmental media to be potentially influenced by the activities of the proposed project are land (landscape), air quality, groundwater and any adjacent drain to any of the project sites. The landscape features include soil, flora and fauna at the proposed project site, which will be impacted by the project activities. Any adjacent drain to any of the project sites will be the recipient of runoff water from the project site. Any percolation of fuels through the soil may impact on groundwater resources. The air quality may also be impacted by dust and gaseous emissions from construction activities.

5.3 Impacts of the Project Activities on the Environmental and Social Components

Activities of potential environmental and social impacts identified with the proposed project are outlined under the four phases of the project activities; namely pre-construction; construction; operations/maintenance and decommissioning phases. The activities are discussed below:

Pre-construction Phase Activities

- Siting of workers camp, where necessary
- Assessment of existing project location, selection of beneficiary institutions, field studies and environmental screening;
- Preparation of environmental and social screening reports;
- Statutory permitting activities from appropriate authorities.

Construction Phase Activities

- Site clearing and excavation works;
- Identification of storage area for construction material;
- Transportation and handling of materials and equipment;
- Civil, mechanical and electrical works

- Construction of waste bin bays (where applicable); and
- Disposal of construction waste/rubble and waste in general.

Decommissioning activities after construction will involve:

- Removal of construction equipment
- Disposal of construction spoil and waste in general; and

Operations and Maintenance Phase Activities

- Housekeeping;
- Waste management (collection and disposal);
- Maintenance and repair works; and
- Materials management and storage (including personal protective equipment, etc.).

Decommissioning Phase

Decommissioning issues under this project will occur after construction and will cover the following:

- Dismantling of the temporary work camp of the contractor;
- Waste management; and
- Restoration of landscape around construction site

5.4 Evaluation of Potential Positive Impacts

Table 5.1: Evaluation of Potential Positive Impacts.

Activity	Receptor	Associated Impact	Significance
Reliable Power supply to the University community through solar energy source	FUOYE community	Improve the quality of education and other services within the institution as there will be longer hours available with better illumination for studying and will also contribute to the achievement of Nigeria's carbon emission reduction targets (20% reduction by the year 2030) in fulfilment of the nation's Nationally Determined Contributions (NDC) to climate change	Major DESC
Reduced noise and pollutants from generator sets, and natural habitats	FUOYE community	Human health will be protected from pollution arising from the use of fossil fuels	Moderate

Activity	Receptor	Associated Impact	Significance
Construction of renewable energy training centre	FUOYE Community members.	Provide capacity development through learning renewable energy technologies and practices in the University and consequently, the certification of trained individuals	Moderate
The installation of streetlights	FUOYE Community members	improve safety by reducing hazards associated with flammable fuels and candles and enhance security within the school.	Moderate
Stimulate economic activities and offer new opportunities for small businesses in the University premises	FUOYE and nearby Communities	Improve social cohesion and community development and generate new income	Moderate
The employment opportunities for skilled, semi-skilled, and unskilled labour	University and nearby communities	Multiply job creation, especially during construction to facilitate overall socioeconomic development	Moderate

5.5 Evaluation of Potential Adverse Impacts Associated with the Proposed Project

The potential adverse impacts from project activities are grouped into the following subjects and discussed further according to the different applicable phases – Preconstruction, Construction, Operation, and Decommissioning phase as presented in **Table 5.2**.

Table 5.2: Evaluation of potential adverse impacts

Activity	Receptor	Associated Impact	Significance
Pre-construction Phase			
Site Selection/ land	Existing crop farming on site	Loss of land for farming activities due to land Take for the Project	Moderate
Site clearing and preparation	Terrestrial flora and fauna	• Vegetation loss • Direct impacts on vegetation and soil-dwelling organisms; indirect impacts on fauna species in the immediate surroundings of the Project site	Minor
	Soil	Loss of topsoil Soil compaction and degradation Increased erosion potential Reduction in structural stability and percolative ability of soil	Minor
	Air Quality and Noise	• Air quality impacts due to emissions from site clearing equipment • Increase in ambient noise levels	Minor
	Workers Safety	• Injuries and accidents to workers during site clearing and preparation.	Minor
Mobilization of construction equipment and materials to site	Air Quality and Noise	• Air quality impacts from vehicular emissions (TSP, NO_x, CO, SO_x) • Increase in noise levels	Minor
	Infrastructure (road)	• Increase in vehicular movement and traffic including potential for road accident	Minor
	Workers Safety	• Injuries and accidents to workers during loading and offloading of construction materials.	Minor
Construction Phase			
Movement of Equipment, Personnel and Plant Materials	Air Quality	Vehicular emissions (CO, SO ₂ , NO ₂) from exhaust Contribution to global warming and ozone layer depletion Dust emissions from construction activities	Minor
	Social System (Road)	Increased traffic from heavy-duty trucks en route to project site	Minor
	Health & Safety	Risk of accidents involving personnel and assets due to vehicle movement	Minor
Civil and Electrical Works / Installation Activities	Air Quality	Emissions from construction equipment (SPM, NO _x , CO, SO _x) Dust from land clearing and stockpiles	Minor

Activity	Receptor	Associated Impact	Significance
	Ambient Noise	• Increased noise levels from construction activities	Minor
	Soil	• Increased erosion from excavation • Reduced soil stability and permeability due to compaction	Moderate
	Terrestrial Flora and Fauna	• Loss of plant species due to invasive species • Loss of fauna due to human activity and noise	Minor
	Groundwater	• Depletion of groundwater from abstraction (e.g., concrete mixing, washing) • Increased sediment load from erosion • Increased runoff and drainage formation from hard surfaces	Minor
	Gender	• Potential discrimination against women and GBV risks	Moderate
	Socio-economic & Health	• Influx of people leading to increased risk of sexually transmitted diseases	Moderate
	Infrastructure (Road)	• Road damage, traffic congestion, and safety concerns	Minor
	Construction Workers Safety	• Risk of injury during construction activities	Moderate
	Soil	• Soil contamination from construction waste (solid and liquid)	Minor
Commissioning Phase			
Waste Generation and Disposal	Groundwater	• Contamination from liquid construction waste streams	Minor
	Infrastructure (Waste Management Facility)	• Disposal of waste at existing facilities in project area	Negligible
Plant Testing	Ambient Noise	• Increase in ambient noise levels during testing activities	Minor
	Workers	• Occupational health and safety hazards (e.g., injuries, electrocution) due to incorrect electrical connections	Moderate
	Campus Occupants Safety	• Risk of electrocution from wrong electrical connections	Minor
	Population Influx	• Temporary increase in population during commissioning phase	Negligible
	Infrastructure (Road)	• Increased traffic and risk of road accidents	Negligible
Operational Phase			
Power Generation and Distribution	Noise	• Noise from batteries and inverters during power generation and evacuation	Negligible
	Gender	• Discrimination of women during employment • GBV (sexual harassment, assault, poor working conditions)	Minor

Activity	Receptor	Associated Impact	Significance
	Socio-economic (Visual)	• Landscape alterations causing unpleasant visual changes in the area	Negligible
	Socio-economic (Health Issues)	• Community health and safety concerns due to electromagnetic field (EMF) radiation	Negligible
	Health, Safety and Welfare of Staff (Plant Operation)	• Electric shock and injuries during plant operation • Work-related issues (discrimination, denial of rights, unfair treatment, poor working conditions)	Moderate
Routine Maintenance	Soil	• Soil contamination from spent batteries and inverters	Minor
	Groundwater	• Groundwater abstraction from cleaning of PV panels	Minor
Waste Generation and Disposal	Soil & Groundwater	• Soil and groundwater contamination from waste streams	Negligible
	Health, Safety and Welfare of Staff (Maintenance)	• Electric shock and injuries during maintenance activities	Minor

CHAPTER SIX

ENVIRONMENTAL, SOCIAL MITIGATION AND MANAGEMENT PLAN

6.1 Introduction

The Environmental and Social Management Plan (ESMP) is a detailed plan and schedule of measures necessary to minimize, mitigate, or control any potential negative environmental and social impacts identified under this project.

This ESMP consists of a set of mitigation, monitoring, and institutional measures to be taken during the implementation and operation of the proposed project to eliminate negative environmental and social impacts, offset them or reduce them to acceptable levels.

ESMP also incorporates the actions needed to implement these measures, including the following features:

- Mitigation measures based on the potential environmental and social impacts, describing with technical details each mitigation measure;

- The ESMP also includes monitoring objectives that specify the type of monitoring activities that will be linked to the mitigation measures. Specifically, the monitoring section of the ESMP provides:
 - ✓ A specific description and technical details of monitoring measures that include the parameters to be measured, frequency of measurements, and definition of thresholds that will signal the need for corrective actions;
 - ✓ Monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures and to furnish information on the progress and results of mitigation.
- The ESMP describes institutional arrangements i.e., who is responsible for carrying out the mitigating and monitoring measures (for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training);
- Additionally, the ESMP includes an estimate of the costs of the measures and activities recommended; and
- The ESMP is required throughout the implementation stage of the project or sub-project.

6.2 Mitigation/Action Plan

Mitigation and management measures for the significant adverse impacts (rated as moderate or major) identified from the analysis and evaluation of the potential impacts from the proposed project activities are provided in Table 6.1.

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
Pre-construction Phase					
1	Site selection/Land	Loss of land for farming activities	REA shall: • Engage affected communities through consultation and participation	Director of Works and Physical Planning/PIU	
2	Site clearing and preparation	Vegetation loss Direct and indirect impacts on flora and fauna	REA shall: Minimize clearing footprint Conduct pre-clearance ecological surveys Avoid clearing during breeding seasons Implementing a biodiversity management plan	Site Engineer	
		Loss of topsoil Soil compaction and erosion Reduced soil stability	REA shall: • Strip and store topsoil • Restrict heavy machinery movement • Implement erosion control (mulching, silt fences) • Progressive restoration	Site Engineer	
		Air emissions from equipment Increased noise levels	REA shall: • Maintain machinery regularly • Apply dust suppression (water spraying) • Limit work to daytime • Provide PPE for noise protection	Site Engineer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
		Injuries and accidents	REA shall: • Implement OHS procedures (ILO standards) • Provide PPE • Conduct safety training/toolbox talks • Enforce supervision	HSE	
3	Mobilization of Construction Equipment & Materials	• Vehicular emissions (TSP, NO_x, CO, SO_x) • Increased noise levels	REA shall: • Maintain vehicles to emission standards • Optimize logistics • Enforce speed limits and reduce idling • Use low-sulfur fuels	Site engineer	
Construction Phase					
1	Movement of Equipment, Personnel & Materials	• Vehicular emissions (CO, SO₂, NO₂) • Dust emissions	REA shall: • Maintain vehicles regularly • Use low-sulfur fuels • Apply dust suppression (water spraying, covering trucks) • Limit idling and enforce speed limits	Site Engineer	
		• Increased traffic and congestion	REA shall: • Implement Traffic Management Plan • Schedule deliveries off-peak	Site Engineer/Traffic Control Officer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
			• Use designated routes • Community awareness and signage		
		• Risk of accidents	REA shall: • Train drivers • Enforce speed limits • Conduct vehicle inspections • Use traffic marshals and signage	Site Engineer/HSE	
2	Civil & Electrical Works / Installation	• Air emissions and dust generation • Increased noise levels	REA shall: • Maintain equipment • Apply dust suppression • Limit work during high winds • Provide PPE REA shall: • Restrict work to daytime • Use silencers • Provide hearing protection • Establish buffer zones	Site Engineer	
		• Soil erosion and compaction	REA shall: • Install silt fences and drainage • Restrict machinery movement • Rehabilitate progressively	Site Engineer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
			• Proper grading		
		• Loss of flora and fauna	REA shall: • Minimize clearing • Control invasive species • Restrict worker movement • Implement biodiversity plan	Site Engineer	
		• Groundwater depletion and contamination	REA shall: • Use water efficiently • Monitor abstraction • Install sediment traps • Prevent contamination	Site Engineer	
		• GBV and discrimination risks	REA shall: • Implement Gender & GBV Action Plans • Enforce code of conduct • Awareness training • Grievance mechanism	State Ministry of Women's Affairs & Social Development (GBV/SEA Service Provider)	
		• Spread of STDs	REA shall: • Carry out Health awareness programs • Provide testing access • Enforce worker conduct • Collaborate with health agencies	Director of Physical planning/PIU	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
		Road damage and congestion	REA shall: - Traffic management plan - Maintain roads - Control vehicle loads - Coordinate with authorities	Site Engineer	
		Worker injuries and accidents	REA shall: - Implement OHS system (ILO aligned) - Provide PPE - Conduct training - Emergency preparedness	SITE Engineer/HSE	
Commissioning Phase					
	Plant Testing	Increase in ambient noise levels during testing activities	REA shall: Restrict testing to daytime hours Use well-maintained equipment with noise suppression features Notify nearby occupants in advance Provide hearing protection (PPE) to workers	Director of Physical planning/PMU	
		Occupational health and safety hazards (injuries, electrocution due to incorrect connections)	REA shall: Implement electrical safety procedures (lockout/tagout) Use certified personnel only	Site Engineer/HSE	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
			Provide PPE (insulated gloves, boots) Conduct safety checks and supervision Ensure emergency response readiness		
		• Risk of electrocution to campus occupants	REA shall: Restrict access to testing areas Install warning signage and barriers Ensure proper grounding and insulation Supervise all testing activities	Site Engineer	
Operational Phase					
1	Power Generation & Distribution	• Discrimination of women in employment • GBV (sexual harassment, assault, poor working conditions)	REA shall: • Implement Gender Action Plan & GBV prevention (World Bank aligned) • Enforce equal opportunity employment • Worker code of conduct & training • Confidential grievance mechanism	PMU/Site Engineer	
		• Electric shock and injuries • Workplace discrimination	REA shall: • Implement OHS system (ILO aligned) • Install LOTO systems & signage • Provide PPE (insulated gloves, boots) • Conduct training & audits • Enforce fair labor practices	PMU/Site Engineer/Director of Physical works	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
2	Routine Maintenance	• Soil contamination from batteries and inverters	REA shall: • Store hazardous materials in sealed/labeled containers • Implement hazardous waste plan • Use certified waste handlers • Install secondary containment & spill response	PMU/Site Engineer	
		• Groundwater use for panel cleaning	REA shall: • Use water-efficient/dry-cleaning methods • Harvest/reuse rainwater • Monitor abstraction & comply with permits • Apply water conservation measures	Site Engineer	
3	Waste Generation & Disposal	• Electric shock and injuries during maintenance	REA shall: • Enforce LOTO procedures • Provide PPE & insulated tools • Conduct competency-based training • Routine inspection & supervision	Site Engineer	
Decommissioning Phase					
1	Dismantling of Plant & Equipment	• Dust emissions	REA shall: • Apply dust suppression (water spraying)	Director of Public Works/ Site Engineer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
		Emissions from machinery and vehicles	- Use low-emission equipment - Cover haulage trucks - Limit idling		
		Increased noise levels	REA shall: Restrict daytime hours - Use silencers - Provide hearing PPE - Notify nearby communities	Director of Public Works/ Site Engineer	
		Injuries and electrocution risks	REA shall: - Implement OHS procedures (ILO aligned) - Apply LOTO systems - Provide PPE - Use trained personnel - Emergency preparedness	Director of Public Works/ Site Engineer	
2	Removal of Foundations & Civil Works	Soil disturbance, erosion, compaction	REA shall: - Minimize excavation footprint - Implement erosion controls - Reinstate topsoil - Progressive rehabilitation	Director of Public Works/ Site Engineer	
		Groundwater contamination risks	REA shall: Proper storage of fuels/chemicals	Director of Public Works/ Site Engineer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
			• Spill prevention & response plan • Prevent contaminant discharge • Regular inspections		
3	Waste Generation & Disposal	• Soil & groundwater contamination from waste	REA shall: • Implement waste management plan • Use licensed contractors • Secure hazardous waste storage • Comply with regulations	Director of Public Works/ Site Engineer	
		• Pressure on waste infrastructure	REA shall: • Coordinate with approved facilities • Schedule transport efficiently • Promote recycling and recovery	Director of Public Works/ Site Engineer	
4	Transportation of Decommissioned Materials	• Emissions and noise from vehicles	REA shall: • Maintain vehicles • Optimize logistics • Enforce speed limits • Use designated routes	Director of Public Works/ Site Engineer	
		• Traffic congestion and road safety risks	REA shall: • Traffic Management Plan • Trained drivers & signage • Off-peak scheduling	Director of Public Works/ Site Engineer	

Table 6.1: Mitigation Measures/actions for Potential Significant Adverse Environmental Impacts					
No	Project Activities	Potential Environmental and Social Impacts	Proposed Mitigation Measures/Actions	Responsibility	Cost
			• Repair road damage		
		• Community accident risks	REA shall: • Community awareness programs • Warning signs and barriers • Escort oversized loads • Enforce safety protocols	Director of Public Works/ Site Engineer	
5	Site Restoration & Rehabilitation	• Habitat loss prior to restoration	REA shall: • Re-vegetate with native species • Restore habitat conditions • Monitor ecological recovery • Prevent invasive species	Director of Public Works/ Site Engineer	
		• Loss of employment post-closure	REA shall: • Worker transition programs • Skills training • Job placement support • Stakeholder engagement	Director of Public Works/ Site Engineer	

6.3 Environmental and Social Monitoring

Environmental and Social monitoring is an important aspect of an ESMP during project implementation. It is a way of systematically monitoring both effects and compliance of the proposed project to existing regulations throughout the entire life cycle and shall oversee the effectiveness of impact mitigation measures, including the extent to which mitigation measures are successfully implemented. Particularly, monitoring shall:

- Improve environmental and social management practices;
- Check the efficiency and quality of the ESMP processes;
- Establish the scientific reliability and credibility of the ESMP for the project (as well as the quality of specialists providing ESMP consultancy services)
- Provide the opportunity to report the results on safeguards and impacts and proposed mitigation measures implementation.

Upon commencement of sub-project implementation in the construction works, the environmental and social specialist and the safeguard unit of Bauchi NUWSRP3 will begin monitoring as an important feedback mechanism. This ensures compliance with the environmental and social measures of the ESMP.

Methods for monitoring the implementation of mitigation measures or environmental impacts should be as simple as possible, consistent with collecting useful information, so that the implementation process can easily be applied.

These indicators could be used to ensure participation process involved in project activities:

- Number and percentage of affected households/individuals/institutions consulted during the planning stage;
- Levels of decision-making of affected people;
- Level of understanding of project impacts and mitigation;
- Effectiveness of local authorities to contributing and making relevant decisions;
- Frequency and quality of public meetings; with community heads and general public;

The environmental and social monitoring plan is shown in **Table 6.2**.

Table 6.2: Environmental and Social Monitoring Plan

No.	Environmental/ Social Component	Monitoring Parameters	Monitoring Site	Frequency	Responsibility (Implementation/ Supervision)	Cost Estimate/ Year (NGN)
	Soil impacts	Presence of habitats or vegetation at the site	Construction site	Daily (throughout the construction period)	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant	
	Air quality/ Noise	Observation of air borne particulates (dust) and exhaust fumes Records of dust level measurements (dust concentration should be below 150µg/m ³) Records of dampening of construction sites and routes for vehicles/trucks Daily noise levels.	Construction site Immediate environs	Daily During Peak construction period	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant	500,000.00
	Vibration and noise nuisance	Complaints on noise nuisance	Construction site Immediate environs	Daily (during construction)	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant	
	Visual Intrusion	Hoarding in place Condition of areas around construction site	Construction site Immediate environs	Daily (during construction)	PIU Safeguards Specialist, Project Contractor /Engineering consultant	No additional costs

No.	Environmental/ Social Component	Monitoring Parameters	Monitoring Site	Frequency	Responsibility (Implementation/ Supervision)	Cost Estimate/Year (NGN)
	Waste Management	Transportation for monitoring of the provision and use of bins in project area Records on frequency and location of waste disposal site of domestic and construction waste	Construction site	Monthly (during construction)	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant, FMEnv, the state ministry,	500,000.00
	Occupational Health and Safety	Transportation for monitoring workers' awareness of Contractor's health and safety policy Availability and proper use of PPEs Availability and proper use of warning signs Availability of first aid kit Adherence to health and safety procedures Records on frequency, type and source of illness/accident/injury Records on non-compliances Absence of unauthorized persons at active construction sites	Construction site	Daily (during construction)	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant	
	Public safety and traffic issues	Transportation for monitoring availability and proper use of warning signs Hoarding of site Use of caution tape around trenches/ excavations Records on frequency, type and source of illness/accident/injury	Construction Site	Daily (during construction)	PIU Safeguards Specialist, Project Contractor/Engineering consultant	150,000

No.	Environmental/ Social Component	Monitoring Parameters	Monitoring Site	Frequency	Responsibility (Implementation/ Supervision)	Cost Estimate/Year (NGN)
		Absence of unauthorized persons at active construction sites				
	Sanitation issues, health and safety impacts	Availability and use of bins Records on frequency and location of waste disposal site of domestic and construction waste Mobile toilet facilities in place Presence of stagnant water in trenches	Construction site	Daily (during construction)	PIU Safeguards Specialist, Project Contractor/ Engineering Consultant	
	Public Complaints/ Grievances Redress	Transportation for monitoring of Grievance Redress issues, which will include such elements as: Lodging and registration of PAPs grievance by grievance redress committee; Redress decision, feedback and implementation; Dissatisfaction and alternative action; and Monitoring and evaluation	Project host community	Weekly (during construction)	State Ministry, PIU Safeguards Specialist, Project Contractor/ Engineering Consultant/school heads/medical director of hospital	150,000.00
	Monitoring of Social Impacts	Transportation to monitor impacts such as, labor influx, GBV and SEA, VAC and STDs. Potential temporary physical or economic displacement, if any and provide	Project host Community	Weekly (during construction)	State Ministry, PIU Safeguards Specialist, Project Contractor/ Engineering Consultant/ medical director of hospital, Community	

No.	Environmental/ Social Component	Monitoring Parameters	Monitoring Site	Frequency	Responsibility (Implementation/ Supervision)	Cost Estimate/ Year (NGN)
					Liaison Officer/Health centers	
11	Routine Maintenance	Implementation of hazardous waste plan Implementation of Gender Action Plan and GBV prevention Worker code of conduct and training Provide PPE (insulated gloves, boots)	Project site and host community	Quarterly (during operation)	PIU and PMU	350,000
TOTAL						1,650,000.00

Table 6.3: Specific Environmental Monitoring Plan

Impact Parameter	Project Phase	Impact Indicator	FME nv Limits	Sampling Location	Sampling Frequency	Sampling Method	Monitoring Duration	Monitoring Personnel
Ambient Air Quality	Site preparation, Construction and Operation and decommissioning	TSP	600µg/m ³	Receiving air - upwind and downwind of site	Daily, during site preparation, construction; Quarterly during operation	Air Sampler	Short-term	PMU-REA Contractor
		NO ₂	100 µg/m ³				Long-term	
		SO ₂	300 µg/m ³					
		CO	20 ppm					
Noise	Site Preparation and Construction	Noise Level	80 dBA (8-hr)	Work Site and 200m away	Daily (During site preparation, construction)	Decibel Noise Meter	Short-term	PIU-REA Contractor
Soil	Site Preparation and construction.	Particle Size, TOC, Oil and Grease Heavy Metals, Nutrients,	As specified in FME nv Guidelines	Within and around construction area.	Once, before and after construction	Visual Inspection and Soil auger	Short-term	PIU-REA Contractor
Socio-economics	Construction stage	Absence of Contractor/comm unity conflict, increase/ decrease in economic activities	National/ World Bank guidelines and procedures	Host FUOYE community	Monthly during construction	Socio-economic survey, observations and interviews	Short term	PIU- Contractor

Impact Parameter	Project Phase	Impact Indicator	FMEnv Limits	Sampling Location	Sampling Frequency	Sampling Method	Monitoring Duration	Monitoring Personnel
Health	Construction and operation	Presence/ absence of alien diseases	National health survey guidelines	Host FUOYE community	Monthly at construction and bi-annually at operation stages	Interview and medical examinations and records	Long term	PIU-REA

6.4 Capacity Building for Implementation of ESMP and Permit Conditions

REA shall identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact on the environmental or social conditions. Employees at each relevant phase of the project must be aware of the potential environmental impacts of their activities and the occupational hazards associated with the work; as well as their roles and responsibilities in achieving conformance with the management documented in this report. Thus, a formal training process will be organized for employees on environmental management programs, plans and procedures associated with the project.

All staff employed will be trained in the following:

- General operation of the plant.
- Environmental management.
- Specific job roles and procedures.
- Occupational health and safety; and
- Contingency plans and emergency procedures. Training will include:
- Induction training on appointments.
- Specialist training (as required for specific job roles); and
- Refresher training as required.

Training for the local community on general environmental awareness and ESMP mitigation measures on community health, safety, and security should also be provided.

Objectives of the training

The main objective of the capacity building and training activities is to create, enhance, and develop the necessary skills and abilities for successful implementation of the proposed project.

It is recommended that the site meetings to discuss ESMP issues and any health and safety issues be identified in the course of the month. Non-compliances identified during monitoring should be reviewed and corrective actions taken. The capacity building plan proposed to achieve this is provided in **Table 6.4**

Table 6.4: Capacity building plan for implementation of the ESMP.

No.	Activity	Target Group/Participants	Timeline/Duration	Proposed Facilitator	Cost USD
1.	Specialized Training on Environmental & Social Management (ESMP, safeguards, monitoring, reporting)	PMU, Environmental & Social Safeguard Officers	3 days (annually)	Consultant / PMU	4,500

No.	Activity	Target Group/Participants	Timeline/Durati on	Proposed Facilitator	Cost USD
2.	ESMP Implementation Training (mitigation measures, roles & responsibilities, monitoring procedures)	Project Team (PMU, Site Engineer, Supervisors)	3 Days (annually)	Consultant / PMU	1,500
3	Contractor Training on ESMP Compliance (mitigation measures, Code of Conduct, OHS requirements)	Contractor's management, workers, HSE Officers	1 day (annually)	Consultant / PMU	1,500
4	Driver & Traffic Management Training (fleet management, road safety, traffic control within project area)	Drivers, Transport Officers, HSE Officers, Security Personnel	1 day (quarterly)	Transport/Traf fic Specialist / PMU	1,200
5	GBV/SEA/SH Prevention & Response Training (Code of Conduct, reporting channels, survivor-centered approach)	Project Team, Safeguard Officers, Contractors	3 Days (biannually)	GBV Specialist / Consultant / PMU	2,500
6	Grievance Redress Mechanism (GRM) Training (complaint handling, documentation, resolution process)	GRC Members (project & management levels), PMU	3 days (biannually)	Consultant / PMU	2,000
Total					13,000

Table 6.5: Description of Cost Breakdown

Description	Cost (USD)
Professional fee for 2 Consultants	3,500
Rent/Hiring of venue	4,500
Feeding of participants - tea break	2,000
Feeding of participants (4 days)	3,200

Total	13,200
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Output of the Training

An efficient capacity building programme takes into consideration the health, safety, environmental and social management measures as provided in this chapter. The focus is to ensure the effective implementation of the ESMP and the permit conditions. All monthly and progress reports shall capture health, safety and environment capacity building activities carried out.

6.5 Institutional Arrangements

Institutional arrangement for the implementation of the Framework of this ESMP shall comprise:

- REA Project Office
- The Federal Government of Nigeria (FGN)
- Federal Ministry of Power
- Transmission Company of Nigeria (TCN)
- Federal Ministry of Environment (FMEnv)
- Nigerian Electricity Regulatory Commission (NERC)
- National Environmental Standards and Regulatory Enforcement Agency (NESREA)
- National University Commission (NUC)
- Ekiti State Ministry of Lands
- Ikole Local Government Area (LGA)

Roles and Responsibilities for the Implementation of the Framework ESMP

The Rural Electrification Agency Project Management Unit (REA-PMU) supervises the implementation of ESMP throughout the project life span, while conformance with the mitigation measures will be ensured by the Engineering, Procurement and Construction (EPC) contractor during the construction phase and by the operations and maintenance (O&M) contractor during the operational phase of the project. **Table 6.6** indicates the roles and Responsibilities of the Stakeholders in the Implementation, Monitoring, and Review of the ESMP.

Table 6.6: The Roles and Responsibilities in the Implementation, Monitoring and Review of the ESMP					
Stakeholder	Pre-Construction Phase	Construction Phase	Commissioning Phase	Operational Phase	Decommissioning Phase
Director of Works / Physical Planning	• Approve site and land use • Review ESMP and ensure institutional commitment • Appoint & train Site Engineer • Ensure livelihood restoration before mobilization	• Supervise ESMP implementation • Ensure contractor compliance • Address grievances and enforce corrective actions	• Oversee safe plant testing • Ensure stakeholder communication • Confirm readiness for operation	• Review ESMP reports • Recommend improvements to PMU/O&M • Ensure safeguards (OHS, GBV, environment)	• Oversee decommissioning activities • Ensure site restoration • Support livelihood transition
REA – PMU	• Approve ESMP and integrate into contracts • Coordinate stakeholders and regulators • Allocate ESMP budget	• Monitor compliance and conduct audits • Report to regulators • Enforce corrective actions	• Ensure compliance during testing • Approve transition to operation	• Oversee ESMP implementation • Ensure monitoring, audits, reporting • Address non-compliance	• Supervise dismantling compliance • Ensure waste management • Prepare closure reports

Site Engineer	• Support ESMP planning • Participate in training	• Implement ESMP daily on-site • Monitor EHS compliance • Maintain records and reports	• Supervise testing • Ensure safety procedures (LOTO, PPE) • Report incidents	• Monitor operations & maintenance • Ensure ESMP compliance • Report environmental & safety issues	• Supervise dismantling • Monitor waste handling • Support site rehabilitation
NESREA / FME Env Representatives	• Review and approve ESMP/ESMP • Issue environmental permits	• Monitor ESMP implementation (environmental compliance) • Conduct inspections and enforce regulations • Engage stakeholders on compliance issues	• Monitor compliance during commissioning • Verify environmental and safety readiness	• Monitor ESMP implementation (environmental compliance) • Conduct periodic audits and inspections • Discuss ESMP improvements with PMU, Director, and O&M Contractor to address non-compliance and emerging risks	• Monitor decommissioning activities • Verify environmental restoration • Approve closure compliance • Recommend corrective actions where necessary

State Ministry of Women's Affairs & Social Development (GBV/SEA Service Provider)	• Review Gender/GBV Action Plans • Support stakeholder engagement on GBV risks	• Monitor implementation of gender and GBV mitigation measures • Provide GBV/SEA support services • Conduct awareness programs	• Monitor GBV risk during commissioning activities • Ensure reporting and response mechanisms are active	• Monitor Gender Action Plan implementation • Handle GBV/SEA cases confidentially • Provide survivor support services • Engage with PMU, Director, and Gender Officer on improvements	• Monitor GBV risks during workforce demobilization • Support vulnerable groups and affected persons • Ensure proper closure of GBV cases and services
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6.6 Estimated Budget for ESMP Implementation

Table 6.7 provides a summary of the cost estimate required to effectively and efficiently implement the recommended mitigation measures and management plans required to address the potential and associated impacts of the proposed project. The total cost of implementing the ESMP is estimated at US\$ **57,300** with the current Naira value of 1,3500 to 1 dollar.

Table 6.7: Cost of ESMP

S/N	ESMP Activity	Cost (USD)	Key Cost Components	Justification
1	Pre-Construction Phase	8,000	Stakeholder engagement, ESMP disclosure, livelihood restoration planning, training of safeguards staff	Required to address social risks early, prevent conflicts, and ensure readiness before project mobilization
2	Construction Phase	13,000	Daily monitoring, mitigation measures (dust, erosion, OHS), PPE, inspections, reporting	Most impact-intensive phase requiring continuous supervision and high resource allocation
3	Commissioning Phase	800	Testing supervision, safety monitoring, stakeholder notification	Short-term phase with limited activities but critical safety requirements
4	Operational Phase	13,500	Routine monitoring, OHS audits, waste management, GBV/SEA implementation, reporting	Long-term phase requiring sustained compliance, monitoring, and system maintenance
5	Decommissioning Phase	4,000	Dismantling supervision, waste disposal, site restoration, livelihood transition	Ensures safe closure, environmental restoration, and social safeguards at project end
6	Mitigation & Monitoring	7,000	Environmental sampling, inspections, compliance audits, documentation	Dedicated funding ensures effective tracking of impacts and regulatory compliance
7	Capacity Building	11,000	ESMP training, OHS training, GBV/SEA awareness, GRM training	Builds stakeholder capacity for effective ESMP implementation and sustainability
	TOTAL	57,300		Cost reflects full lifecycle ESMP implementation aligned with international standards

CHAPTER SEVEN

INCIDENT REPORTING AND EMERGENCY RESPONSE PLAN

7.1 Introduction

For a project of this nature, Incident Reporting and Emergency Response Plan (ERRP) is a specialized component of the ESMP that addresses the unique risks associated with large-scale photovoltaic (PV) installations, such as electrical hazards, chemical spills from battery energy storage systems (BESS), and fire risks. The primary objective of the ERRP is to establish a clear protocol for the identification, notification, and mitigation of emergencies. The plan must be structured around a tiered response system.

7.2 Key components

The key components of ERRP include:

1. **Emergency Organization and Responsibilities:** The plan must define the "Emergency Coordinator" role, who holds the authority to halt site operations. This individual is responsible for maintaining communication with local emergency services, such as fire departments and medical facilities, which is critical given the remote locations often chosen for solar farms.
- 2.
3. **Hazard-Specific Procedures:** Solar projects require specific protocols for:
 - **Electrical Hazards:** Procedures for de-energizing arrays during maintenance or fire events to prevent arc flash injuries.
 - **Battery Energy Storage System (BESS) Safety:** If the project includes lithium-ion battery storage, the plan must detail thermal runaway mitigation, including specialized fire suppression techniques and hazardous material containment to prevent toxic gas release.
 - **Natural Disasters:** Protocols for high-wind events (e.g., stowing trackers in a "park" position) and flood mitigation for inverter stations.
4. **Reporting and Investigation:** Every incident, including "near misses," must be documented in an Incident Log. The reporting process follows a strict timeline: initial notification within 2 hours, and a detailed Root Cause Analysis (RCA) report within 48 hours. This data is used to calculate the incident frequency rate, ensuring that the project remains within the safety thresholds defined during the design phase.
5. **Communication and Training:** The ERRP mandates regular emergency drills—such as fire evacuation and spill response—to ensure that all personnel, including subcontractors, are familiar with assembly points and alarm signals.

CHAPTER EIGHT

REMEDIATION AND ABANDONEMENT PLAN

8.1 Remediation Plan After Decommissioning/ Closure

Upon the completion of useful life cycle of a project, there is a need to abandon and/or decommission such project if it no longer becomes economically viable either as a result of depleted feed stock or competing technology. The proposed solar project is expected to have a life span of 25 years. It is envisaged that technology and environmental policies could have changed so drastically by then, hence a definite decommissioning plan cannot be put in place for now. However, it is of importance that abandonment activities be planned in advance in accordance with the Nigerian regulatory requirements.

8.2 Decommissioning Activities

Decommissioning refers to the process of removing all the operating assets of a project after completion of its life cycle. The average life span of the solar Photovoltaic (PV) power plant to be provided as part of the proposed Project is 25years (which can be extended through regular maintenance), while the training center can last for 40 years or more. Even after 25 years, the PV panels can still generate up to 90% of the design capacity.

During decommissioning, REA shall ensure that the project sites are returned to a safe and environmentally acceptable condition. The decommissioning activities will typically include the following:

- ✓ Dismantling and removal of PV panels and associated infrastructure (mounting structure, power evacuation cable, inverters, transformers, batteries, etc.);
- ✓ Removal of any sub-surface installations (e.g. underground cables);
- ✓ Waste generation and management;
- ✓ Restore the environment to allowable baseline conditions and monitor the process in line with legislative and regulatory requirements and best industry standards; and
- ✓ Assess the residual impacts, if any, that the project has on the environment; and specifically, if there are any future restrictions for other activities.

8.3 Management of Decommissioning Activities

In the event of decommissioning, REA, in conjunction with the leadership of the Academy, shall ensure that the Project site is left in a safe and environmentally acceptable condition. A standard decommissioning, abandonment, and closure programme shall be invoked. The tasks will include, amongst others:

- Evacuation of the dismantled PV panels and other related items (such as inverters and control devices) to the manufacturers for recycling.
- Transportation of spent batteries to recycling facilities;
- Monitoring the abandoned project environment as necessary.

Decommissioning activities will only begin after due consultation with the relevant stakeholders, including the regulatory authorities. The decommissioning activities shall be carried out in line with the relevant provisions of the National Guidelines for Decommissioning of Facilities in Nigeria (2017) issued by the FMEnv.

Typically, the following actions shall be undertaken for decommissioning:

- An updated plan which takes into account the most cost-effective and best practicable methods.

- Legal requirements and industry practices at that time for the facility decommissioning shall be developed and submitted to the FMEnv and other relevant regulatory authorities for approval.
- The plan shall include, but not limited to the following:
 - ✓ Description of the site
 - ✓ Components to be decommissioned.

Description of the decommissioning scope, objectives, end state and strategy;

- Activities to be performed during the decommissioning;
- Schedule of decommissioning activities; Estimate of the decommissioning cost;
- Estimated inventory of waste streams to be generated during the decommissioning and handling techniques;
- Decommissioning team (qualifications, roles and responsibilities)
- To ensure that due consideration is given to all options a detailed evaluation of facility decommissioning options shall be carried out.
- The options will include facility mothballing, partial facility decommissioning or complete site decommissioning. The evaluation will consider environmental issues in conjunction with technical, safety and cost implications to establish the best practicable environment friendly options for the Project decommissioning.
- A risk assessment shall be conducted to ensure that nothing which could be constituted as a hazard for other users of the site or for the environment in general, will be left at the site.
- The Project site shall be left in a safe and environmentally acceptable condition.
- Hazard identification and analysis shall be conducted to determine special safety concerns to be addressed.
- An appropriate Health, Safety and Environment (HSE) plan shall be implemented to ensure that the decommissioning activities are carried out in an environmentally sound manner and in conformity with relevant laws and regulations guiding such operations
- Third-party notifications should be carried out before any demolition and should be conducted in a phased sequence.
- Socio-economic considerations of facility decommissioning shall be carried out. These will include assessment of potential effects associated with termination of employment (at the end of the operational phase) and measures to minimize the effects by:
- Ensuring that employees are fully informed about the decommissioning and how it will affect them before the project finally closes.
- Building community capacity to manage opportunities and impacts arising from the decommissioning and post-decommissioning phase of the Project.
- Providing training to build local skills tailored to project decommissioning and post-decommissioning activities (e.g. equipment dismantling, rehabilitation activities, monitoring, etc.).
- Providing training to transfer project-learned skills to alternative and secondary industries tailored to respond to market economy.
- An effective waste management plan shall be developed for the decommissioning activities. The decommissioning options for redundant structures and equipment will include: the complete dismantling of structures and equipment and the return of all components to the equipment manufacturer for recycling. A detailed record of all suitable recycling materials shall be maintained.

8.4 Abandonment Plan

Before site abandonment, REA shall establish a standard procedure for incorporating the following practices:

- Identification of the components of the power plant that will be abandoned and/or removed;
- The proposed methods for abandonment or re-use of the plant equipment/material are applicable;
- Processes put in place to mitigate potential environmental impacts associated with the abandonment process; and
- Appropriate site rehabilitation programs (including re-vegetation of the site with native plant species) to return the Project site to its original status (as much as possible).

In the event of the project being abandoned, this shall be done in accordance with strict compliance with legislative requirements and international best practices. The decommissioning, abandonment and/or closure programme shall generally be managed by a team of competent personnel from the REA-Project Management Unit, the Department of Works and Physical Planning Department of the Academy. The abandonment process shall be carried out as follows:

- Relevant stakeholders shall be duly informed;
- Physical Asset Verification (PAV) of the facilities shall be carried out;
- National Sectoral Regulations, as they affect the abandonment of the project, shall be strictly complied with to ensure:
- Restoration and rehabilitation of the environment.
- Management of residual impacts of the project in strict compliance with extant
- National/ FMEnv sectoral regulations.

In addition, a site close-out permit shall be obtained as appropriate, and a close-out report shall be prepared and archived for future reference.

CHAPTER NINE

STAKEHOLDERS ENGAGEMENT AND GRIEVANCE REDRESS MECHANISM

9.1 Preamble

Consultations play a crucial role in identifying the key environmental and social issues that are central to the preparation of this ESMP. A Stakeholder Engagement Plan (SEP) was developed to support the effective and sustainable implementation of all phases of the Project lifecycle, including pre-construction, construction, operation, and decommissioning.

The SEP outlines the methods used to identify stakeholders, the approaches adopted for engaging them, and the outcomes of consultations conducted to date. It also details the measures taken by the Project to ensure that relevant information was appropriately disclosed to stakeholders.

9.2 Stakeholder Engagement

A Stakeholder Engagement Plan (SEP) is the process of managing stakeholder expectations which influences project decisions throughout the life cycle of the project. This process provides a plan to interact effectively with stakeholders and support the project interest. It is very important to plan these activities well so that they appraise the contribution of stakeholders on projects, manage their expectations also achieve project objectives. The stakeholder engagement process emphasized free, prior, and informed consultation (FPIC) with affected communities and other relevant stakeholders, while considering appropriate approaches for involving vulnerable and marginalized groups. Consultations included early disclosure of information in formats that are accessible and easily understood, as well as key informant interviews, focus group discussions (segmented by men, women, and youth), and broader public meetings.

Table 9.1: Stakeholders Engagement Plan (SEP)

Groups and individuals	Date	Type of Engagement	Discussion
Management of the University	11/02/2026	Consultation /homage	Overview of the ESIA, benefits of the proposed REA Solar project
Management of the University Teaching Hospital	11/02/2026	Consultation /homage	Overview of the ESIA, benefits of the proposed REA Solar project
University Community	12/02/2026	Focal Group Discussion,	An overview of the ESIA and the benefits of the proposed REA solar project.

All consultation activities were properly documented, including relevant data, supporting evidence, participant lists with contact information, and photographic records. Information disclosure complied with the provisions of national regulations, including the EIA Act No. 86 of 1992 (as amended under Cap E12 LFN 2004), as well as the World Bank's Environmental and Social Safeguards Standards (ESSS).

9.3 Objectives of Stakeholder Engagement

The purpose of public participation in an ESMP is to ensure that potentially affected and interested stakeholders are provided with adequate, clear, and accessible information in an objective manner. This enables them to identify key concerns, contribute meaningful input, and propose options for improving project benefits and considering alternatives.

The stakeholder engagement process has been structured in line with the requirements of the Nigerian EIA Act as well as applicable international standards. For this Project, the main objectives of stakeholder engagement are as follows:

- Identify key stakeholders that can influence the Project and its activities;
- Inform and educate stakeholders about the proposed Project;
- Gather local knowledge to improve the understanding of the environmental and social context;
- Better understand the locally-important issues;
- Identify the most effective methods and structures through which to disseminate project information, and to ensure regular, accessible, transparent and appropriate consultation;
- Provide a means for stakeholders to have input into the Project planning Process;
- Take into account the views of stakeholders in the development of effective mitigation measures and management plans; and
- Lay the foundation for future stakeholder engagement.

9.4 Disclosure and Participation Plan

Information disclosure is a critical activity, not only as a means of engagement but also as a foundation for enabling other engagement processes to be carried out in an informed and participatory manner. This section outlines the procedures to be followed for information disclosure and stakeholder participation as part of the implementation of the EEP.

In accordance with the World Bank Safeguards requirements, the REA is expected to disclose the environmental and social assessment, along with a documented record of stakeholder engagement. This record should include details of the stakeholders consulted, a summary of the feedback received, and a clear explanation of how the feedback was incorporated into the Project, or the reasons why it was not adopted.

Disclosure Mechanism

The process of information disclosure can be undertaken in two ways: either voluntary disclosure or disclosure as part of the regulatory requirements (EIA requirements, public hearing). While regulatory disclosure involves the provisioning of information as required by the authorities and agencies involved in the project, voluntary disclosure refers to the process of disclosing information to the various stakeholders in a voluntary manner. This disclosure not only allows for trust to be built amongst the stakeholders through the sharing of information, but it also allows for more constructive participation in the other processes of consultation and resolution of grievances due to availability of accurate and timely information.

Process for Disclosure of Information

As a standard practice, this ESMP will be released for public review according to the AfDB disclosure procedures, and for a period of 21 days in accordance with Nigerian Regulatory Frameworks. Distribution of the disclosure material will be done by making them available at venues and locations convenient for the stakeholders and places to which the public have unhindered access. The language of the ESMP is in English. The report will be made accessible for the general public at the following locations:

- The EA Department of the Federal Ministry of Environment;
- The Ekiti State Ministry of Environment,
- The Federal University, Oye-Ekiti
- Other designated public locations to ensure wide dissemination of the materials.

Electronic copies of the ESMP report will be made available on the websites of the World Bank and FMEnv, enabling stakeholders with internet access to review information on the proposed development and participate in the public consultation process. Stakeholder input will be facilitated through various mechanisms, including press releases and media announcements, as well as notifications to local, regional, and national NGOs, relevant professional bodies, and other interested parties regarding the disclosed materials.

9.5 Stakeholder Identification/Mapping and Analysis

The stakeholders were identified based on the direct project beneficiaries, adversely impacted groups, project supporters /proponents, regulatory/ planning, However, the stakeholders covered are;

- Rural Electricity Agency (REA)
- Federal Ministry of Environment (FMEnv)
- Ekiti State Ministry of Environment
- Ikole Local Government Area
- Federal University, Oye-Ekiti /community

Major Points of the Initial Consultation

Key agenda points included:

1. Introduction of Stakeholders
2. Opening Remarks
3. Description of the Proposed Project by REA/Consultant
4. Overview of The ESMP and Public Consultation by Consultant
5. Questions, Comments and Remarks by other stakeholders
6. Closing Remark

Key feedback received during Stakeholder Consultations are presented below:

Title	Environmental and Social Impact Assessment Stakeholders' engagement meeting, held on the 13 th of February 2026.
Language	English language
Location	Office of the Registrar, Federal University Oye-Ekiti, Ekiti State

Participants	Prof. Mufutau A. Ibrahim (Registrar, FUOYE); Kayode Lawrence O. (Deputy Director, Works); Anasieze Godwin (Assistant Chief Physical Officer), Emmanuel Osamiewenfan (Team lead, Charlton Consult Limited) and Dr. Charles Ebojei (Charlton Consult Limited).
Opening Remark	The Deputy Directed welcomed the team and participant to the stakeholder's engagement meeting with the management of FUOYE. He announced that the Vice Chancellor, and the Deputy Vice Chancellors were unavoidably absent due to prior engagement outside the university premises. Thus, they were unable to attend the meeting. He commended the team for the visit and stated that the University was in dire need of sustainable electricity supply to meet her needs as an institution of higher learning and to support the student and staff of the university in carrying out their academic activities within the university premises.
Presentation by the ESIA Consultant	The team lead of Charlton Consult limited, Mr. Emmanuel on behalf of the project initiators, REA and World bank appreciated the management of the University for accepting the proposed intervention project under the auspices of the Distributed Access through Renewable Electricity Scale-up (DARES) programme aimed at enhancing access to electricity to Nigeria households, and the Energizing Education Programme (EEP) targeted at empowering institutions of Higher learning, with sufficient electricity supply as a viable alternates through the deployment of Hybrid Solar Power Plant. He stated that the proposed Solar hybrid Power plant project was in-line with the Energy Transition Plan of the Federal Government, the Sustainable Development Goal 7, and the EEP which was conceived to empower university community to be self-sufficient in terms of meeting their energy needs while contributing immensely to the reduction of the use of fossil fuel and Carbon footprint. Mr. Emmanuel posited that the stakeholder's engagement meeting was an essential component of the Environmental and Social Impact Assessment study for the Project, where environmental and social issues that may likely impact the success of the project are identify and resolved, while the fears and concerns of stakeholders are noted and incorporate in the project design for enhanced sustainability.
Remark by the Registrar (FUOYE)	The Registrar, Prof Mufutau appreciated the Federal Government and the REA for the laudable project which promises to transform the energy landscape of the University. He commented that the university community had been plagued with lack of access to sufficient and reliable energy supply from the national grid since inception its inception both at the University in Oye-Ekiti and the University Campus in Ikole. He mentioned that the University through self-help provided minimal electricity supply through the use of diesel-powered generators and the deployment of individual solar power solution to meet their energy need. This is affirmed had eaten deep into the finances of the institution. He stated that the Chairman of the Governing Council, Senate Victor Ndom Egba had promised to provide access to reliable energy supply to the University to aid its activities. This promise is still lingering due to obvious reasons. However, the University is on the verge of developing and fabricating its own power plant to bridge the energy gap in the university. Though, the proposal is at its infancy stage. Hence, the proposed Solar hybrid power plant was a welcomed development to the University Community and the larger Oye-Ekiti Town who suffer similar faith with the University.

Comments, Concern & Questions	The Registrar, enquired how soon will the proposed solar power project be available for use in earnest, to enable the University to consider its options in regards to their own power plant initiative. The Consultant, Mr. Emmanuel enquired about the technology that the university proposes to leverage upon in the development of their power plant. He raised concerns about the issue of none payment of compensation for land by the government as posited a farmer during FGD with community members. Mr. Kayode Lawrence raised concerns about the possibility of having both the proposed University Power plant and the REA Solar Hybrid power plant running simultaneously and what becomes of the excess electricity.
Response	Prof Mufutau, stated that indeed, they have been hearing complaints of none payment of compensation by the State Government who ceded the land to the Federal Government for the University to kick off. However, they are at the verge of securing the Certificate of Occupancy from the State Government to the University. He mentioned that within the University premises several encroachments have been observed lately by individuals who erect buildings within the perimeter of the University despite warning. Also, he responded that the location identified for the implementation of the project is within Phase 3 of the university masterplan and it is devoid of any issues of compensation as several of the structural buildings and sandwiched the College of Medicine and Fasina Conference center. The location it is free any form of encumbrances. Dr. Charles Ebojei informed the meeting that the precise date for the commencement of installations of the solar power plant and the eventual supply of electricity to the university can only be determined once the preliminary designs and approval have been obtained by the REA. However, he stated that power supply should be available within one year, pending verification from REA. Mr. Emmanuel responded to the possibility of having both proposed power plants running and the likelihood of having more energy than will be needed by the University. He suggested that the university could consider expanding her income generation stream by metering and selling electricity to its neighboring communities in Oye-Ekiti, who suffer from electricity deprivation from the national grid. Prof Mafuta, responded that the technology proposed by the University will be determined in their subsequent meeting, where the financial implications will be made known for the University management to consider. However, they may consider deploying the University's proposed power plant to serve the Ikole campus, which is several kilometers away from the main campus.
Closing Remark	On behalf of the Vice Chancellor, Prof Joshua Olalekan Ogunwole, the Registrar appreciated the REA and the team for the stakeholder's engagement, which was robust and insightful. He promised that the Management of the University will provide all the necessary support for the project to commence as soon as possible.



Plate 9.1: Stakeholders' Engagement with the Management



Plate 9.2: Questionnaire Administration

9.6 Grievance Redress Mechanism (GRM)

A Grievance Redress Mechanism (GRM) shall be established for the proposed Solar Power Plant Project at Oye-Ekiti to provide an accessible, transparent, and effective process for receiving and resolving complaints or concerns arising from project activities. The GRM is designed to strengthen stakeholder confidence, promote accountability, and ensure that issues affecting students, staff, contractors, and host communities within Oye-Ekiti are addressed in a timely and fair manner. The mechanism will serve as an important tool for preventing conflicts and enhancing cooperation among all parties involved in the implementation of the project.

The primary objective of the GRM is to provide affected persons and stakeholders in Oye-Ekiti with a formal platform through which grievances can be lodged and resolved amicably. The mechanism will

ensure that complaints relating to environmental impacts, social concerns, labor issues, security matters, or operational disturbances are properly documented, investigated, and addressed. It will also improve communication between the project proponents, the University management, the Rural Electrification Agency (REA), Charlton Consult Limited, contractors, and the host communities in Oye-Ekiti.

The scope of grievances to be handled under the mechanism includes concerns relating to land use, noise and dust generation, occupational health and safety, damage to infrastructure, employment and labor disputes, community health and security concerns, theft or vandalism of project facilities, and any dissatisfaction associated with project activities. Sensitive issues such as harassment, discrimination, and gender-based violence shall also be handled confidentially and in accordance with established safeguarding procedures.

To ensure effective implementation, a Grievance Redress Committee (GRC) shall be constituted. The committee may comprise representatives of the University management, the Rural Electrification Agency, Charlton Consult Limited, contractors, community leaders from Oye-Ekiti, student representatives, security personnel, and environmental and social safeguard officers. The committee will be responsible for receiving complaints, conducting investigations, facilitating dialogue among parties, and ensuring that corrective measures are implemented where necessary.

Stakeholders shall be able to submit grievances through multiple channels to ensure accessibility and inclusiveness. Complaints may be lodged verbally or in writing through complaint boxes placed within the University premises, dedicated telephone lines, email addresses, community liaison officers, or directly through the University's Works and Maintenance Department. Anonymous complaints shall also be accepted and treated confidentially to encourage openness and protect complainants from fear of retaliation.

Upon receipt of grievance, the complaint shall be formally registered and acknowledged within a reasonable timeframe. The Grievance Redress Committee will assess and investigate the matter to determine appropriate corrective actions. Resolution outcomes shall be communicated clearly to the complainant, and where necessary, follow-up actions shall be monitored to ensure satisfactory implementation. Where a complainant is dissatisfied with the decision reached, an appeal process shall be provided to allow for further review and resolution of the grievance.

9.6.2 Publicizing and Disclosure of the GRM

The GRM will be disclosed to the stakeholders through written and verbal communication. The mediums to be used for this purpose are public meetings, group discussions. The GRM disclosure will be done along with the disclosure of other management plans.

9.6.3 Receiving and Recording Grievances

As part of the GRM, the grievances from the stakeholder or their representatives may be communicated verbally (in person or over a telephonic conversation) or in written form to the project representatives or to the designated Grievance Officer (GO) directly. If the grievance is received directly by the GO or other project representatives, it will be recorded directly into the Grievance Form as soon as the personnel return to site.

9.6.4 Maintaining a Grievance Register

Each grievance thus received, shall be recorded in a grievance register. This grievance register shall be updated at each stage of the grievance redressal. Once the grievance is recorded in the register, a preliminary analysis shall be undertaken by the social standard officer/ manager to ensure that the grievance is within the scope of the GRM.

9.6.5 Acknowledgement of Grievance

Once the grievance has been recorded, the stakeholder will receive an acknowledgement of receipt along with a summary of the complaint.

9.6.6 Site Inspection and Resolution

Site inspections may not be necessary for all grievances during the verification and resolution process. The need for a site visit will be determined based on the nature and sensitivity of the issue.

9.6.7 Resolution, Escalation, and Closure

Based on the understanding developed, the Social Safeguard Officer, in consultation with relevant departments, shall determine an appropriate resolution to the issue. This may include providing information to clarify the situation, implementing corrective actions to address identified problems, offering compensation; either financial or in kind for any damage caused, and introducing mitigation measures to prevent recurrence. The agreed resolution shall be communicated to the complainant within 10 working days after completion of the site investigation. Where the issue falls outside the mandate of the Social Safeguard Officer, it shall be escalated to the Head of the PMU under the NEP, and the complainant shall be duly informed of the escalation. The Head of the PMU shall make efforts to resolve the grievance within 10 working days of receiving it.

If the grievance remains unresolved and no adequate solution can be identified by the Head of the PMU, a formal response shall be provided to the complainant, along with guidance on alternative avenues for redress. This may include referral to a citizens' rights mediation centre for resolution prior to pursuing legal action.

At any stage, if the complainant is dissatisfied with the proposed resolution, they may request that the grievance be escalated to the next level. In cases where a grievance is determined to be unfounded, a clear and reasoned explanation shall be provided to the complainant.

9.6.8. Update of Records

The grievance register shall be updated on a weekly basis to reflect the current status of each complaint. Once a grievance has been resolved and the outcome communicated to the complainant, it shall be formally closed in the register. The register should also document how each grievance was addressed, providing a clear record of the resolution process. These records will serve as useful references for handling similar grievances in the future. Where there is evidence of recurring issues or repeated grievances, such matters should be escalated to the Head of the PMU under the NEP for assessment, to determine whether modifications to the project design are necessary.

CHAPTER TEN

CONCLUSION AND RECOMMENDATION

10.1 Conclusion

The Environmental and Social Impact Assessment (ESMP) for the proposed solar power plant at the Federal University, Oye-Ekiti, Ekiti, was conducted to comply with applicable government policies, regulatory requirements, financiers' standards, and stakeholder expectations. The objective is to ensure that proactive environmental and social considerations are integrated into the project design and implementation. This study was carried out in accordance with Nigeria's regulatory framework for environmental and social management, particularly the Nigerian EIA Act Cap E12 LFN 2004, which mandates EIAs for projects with the potential to cause significant environmental impacts. Additionally, the ESMP aligns with the World Bank's Environmental and Social Standards.

The ESMP process is intended to provide comprehensive information to support informed decision-making and promote environmentally sound and socially sustainable development. Stakeholder consultations have been conducted and will continue throughout the project lifecycle. These engagements ensured that concerns and questions regarding the proposed project were adequately addressed to the satisfaction of stakeholders.

Baseline environmental and social conditions covering both biophysical and socio-economic aspects were established through field surveys and sampling, supported by literature reviews, maps, and other secondary data sources. This baseline information will serve as a reference point for future monitoring and evaluation. The assessment examined interactions between the project activities and existing environmental and socio-economic conditions to identify, characterize, and evaluate potential impacts. Appropriate mitigation measures and recommendations were subsequently developed based on the mitigation hierarchy of avoiding impacts where possible, minimizing unavoidable impacts, restoring affected resources, and compensating for residual impacts where necessary. These measures were informed by industry best practices, available technologies, and health, safety, and environmental (HSE) considerations.

An Environmental and Social Management Plan (ESMP) was also developed to guide the management of potential adverse impacts during project implementation and operation. The ESMP outlines procedures for implementing environmental and social commitments and includes a monitoring framework to track changes in environmental conditions over time. In this regard, the Rural Electrification Agency (REA) will ensure that parameters such as air quality, noise levels, and groundwater conditions are monitored in compliance with the Federal Ministry of Environment (FMEnv) and World Bank standards. Mitigation measures implemented under the ESMP followed the hierarchy of avoid, minimize, restore, and compensate.

10.2 Recommendation

The ESMP study recommends the following:

- Ensure full implementation of the Environmental and Social Management Plan (ESMP) throughout the project lifecycle.

- Conduct regular environmental monitoring for air quality, noise, groundwater, and waste management.
- Maintain continuous stakeholder engagement and effective community communication.
- Prioritize local employment, capacity building, and renewable energy training opportunities.
- Implement strong occupational health and safety measures, including emergency response systems.
- of Establish and maintain an efficient Grievance Redress Mechanism (GRM) for timely resolution complaints.
- Promote proper waste management, including safe disposal of hazardous and electronic waste.
- Ensure compliance with regulatory requirements through continuous oversight by the Rural Electrification Agency and relevant authorities.

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Appendix – Laboratory Report -Soil Oye-Ekiti Wet Season

Parameter	Unit	Depth (cm)	SP1	SP2	SP3	Control
pH	-	0–15	6.7	6.8	6.9	6.9
		15–30	6.6	6.7	6.9	6.9
Electrical Conductivity (EC)	μS/cm	0–15	126	167	208	149
		15–30	170	216	262	157
Temperature	°C	0–15	31.1	31.7	32.3	30.4
		15–30	30.9	31.3	31.7	30.8
Nitrate	mg/kg	0–15	0.15	0.70	1.24	0.92
		15–30	0.10	0.75	1.40	0.81
Ammonia	mg/kg	0–15	1.40	1.80	2.20	1.95
		15–30	1.20	1.68	2.15	1.76
Phosphate	mg/kg	0–15	1.6	2.0	2.4	1.2
		15–30	1.15	1.38	1.60	1.8
Sulphate	mg/kg	0–15	0.6	1.5	2.5	0.5
		15–30	0.9	1.0	1.1	0.8
Chloride	mg/kg	0–15	1.2	1.4	1.5	1.4
		15–30	1.0	1.4	1.8	0.12
Total Organic Carbon (TOC)	%	0–15	0.75	1.00	1.25	1.01
		15–30	0.10	0.70	1.30	0.11
Moisture Content	%	0–15	6.5	9.4	12.2	12.3
		15–30	1.1	8.4	15.6	

Dry Season

Parameter	Unit	Depth (cm)	SP1	SP2	SP3	Control
pH	-	0–15	6.2	6.3	6.5	6.8
		15–30	5.4	5.9	6.5	6.5
Electrical Conductivity (EC)	μS/cm	0–15	145	186	228	139
		15–30	240	303	366	176
Temperature	°C	0–15	32.0	34.2	36.5	31.7
		15–30	32.8	33.9	34.9	31.9
Nitrate	mg/kg	0–15	0.05	0.36	0.68	0.01
		15–30	0.10	0.31	0.51	0.01
Ammonia	mg/kg	0–15	0.41	0.76	1.12	1.15
		15–30	0.12	0.85	1.57	1.16
Phosphate	mg/kg	0–15	1.2	1.3	1.4	1.2
		15–30	0.8	1.2	1.7	1.6
Sulphate	mg/kg	0–15	1.5	1.9	2.3	0.5
		15–30	0.3	0.9	1.4	0.8
Chloride	mg/kg	0–15	0.8	1.3	1.9	0.4
		15–30	1.0	1.8	2.5	0.1
Total Organic Carbon (TOC)	%	0–15	0.25	0.50	0.74	1.2
		15–30	0.18	0.28	0.37	0.06
Moisture Content	%	0–15	4.8	6.1	7.5	7.3
		15–30	5.2	6.2	7.2	5.1

QUESTIONNAIRES

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PLAN (ESIA) PHASE III: ENERGIZING EDUCATION PROGRAM (EEP) PROJECT

NOTE:

Please read each question carefully. Your answers are completely confidential and will be included only in summaries where individual answers cannot be identified. Unless otherwise instructed, please tick the appropriate answer category that best describes your opinion. It will take approximately 20 minutes to complete this questionnaire.

SECTION A: Household data

Location/Name of School.....

1. Gender of Respondent: (a) Male (b) Female
2. Age: (a) Below 18 yrs (b) 18-45 yrs (c) 46-65 yrs (d) Above 66 yrs
3. Marital Status: (a) Single (b) Married (d) Divorced/Separated (e) Widowed
4. Occupation: (a) Civil Servant (b) Daily Labourer (c) Trading & Shop Keeping (d) Artisans (e) Employed (salary)(f) Retired (g) Farmer (h) Unemployed (i) Others specify.....
5. Residential Status: (a) Permanent Resident (b) Back Home (Returnee) (c) Nonresident, Visiting
6. Ethnic Group: (a) Ebira (b) Igala (c) Hausa-Fulani (d) Igbo (e) Hausa Yoruba (f) others.....
7. Religion: (a) Islam (b) Christianity (c) Traditional
8. Relationship to Household Head (HH): (a) Self (b) Spouse (c) Child (d) Parent (e) Other, specify.....
9. Size of the HH
10. How long have you been living/working in this area? (a) 0-2 yrs (b) 3-5 yrs (c) 6-9 yrs (d) 10 yrs and Above
11. Education: (a) NO formal education (b) Primary School (c) Secondary School (d) Tertiary (Excluding University) (e) University Graduate (f) University Postgraduate

SECTION B: Health Status

1. How do you manage your health conditions when sick? (a) Attend hospital/clinic (b) Buys drugs from nearby chemist (c) Traditional medicine (d) None (e) Others Specify.....
2. If you do attend a hospital/clinic, when did you last visit one? (a) last six months (b) last one year (c) last five years (d) more than five years ago (e) Never visited one.
3. Please tick one or more of the under-mentioned ailments/sicknesses that you suffer from most, accordingly?
- 4.
- 5.

Ailment	√	Ailment	√
Whooping Cough		Rheumatism	
Tuberculosis		Rashes	
Asthma		Eczema	
Dysentery		Ringworm	

Diarrhoea		Eye pains	
Cholera		Cataract	
Pile		Glaucoma	
Hypertension		Typhoid fever	
Congestive health problem		Malaria	
Pneumonia		Sickle cell anemia	
Sexually transmitted diseases		Epilepsy	

7. Do you think your health condition will be affected by the proposed Infrastructure intervention? (a) Yes (b) No

8. If yes, how?

9. Please suggest how this can be averted during construction and implementation.....

SECTION C. Standard of Living /Socioeconomic Activities

1.0 Assets

1.1 What sort of housing does your household live in?					
a. Construction material - Walls		Plastered mud	c. Number of rooms		1-2
		Cement blocks			3-4
		Other (specify)			Other (specify)
b. Construction material - roofing		Corrugated roofing	d. Other structures on plot		Animal Pen
		Aluminium			Granary
		Asbestos			Shops
		Tile			Kiosks
		Other (specify)			Other (specify)
e. Construction material - floor		Earthen			
		Concretes			
		Tiles			
		Other (specify)			
f. Toilet Facility		Pit latrine			
		Water closet			
		Toilet facility outside dwelling			
		Pier latrine			
		Other (specify)			
		None			

g. Tenure of housing		Owned
		Rented
		Occupied rent free
		Other
h. Tenure of land		Owned
		Rented
		Occupied rent free
		Lease hold
		Others specify

1.2 Indicate household refuse disposal for solid waste? (Multiple options) (a) Depositing refuse at backyard of the house (b) Dumping in water body (c) Dumping in community refuse/garbage pit/dumpsite (d) Burning after gathering together (e) Waste collector (f) Other specify.....

2.0 Household Services

2.1 Rank in order of availability and usability the source(s) of lighting for the household? (Please use 1, 2, in hierarchical order with 1 indicating the most available and used source)

(a) PHCN	(b) Generator	(c) Lantern	(d) Candle	(e) Palm Oil Lamp	(f) Torchlight Battery	(g) Wood	(h) Kerosene	(i) Gas
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2.2 Using the method in 2.1, indicate major source of energy for cooking?

(a) Fire Wood	(b) Coal	(c) Kerosene	(d) Electricity	(e) Animal dropping	(f) Gas	(g) Crop Residue/saw dust	Others
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3.0 Sources of Water

Sources	for drinking	for cooking	for bathing and washing
a. Well			
b. Borehole/Water pump			
c. Community tap			
d. Piped water outside dwelling			
e. River			
f. Rain harvesting			
g. Water vendor			
h. Tanked water			
i. Other (specify)			

4.0 Income and source livelihood

Please, state your main income per month and source livelihood	₦
--	---

4.1

Remittances

1. Does anyone in the family who lives elsewhere send money to you?	1	YES	2	NO
2. If yes, how much (per month)	₦			

5. In your opinion, how has the standard of living of your household changed over the previous three years? (a) Same (b) Better (c) Worse

6. Is the option in 5 propelled by the state of the electricity provision/availability? (a) Yes (b) No

7. If 6 is YES, do you think the proposed infrastructure intervention will improve the situation? (a) Yes (b) No

8. If 7 is YES specify how the project will improve the situation

SECTION D: Gender-Based Violence/Sexual Exploitation and Abuse

1. Are there any provisions which restrict women's access to health and other social services? In particular which:
(Please specify in the space provided for this purpose "yes" or "no")

() require the consent of a male relative/husband for a married woman's medical examination or treatment or access to contraceptives or abortion,

() require parental consent in case of adolescents' access to contraceptives abortion;

() allow medical practitioners to refuse provision of a legal medical service on grounds of conscientious objection

() prohibit certain medical services, or require that they be authorized by a physician, even where no medical procedure is required; in particular:

() IUDs (intrauterine devices) or hormonal contraceptives

() Emergency contraceptives, including the morning-after pill, (

) Sterilization on request;

() Early abortion (in first trimester of pregnancy) at the pregnant woman's request

() Medically assisted reproduction (e.g., in vitro fertilization) 2.

Are the following acts criminalized?

(Please specify in the space provided for this purpose "yes" or "no")

() adultery

() prostitution

(If yes, who is criminally responsible? (a) the sex worker (b) the procurer and/or the customer) (c) both

3. Are there any measures and programs put in place in order to increase women's participation safety e.g. in public urban spaces, in public transportation, etc.? (a) Yes (b) No (c) No idea

4. Are there specific training programs for medical and legal professionals on the issue of gender-based discrimination in the area of health and safety? (a) Yes (b) No (c) No idea

5. How do you ensure gender equity in the community? (a) Women are elected in public office (b) Females are given equal opportunity and access to education and employment (c) Quotas on genders are ensured in leadership of community-based organizations (d) Others specify.....

SECTION E: Resources/ Cultural Property

1. Please indicate the environmental problems that your community experiences. (a) Soil infertility (b) Poor drainage system (c) Bad road (d) Bad lands (e) environmental degradation (f) Degraded land (i) Destruction of infrastructures (j) Others
(specify)
2. Please indicate the environmental problems that your community would likely experience and whose cause can be linked to the proposed Infrastructure intervention project during construction?
(a) Soil infertility (b) Poor drainage system (c) Bad road (d) Low visibility
(e) Erosion Problems (f) Flooding (g) Environmental degradation
(h) Destruction of infrastructures (i) encroachment of land properties (j) Pollution (air, surface water, ground water, noise) (k) others (specify)
.....
3. Do you think the proposed Infrastructure intervention project will affect any valued resource/cultural/archaeological property in your area? (a) YES (b) NO
4. If yes mention the name(s) of the valued resource/cultural/archaeological property
.....
5. How will valued resource/cultural/archaeological property be affected? (a) Displacement of such valued cultural properties (b) Vandalization of sacred items/locations (c) Possible theft of sacred/archaeological items (d) Others,
specify:.....

SECTION F: Intervention Project Activities Impact Evaluation

1. Are you aware of the proposed Solar Power Project? (a) Yes (b) No
2. If yes, from which source (a) Community meetings (b) Media (TV, Radio, Newspaper, Internet) (c) Others specify.....
3. Do you think the proposed Infrastructure intervention project can cause restiveness in your community? (a) YES (b) NO
4. If 3 is yes, how will the proposed Infrastructure intervention result in restiveness? (a) Disrespect of norms and culture by contractors (b) loss of farmland / Property (c) Possible theft of sacred/archaeological items (d) local people not employed during
construction (e) Others, specify:
5. How will the proposed Infrastructure intervention project impact on your livelihood and environment?

Positive impacts	Negative impacts
(a)	
(b)	
(c)	

6. Can you name some of the animals and other habitat that may be affected by the proposed Infrastructure intervention project?
.....
7. What do you expect from the activities of solar power Infrastructure intervention? (a) employment of Locals during construction (b) compensation for those whose properties will be affected (c) capacity building for maintenance during implementation (d) community input into final engineering design (e) Others please specify.....

Section G: Grievance Redress Mechanism

1. Have you had grievances issue in this community in the last three years? (a) Yes (b) No
2. If 1 is yes, what was the cause of the grievance? (a) Land issue (b) theft of valuables (c) vandalization of property (d) Others, please specify.....
3. Who do you report your grievances in this community to? (a) School authority/management (b) Law enforcement (c) My landlord/CDA (d) traditional/community leader (e) Others, please specify.....
4. Are grievances satisfactorily addressed or resolved by option(s) chosen in question 3 above? (a) Yes (b) No
5. Are there any other issue(s) of concerned as regards the proposed intervention project in your area, please state clearly?.....

MINUTE OF MEETING HELD BETWEEN CHARLTON CONSULT LIMITED AND THE MANAGEMENT TEAM OF THE FEDERAL UNIVERSITY OYE-EKITI, ON THE DEPLOYMENT OF SOLAR POWER PLANT IN THE UNIVERSITY BY THE RURAL ELECTRIFICATION AGENCY.

Title	Environmental and Social Impact Assessment Stakeholders' engagement meeting, held on the 13 th of February, 2026.
Language	English language
Location	Office of the Registrar, Federal University Oye-Ekiti, Ekiti State
Participants	Prof. Mufutau A. Ibrahim (Registrar, FUOYE); Kayode Lawrence O. (Deputy Director, Works); Anasieze Godwin (Assistant Chief Physical Officer), Emmanuel Osamiewenfan (Team lead, Charlton Consult Limited) and Dr. Charles Ebojei (Charlton Consult Limited).
Opening Remark	The Deputy Directed welcomed the team and participant to the stakeholder's engagement meeting with the management of FUOYE. He announced that the Vice Chancellor, and the Deputy Vice Chancellors were unavoidably absent due to prior engagement outside the university premises. Thus, they were unable to attend the meeting. He commended the team for the visit, and stated that the University was in dire need of sustainable electricity supply to meet her needs as an institution of higher learning and to support the student and staff of the university in carrying out their academic activities within the university premises.
Presentation by the ESIA Consultant	The team lead of Charlton Consult limited, Mr. Emmanuel on behalf of the project initiators, REA and World bank appreciated the management of the University for accepting the proposed intervention project under the auspices of the Distributed Access through Renewable Electricity Scale-up (DARES) programme aimed at enhancing access to electricity to Nigeria households, and the Energizing Education Programme (EEP) targeted at empowering institutions of Higher learning, with sufficient electricity supply as a viable alternates through the deployment of Hybrid Solar Power Plant. He stated that the proposed Solar hybrid Power plant project was in-line with the Energy Transition Plan of the Federal Government, the Sustainable Development Goal 7, and the EEP which was conceived to empower university community to be self-sufficient in terms of meeting their energy needs while contributing immensely to the reduction of the use of fossil fuel and Carbon footprint. Mr. Emmanuel posited that the stakeholder's engagement meeting was an essential component of the Environmental and Social Impact Assessment study for the Project, where environmental and social issues that may likely impact the success of the project are identify and resolved, while the fears and concerns of stakeholders are noted and incorporate in the project design for enhanced sustainability.
Remark by the Registrar (FUOYE)	The Registrar, Prof Mufutau appreciated the Federal Government and the REA for the laudable project which promises to transform the energy landscape of the University. He commented that the university community had been plagued with lack of access to sufficient and reliable energy supply from the national grid since inception its inception both at the University in Oye-Ekiti and the University Campus in Ikole. He mentioned that the University through self-help provided minimal electricity supply through the use of diesel-powered generators and the deployment of individual solar power solution to meet their energy need. This is affirmed had eaten deep into the finances of the institution. He stated that the Chairman of the Governing Council, Senate Victor Ndom Egba had promised to provide access to reliable energy supply to the University to aid its activities. This promise is still lingering due to obvious reasons. However, the University is on the verge of developing and fabricating its own power plant to bridge the energy gap in the university. Though, the proposal is at its infancy stage. Hence, the proposed Solar hybrid power plant was a welcomed development to the University Community and the larger Oye-Ekiti Town who suffer similar faith with the University.

Comments, Concern & Questions	The Registrar, enquired how soon will the proposed solar power project be available for use in earnest, to enable the University to consider its options in regards to their own power plant initiative. The Consultant, Mr. Emmanuel enquired about the technology that the university proposes to leverage upon in the development of their power plant. He raised concerns about the issue of none payment of compensation for land by the government as posited a farmer during FGD with community members. Mr. Kayode Lawrence raised concerns about the possibility of having both the proposed University Power plant and the REA Solar Hybrid power plant running simultaneously and what becomes of the excess electricity.
Response	Prof Mufutau, stated that indeed, they have been hearing complaints of none payment of compensation by the State Government who ceded the land to the Federal Government for the University to kick off. However, they are at the verge of securing the Certificate of Occupancy from the State Government to the University. He mentioned that within the University premises several encroachments have been observed lately by individuals who erect buildings within the perimeter of the University despite warning. Also, he responded that the location identified for the implementation of the project is within Phase 3 of the university masterplan and it is devoid of any issues of compensation as several of the structural buildings and sandwiched the College of Medicine and Fasina Conference center. The location it is free any form of encumbrances. Dr. Charles Ebojei informed the meeting that the precise date for the commencement of installations of the solar power plant and the eventual supply of electricity to the university can only be determined once the preliminary designs and approval have been obtained by the REA. However, he stated that power supply should be available within one year, pending verification from REA. Mr. Emmanuel responded to the possibility of having both proposed power plants running and likelihood of having more energy that will be needed by the University. He suggested that the university could consider expanding her income generation stream by metering and selling electricity to her neighboring communities in Oye-Ekiti who suffer electricity deprivation from the national grid. Prof Mufutau, responded that the technology proposed by the University will be determined in their subsequent meeting, where the financial implication will be made know for the University management to consider. However, they may consider deploying the University proposed power plant to serve the Ikole campus which is several kilometers away from the main campus.
Closing Remark	On behalf of the Vice Chancellor, Prof Joshua Olalekan Ogunwole, the Registrar appreciated the REA and the team for the stakeholder's engagement, which was robust and insightful. He promised that the Management of the University will provide all the necessary support for the project to commence as soon as possible.

[illegible]

Name of University FUOTF
Location OYE-EKIB
Date 13/2/2020

s/n	Name	Designation	Contact	Signature
	Ezekiel ESTHER	Business	081140917497	
	Adebayo Rachel	Student	08146365100	
	Thomas O. Bright	Student	07040943522	
	Tusaf Oluwatimilehin	Student	09025740022	
	Oyazumi K. Habeebat	Student	09034199479	
	Sanni Ahmed Ishola	Student	07014563284	
	Sunday Damilola Kemiola	Student	0816260244	
	Dunpejo Caroline Dunase	Student	07037225756	
	Mr Alanrew-Jude Duro	Business	08127437328	
	Mr Sami Amin	Business	07035825162	
	Supriya Kemi	Business	070142327621	
	Keshinro Beatrice. I.	Business	08039705151	
	Emiseye Folajimi. I.	Business	08063629452	