

**FINAL ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR THE  
INTERCONNECTED 2.5MW SOLAR-HYBRID PROJECTS UNDER THE NIGERIA  
DISTRIBUTED ACCESS THROUGH RENEWABLE ENERGY SCALE-UP (DARES) -  
REA-NEP/DARES/C/CQS/071/2025**

**Submitted To**



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

**JUNE 2026**

# **FINAL ESMP REPORT**

**Of the Proposed Solar Power Plant and Associated Infrastructure at the  
University of Ilorin (UNILORIN), Ilorin, Kwara State**

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

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

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## LIST OF ACRONYMS AND ABBREVIATIONS

|                    |                                                                       |
|--------------------|-----------------------------------------------------------------------|
| APPI               | Area of Potential Project Influence                                   |
| ARAP               | Abbreviated Resettlement Action Plan                                  |
| BESS               | Battery Energy Storage System                                         |
| BMP                | Biodiversity Management Plan                                          |
| BOD                | Biochemical Oxygen Demand                                             |
| COPE               | Care of the People                                                    |
| CWD                | Coarse woody debris                                                   |
| DRG                | Debt Relief Gains                                                     |
| EA                 | Environmental Assessment                                              |
| ECN                | Energy Commission of Nigeria                                          |
| EEP                | Energizing Education Programme                                        |
| EIA                | Environmental Impact Assessment                                       |
| EIS                | Environmental Impact Statement                                        |
| EMF                | Electromagnetic Field                                                 |
| EMS                | Environmental Management Strategy                                     |
| ERSED              | Erosion and sediment control                                          |
| ESCP               | Erosion and Sediment Control Plan                                     |
| ESMP               | Environmental and Social Impact Assessment                            |
| ESMP               | Environmental and Social Management Plan                              |
| FEPA               | Federal Environmental Protection Agency                               |
| FGN                | Federal Government of Nigeria                                         |
| FME <sub>env</sub> | Federal Ministry of Environment                                       |
| GPS                | Global Positioning System                                             |
| GW                 | Gigawatt                                                              |
| Ha                 | Hectares                                                              |
| HSE                | Health, Safety, and Environment                                       |
| HT                 | High Tension                                                          |
| ICREEE             | Inter-ministerial Committee on Renewable Energy and Energy Efficiency |
| LGA                | Local Government Area                                                 |
| LT                 | Low Tension                                                           |
| NACOP              | National Council on Power                                             |
| MW                 | Megawatt                                                              |
| MWh                | Megawatt hour                                                         |
| MW <sub>p</sub>    | Megawatt peak                                                         |
| NEEAP              | National Energy Efficiency Action Plan                                |
| NEP                | Nigeria Electrification Project                                       |
| NEPP               | National Electric Power Policy                                        |
| NERC               | Nigerian Electricity Regulatory Commission                            |
| NESREA             | National Environmental Standards and Regulations Enforcement Agency   |
| NIMET              | Nigerian Meteorological Agency                                        |
| NML                | Noise Management Level                                                |
| NO <sub>x</sub>    | Nitrogen oxides                                                       |
| NSITF              | National Social Insurance Trust Fund                                  |
| NUC                | National University Commission                                        |
| O&M                | Operations and maintenance                                            |
| PAPs               | Project Affected Persons                                              |

|          |                                                          |
|----------|----------------------------------------------------------|
| PCT      | Plant Community Type                                     |
| PESCP    | Progressive Erosion and Sediment Control Plan (aka ESCP) |
| PMP      | Project Management Plan                                  |
| PV       | Photovoltaic                                             |
| REA      | Rural Electrification Agency                             |
| SE4All   | Sustainable Energy for All                               |
| Sp./spp. | Species/species (plural)                                 |
| SWMP     | Soil and Water Use Management Plan                       |
| TCN      | Transmission Company of Nigeria                          |
| TCP      | Traffic Control Plans                                    |
| TMP      | Traffic Management Plan                                  |
| TWA      | Time Weighted Average                                    |
| VLMP     | Vegetation and Land Management Plan                      |
| WMP      | Waste Management Plan                                    |
| WPMP     | Weed and Pest Management Plan                            |

## ESMP PREPARERS

| Key Experts                | Position                                  | Qualifications                         |
|----------------------------|-------------------------------------------|----------------------------------------|
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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. **MISSION** To provide access to 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. **MANDATE** - Promote Rural Electrification in the Country - Co-ordinate Rural Electrification Programs in the country - Administer the Rural Electrification Fund (REF) to promote, support, and provide rural electrification through Public and Private Sector Participation. The Abuja Office is located at No. 15 Constitution Avenue, Central Business District, FCT-Abuja.

### **Project Specific Activities**

This component of the project will involve activities undertaken during the various implementation phases of the project as follows;

- Site clearing
- Civil, mechanical and electrical works
- Installation of PV panels and associated plant facilities
- Construction of training centre
- Installation of streetlights as well as underground armoured 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

## **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 and 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 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.

## **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 ESCO will also be responsible for maintaining appropriate environmental, health and safety (EHS) standards during operations, including electrical safety, emergency response, waste management, battery and e-waste handling, worker protection, and community health and safety. Performance and maintenance records should be regularly documented and reported, while any end-of-service handover should include asset condition assessments, updated maintenance records, operating manuals, outstanding repairs, and training where required. This integrated approach reduces interface risks between construction and operations and supports consistent performance throughout the project lifecycle.

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*

- 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**

Climate of the area is tropical with dry and rainy seasons respectively characterized by the hot and wet conditions associated with the movement of the Inter-Tropical Convergence Zone (ITCZ) north and south of the equator. The ITCZ appears as a band of clouds, usually thunderstorms, circling the globe near the equator and Nigeria is located just north of the equator. When it is to the south of the equator, the north-east winds prevail producing the dry season and when in the Northern Hemisphere, the south-westerly wind prevails, bringing rainfall and the rainy season. Climate of the area is tropical with the dry and rainy seasons. Its mean monthly rainfall is 14-242 mm characterized by annual level of 700 – 1800 mm and mean monthly relative humidity of 54 – 89%. The mean monthly minimum air temperature is 21.3 – 23.7 °C with maximum of 27 – 33.7 °C. Its mean monthly sunshine period is 3.2 – 8.4 hours per day with surface wind is 1 – 10 m/s having occasional calmness characterized by prevailing southwestern direction. All these agree with the measured meteorological data of the study area during this study. The biophysical and physico-chemical properties of the proposed project's environment were adequately studied (see chapter Four).

### **Socio-economic and Health Study**

This chapter 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 UNILORIN. 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 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.

## **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 through solar energy source 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 centre 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 and candles and enhance security within the school.
- Improve social cohesion and community development and 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<sub>x</sub>, CO, Total Suspended Particulates (TSP), SO<sub>x</sub> 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 and 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 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 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 1,3500 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)
- Kwara State Ministry of Environment
- Ilorin East Local Government Area
- University of Ilorin 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, Ilorin in Kwara 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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## ACKNOWLEDGEMENTS

The Rural Electrification Agency would like to thank the ESMP Consultant – Chalton Consult Limited for their commitment to the success of the ESMP study. We also thank the World Bank, Federal Ministry of Environment, the Kwara State Ministry of Environment, and other stakeholders, including the local communities in the Project area, for their valuable contributions and support.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background**

The Federal Government of Nigeria, in partnership with the World Bank, launched the Distributed Access through Renewable Energy Scale-Up (DARES) Project, a US\$750 million initiative aimed at expanding electricity access to approximately 17.5 million Nigerians living in rural and underserved communities. The project builds on the successes recorded under the Nigeria Electrification Project (NEP), which has already delivered clean, reliable, and sustainable electricity to over seven million Nigerians.

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. MISSION To provide access to 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. MANDATE - Promote Rural Electrification in the Country - Co-ordinate Rural Electrification Programs in the country - Administer the Rural Electrification Fund (REF) to promote, support, and provide rural electrification through Public and Private Sector Participation. The Abuja Office is located at No. 15 Constitution Avenue, Central Business District, FCT-Abuja.

### **1.2 Project Specific Activities**

This component of the project will involve activities undertaken during the various implementation phases of the project as follows;

- Site clearing
- Civil, mechanical and electrical works
- Installation of PV panels and associated plant facilities
- Construction of training centre
- Installation of streetlights as well as underground armoured 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 and 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, the 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. **Project Lifecycle Integration:** 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. **Institutional and Regulatory Boundaries:** 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. **Environmental and Social Receptors:** 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. **Mitigation and Monitoring Protocols:** 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 12th to 14th February 2026 (dry season), while the secondary data collection was obtained from existing sources, including the following:

- Stakeholders, including government agencies, community chiefs, elders, women, and youths in various communities and community-based organizations (cooperative societies, development committees, etc).
- Local experts and research, and academic organizations
- National and state data sources (population data).
- Environmental Assessment of Cobalt in Ilorin East Kwara 20214.

### **1.6.3 Sampling Design/ Protocol**

Sampling maps were designed to provide spatial distributions of the sampling points within the study area (see Plate 1.1).

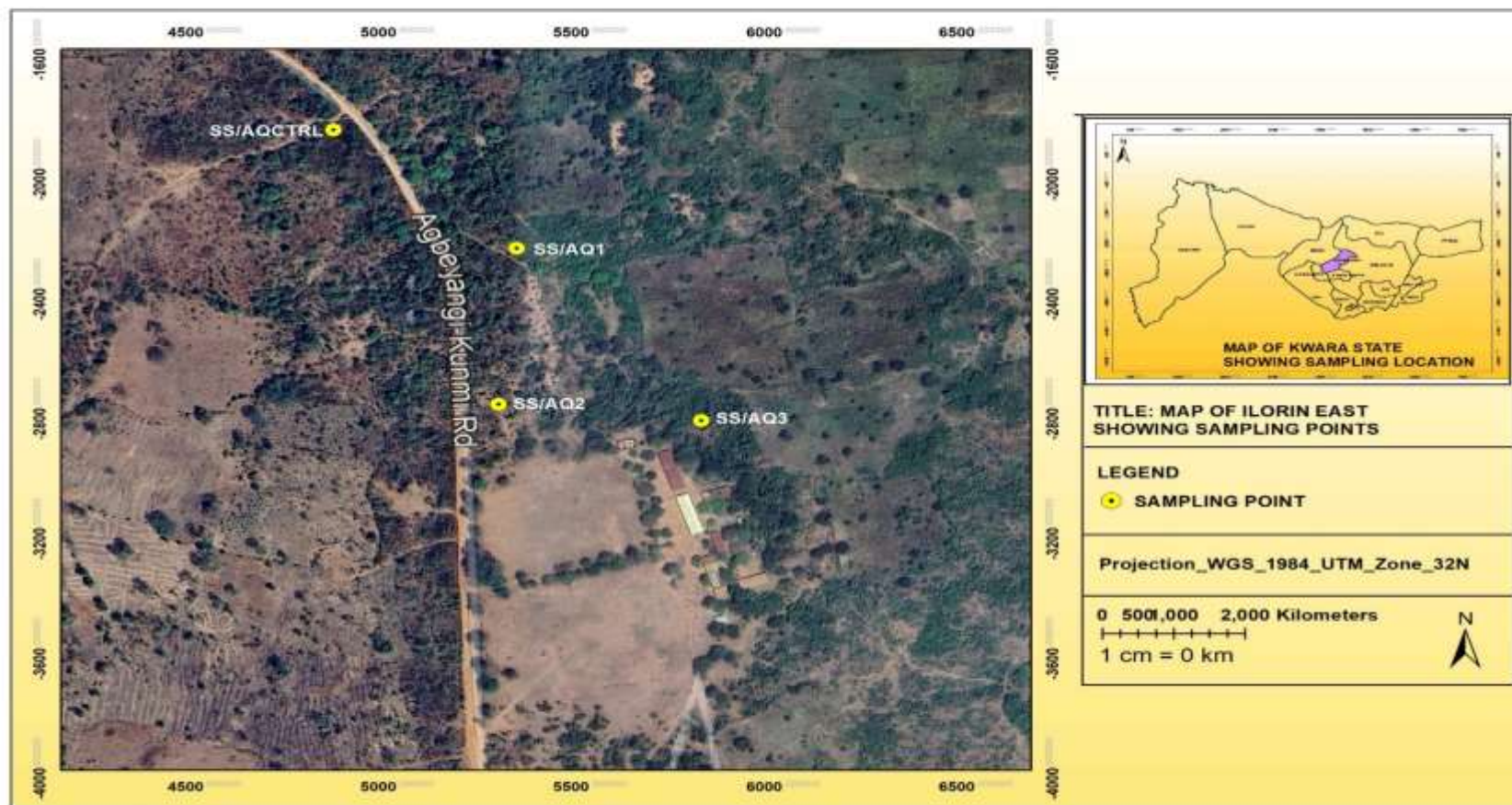


Plate 1.1: Sampling Map

#### **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 4.1). Each sampling location was adequately georeferenced with a GPS. Kwaramax Gas Meter with Model No.2750 was used for the measurement of the following parameters: Carbon Monoxide (CO), Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), Carbon Dioxide (CO<sub>2</sub>), and Hydrogen Sulphide (H<sub>2</sub>S). 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. Plate 4.2 shows air quality and noise measurements being taken during the studies.

##### **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). Dendrometric parameters recorded included height (m), diameter (cm) and number of trees. A pair of binoculars (Model: Helios Fieldmaster 8x40) was 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 for 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 in the course of 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 Limited, Warri Delta State, Nigeria (accredited by FMEnv) for analyses. 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, Kwara State Ministry of Environment, Kwara 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**

The University of Ilorin is located within Ilorin East Local Government Area of Kwara State, North Central Nigeria, along the Old Jebba Road. Lying on latitude 8°36'6.98"N and longitude 4°48'21.66"E, the surrounding environment is predominantly urban and peri-urban in character, comprising a mix of educational institutions, healthcare facilities, residential neighbourhoods, commercial activities, and transportation infrastructure. The area experiences moderate to high human and vehicular traffic due to the presence of the University, and adjoining communities. Major access roads within the area provide connectivity to other parts of Ilorin metropolis and neighbouring settlements, thereby enhancing accessibility to the project location.

The adjacent environment is characterized by relatively flat terrain with scattered vegetation, open spaces, and built-up developments typical of an expanding urban centre. Land use within the vicinity includes institutional, residential, commercial, and small-scale agricultural activities. Public utilities and social infrastructure such as electricity, water supply, telecommunications facilities, and healthcare services are available within the area. The presence of the University has also contributed significantly to socioeconomic activities in the surrounding communities through employment generation, commercial development, educational opportunities, and improved healthcare access. Overall, the adjoining environment is considered suitable for institutional and infrastructure development, subject to the implementation of appropriate environmental and social management measures.

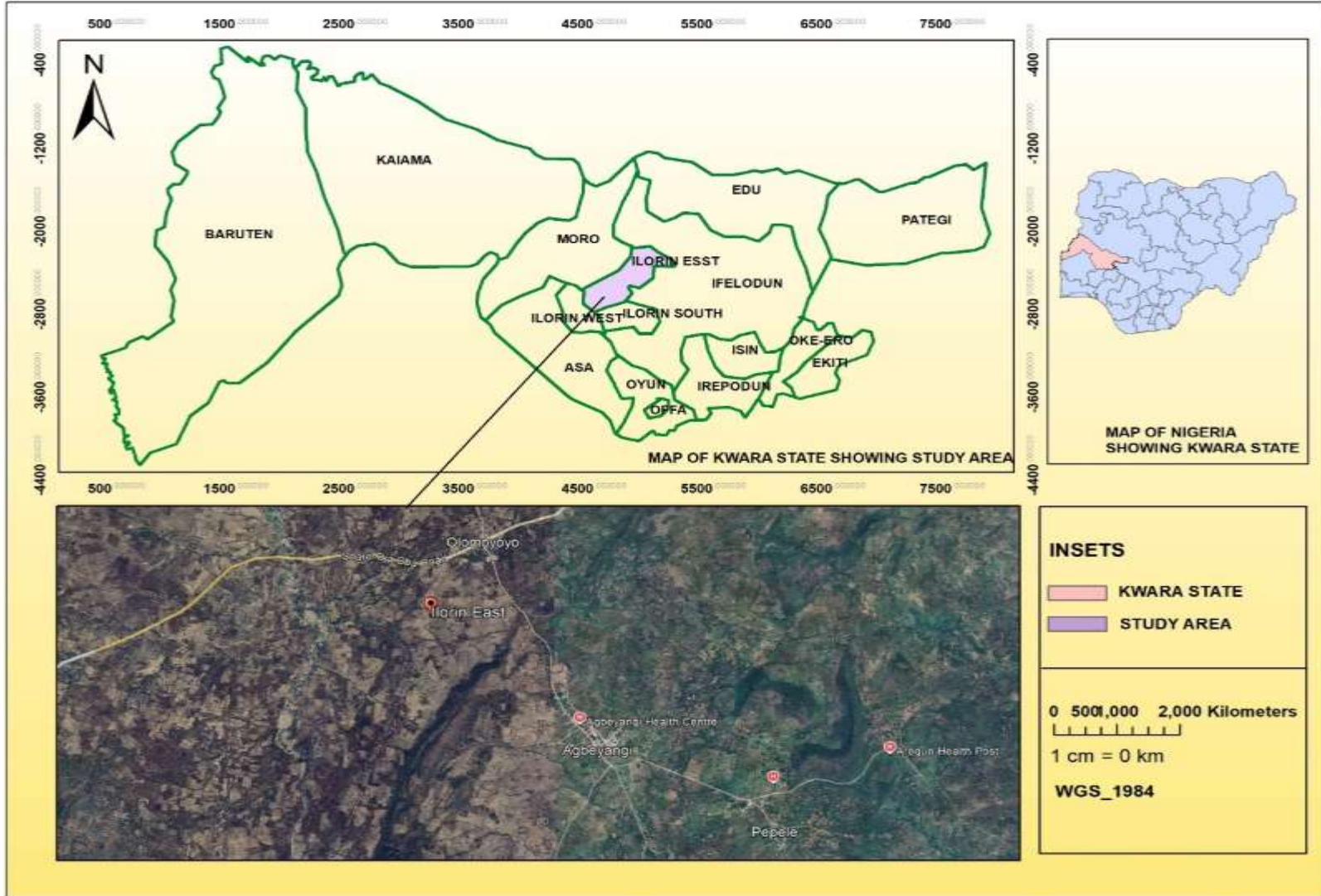


Figure 2.1: Administrative Map of Kwara State Showing the Project Area

## 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), is a critical strategy to bridge 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 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 organisations 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, which 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-own 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 agricultural (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 on 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**

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 ₦30,000.00 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 Act makes provisions for the payment of compensation to workmen for injuries suffered in the course of their employment. The compulsory insurance covers employees for injury or death resulting in the course of work or in workplaces. All types of workers are covered, including those employed under a contract for service or an apprenticeship with an employer, whether by way of manual labour, clerical work or otherwise, and whether the contract is expressed or implied, is oral or in writing. The programme will employ both skilled and non-skilled labour and shall be subject to this law as applicable.

### **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
- World Bank Safeguards Policies

### **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)**

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**

#### **Kwara 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 Kwara State Environmental Law 2021.

#### **Kwara 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.

#### **Kwara 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 UNILORIN. 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, Kwara 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 Solar-Power Project**

#### Pre-construction Phase

| Aspect                   | Nigeria Legal Requirements        | World Bank Standards                             | 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                             | 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                     |

### Operation and Maintenance Phase

| Aspect                    | Nigeria Legal Requirements       | World Bank Standards             | 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                             | 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 ENVIRONMENTAL CONDITION OF THE PROJECT AREA**

#### **4.1 Overview of Project Environment**

##### **4.1.1 Climate and Meteorology**

Ilorin experiences a tropical wet-and-dry climate characterized by distinct rainy and dry seasons, typical of the Guinea Savannah ecological zone of North Central Nigeria. The climate is influenced mainly by the interaction between the moist south-westerly maritime mass from the Atlantic Ocean and the dry north-easterly continental air mass originating from the Sahara Desert. The rainy season usually extends from April to October, while the dry season occurs between November and March. Annual rainfall in Ilorin generally ranges between 1,000 mm and 1,500 mm, with peak rainfall commonly occurring between July and September.

Temperatures in Ilorin are relatively high throughout the year, with mean daily temperatures typically ranging from about 25°C to 35°C. The hottest period is usually between February and April, just before the onset of the rainy season, while relatively cooler conditions are experienced during the rainy months and the Harmattan period in December and January. Relative humidity is generally high during the wet season, often exceeding 70%, but decreases considerably during the dry season due to the influence of the Harmattan winds. Wind patterns in the area are moderate, with south-westerly winds dominating during the rainy season and dry north-easterly winds prevailing during the Harmattan season.

The climatic conditions of Ilorin are generally favourable for agriculture, vegetation growth, and human habitation. However, seasonal variations in rainfall and temperature may influence environmental conditions such as surface runoff, erosion, dust generation, and ambient air quality. These climatic characteristics are therefore important considerations in project planning, design, construction, and operational activities within the area.

The relative humidity pattern in Ilorin is strongly influenced by the seasonal movement of moist maritime air masses and dry continental winds. Relative humidity is generally high during the rainy season, typically ranging between 75% and 88% from May to September due to increased rainfall and atmospheric moisture. The highest humidity levels are usually recorded in July and August. During the dry season, particularly between November and February, relative humidity decreases significantly as a result of the dry Harmattan winds from the Sahara Desert, with values sometimes falling below 40%. These seasonal variations influence local weather conditions, thermal comfort, vegetation growth, and environmental processes within the area.

Wind conditions in the State are influenced by seasonal atmospheric circulation. During the dry season, the north-easterly Harmattan winds dominate, often carrying dust particles that reduce visibility and increase atmospheric dryness. In the rainy season, moist south-westerly winds prevail and contribute to precipitation.

##### **4.1.2 The Local Geology**

The local geology of Ilorin is predominantly underlain by Precambrian Basement Complex rocks, which form part of the extensive Nigerian Basement Complex. The major rock types within the area include

granite gneiss, migmatite, quartzite, schist, and granitic intrusions. These rocks are generally hard, crystalline, and structurally stable, providing suitable foundation conditions for infrastructure and institutional development. In some areas, weathering of the basement rocks has resulted in the formation of lateritic soils and sandy clay deposits that overlie the bedrock.

The geological characteristics of Ilorin influence the area's soil properties, drainage conditions, groundwater occurrence, and topographic features. The weathered overburden and fractured basement rocks serve as important groundwater reservoirs, supporting borehole development and water supply within the area. In addition, the presence of lateritic materials makes portions of the area suitable for construction purposes such as road development and building foundations. However, erosion and surface runoff may occur in areas with exposed or poorly managed soils, especially during the rainy season.

#### **4.1.3 The Topography**

The topography of Ilorin is generally characterized by gently undulating plains with elevations ranging between approximately 250 m and 350 m above mean sea level. The terrain is predominantly flat to moderately sloping, with isolated hills and ridges occurring in some parts of the city and surrounding areas. The area falls within the transitional zone between the forest and savannah regions of Nigeria, resulting in a landscape that supports both scattered vegetation and open grassland.

Surface drainage in Ilorin is influenced by the natural topography, with runoff flowing through seasonal streams, drainage channels, and minor rivers during the rainy season. The relatively gentle slopes within most parts of the area favour urban development, agriculture, transportation, and infrastructure projects. However, localized erosion and surface runoff may occur in areas with disturbed soil surfaces or inadequate drainage systems, particularly during periods of intense rainfall.

#### **4.1.4 Project Location from Flood Level**

The project location at the University of Ilorin is situated within an area of relatively gentle topography and moderate elevation, which generally reduces the susceptibility of the site to severe flooding. The area is characterized by well-drained terrain with natural surface runoff pathways that convey stormwater during the rainy season. Based on field observations and the surrounding landform characteristics, the project site is not located within a major floodplain or along the immediate banks of any large river system. Consequently, the overall flood risk within the immediate project area is considered low to moderate.

### **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 <sub>x</sub>  | 0.04 – 0.06           | 0.08                 |
| SO <sub>2</sub>  | 0.01                  | -                    |
| NH <sub>3</sub>  | 0.28                  | -                    |
| PM <sub>10</sub> | -                     | 80 µg/m <sup>3</sup> |
| TSP              | 250 µg/m <sup>3</sup> | 80 µg/m <sup>3</sup> |

**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)<br>Day      | 55.7 – 68.2      | 63.4               | 55.1 – 67.2      | 68.0               | 90                       |
| SO <sub>x</sub>  | µg/m <sup>3</sup> | 0.01             | 0.01               | 0.01             | 0.01               | 26                       |
| NO <sub>x</sub>  | µg/m <sup>3</sup> | 0.01             | 0.01               | 0.01             | 0.01               | 75 – 113                 |
| SPM              | µg/m <sup>3</sup> | 39 – 58          | 35.8               | 28 – 39          | 35.2               | 250                      |
| VOC              | µg/m <sup>3</sup> | 0.01             | 0.01               | 0.01             | 0.01               | 60                       |
| CO               | µg/m <sup>3</sup> | 0.5 – 2.3        | 1.9                | 0.3 – 1.8        | 1.4                | 11.4                     |
| O <sub>3</sub>   | µg/m <sup>3</sup> | 10 – 18          | 7.0                | 1.8 – 3.2        | 0.9                | NA                       |
| CO <sub>2</sub>  | µg/m <sup>3</sup> | 130 – 270        | 102.6              | 108 – 109        | 90.82              | NA                       |
| H <sub>2</sub> S | µg/m <sup>3</sup> | 0.01             | 0.01               | 0.01             | 0.01               | 0.01                     |
| Air Temperature  | °C                | 35.5 – 38.8      | 34.6               | 34.5 – 37.8      | 33.7               | NA                       |
| Wind Speed       | m/s               | 0.1 – 1.0        | 0.21               | 0.6 – 1.6        | 1.2                | NA                       |
| Humidity         | %                 | 30 – 48          | 41.5               | 62 – 84          | 73.2               | NA                       |

*Field work 2026***Noise Level**

Noise levels during the dry season ranged from 55.7–68.2 dB(A), while the wet season recorded 55.1–67.2 dB(A). The dry season control value (63.4 dB(A)) was slightly lower than the wet season control value (68.0 dB(A)). Seasonal differences were minimal, indicating that noise generation was mainly associated with anthropogenic activities rather than climatic conditions. 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 |

### **Sulphur Oxides (SO<sub>x</sub>)**

SO<sub>x</sub> concentrations remained constant at 0.01 µg/m<sup>3</sup> across both seasons and control sites. This indicates negligible sulphur-related emissions in the area and no observable seasonal influence. The values were significantly below the FMENV limit of 26 µg/m<sup>3</sup>, implying minimal contribution from combustion sources containing sulphur compounds.

### **Nitrogen Oxides (NO<sub>x</sub>)**

NO<sub>x</sub> concentrations also remained uniform at 0.01 µg/m<sup>3</sup> during both seasons. The absence of seasonal variation suggests limited industrial or vehicular combustion activities capable of generating nitrogen oxides. Concentrations were far below the FMENV permissible range of 75–113 µg/m<sup>3</sup>.

### **Suspended Particulate Matter (SPM)**

SPM concentrations were noticeably higher during the dry season (39–58 µg/m<sup>3</sup>) compared to the wet season (28–39 µg/m<sup>3</sup>). This seasonal increase is expected because dry conditions promote dust suspension, soil particle resuspension, and reduced atmospheric washout. In contrast, rainfall during the wet season suppresses airborne particulates through wet deposition. Despite this variation, all values were below the FMENV limit of 250 µg/m<sup>3</sup>.

### **Volatile Organic Compounds (VOC)**

VOC concentrations remained constant at 0.01 µg/m<sup>3</sup> in both seasons and at control points, indicating very low organic pollutant emissions and no significant seasonal effect. The recorded concentrations were well below the FMENV limit of 60 µg/m<sup>3</sup>.

### **Carbon Monoxide (CO)**

CO concentrations showed slightly elevated levels during the dry season (0.5–2.3 µg/m<sup>3</sup>) relative to the wet season (0.3–1.8 µg/m<sup>3</sup>). Reduced atmospheric dispersion and increased combustion activities during the dry season may explain this trend. Wet season rainfall and improved atmospheric mixing likely contributed to lower concentrations. All values remained substantially below the FMENV limit of 11.4 µg/m<sup>3</sup>.

### **Ozone (O<sub>3</sub>)**

Ozone concentrations were significantly higher in the dry season (10–18 µg/m<sup>3</sup>) compared to the wet season (1.8–3.2 µg/m<sup>3</sup>). Higher solar radiation and elevated temperatures during the dry season enhance photochemical reactions responsible for ozone formation. The wet season's cloud cover and reduced sunlight intensity likely limited ozone production. No FMENV standard was provided for comparison.

### **Carbon Dioxide (CO<sub>2</sub>)**

CO<sub>2</sub> concentrations were considerably higher during the dry season (130–270 µg/m<sup>3</sup>) than during the wet season (108–109 µg/m<sup>3</sup>). This variation may be linked to reduced atmospheric dilution, higher temperatures, and increased anthropogenic activities in the dry season. The wet season's enhanced

vegetation activity and atmospheric mixing may contribute to lower concentrations. No FMENV limit was specified.

### **Hydrogen Sulphide (H<sub>2</sub>S)**

H<sub>2</sub>S concentrations remained constant at 0.01 µg/m<sup>3</sup> throughout both seasons and control sites. Since the values matched the FMENV limit (0.01 µg/m<sup>3</sup>), the area may require periodic monitoring to ensure concentrations do not exceed permissible thresholds, although no seasonal variation was observed.

### **Air Temperature**

Air temperatures were generally higher during the dry season (35.5–38.8°C) than in the wet season (34.5–37.8°C). This reflects the expected climatic pattern, where dry season conditions are characterized by intense solar radiation and reduced cloud cover. Lower wet season temperatures are attributable to rainfall and increased atmospheric moisture.

### **Wind Speed**

Wind speed was relatively low during the dry season (0.1–1.0 m/s) but increased during the wet season (0.6–1.6 m/s). Increased wind movement during the wet season may enhance pollutant dispersion and contribute to the lower concentrations of some air pollutants observed during this period.

### **Relative Humidity**

Relative humidity showed a clear seasonal difference, with lower dry season values (30–48%) and substantially higher wet season values (62–84%). This trend reflects the increased atmospheric moisture associated with rainfall during the wet season. Elevated humidity may also aid in reducing particulate matter concentrations through moisture-induced particle settling.

## **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 soil physicochemical characteristics showed clear variations between the dry and wet seasons as well as between sampled locations and control sites (see **Tables 4.4 – 4.6**). 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<br>(0–15 cm) | Dry Season<br>(15–30 cm) | Control Mean<br>(0–15 cm) | Control<br>Mean (15–30<br>cm) | Wet Season<br>(0–15 cm) | Wet Season<br>(15–30 cm) | Control<br>(0–15 cm) | Control (15–30 cm) |
|---------------------------------|-------|-------------------------|--------------------------|---------------------------|-------------------------------|-------------------------|--------------------------|----------------------|--------------------|
| pH                              | -     | 6.2 – 6.9               | 5.4 – 6.5                | 5.7                       | 5.4                           | 6.5 – 6.7               | 6.4 – 6.9                | 6.8                  | 6.5                |
| Electrical Conductivity<br>(EC) | μS/cm | 95 – 128                | 140 – 166                | 109                       | 106                           | 126 – 208               | 170 – 262                | 147                  | 187                |
| Temperature                     | °C    | 33.0 – 36.5             | 32.8 – 34.9              | 34.7                      | 33.9                          | 32.5 – 32.8             | 32.9 – 34.7              | 32.4                 | 32.8               |
| Nitrate                         | mg/kg | 0.25 – 0.68             | 0.10 – 0.51              | 0.21                      | 0.31                          | 0.15 – 1.24             | 0.10 – 1.40              | 0.92                 | 0.81               |
| Ammonia                         | mg/kg | 0.41 – 1.12             | 0.12 – 1.97              | 1.25                      | 1.16                          | 1.40 – 2.20             | 1.20 – 2.15              | 1.95                 | 1.76               |
| Phosphate                       | mg/kg | 1.2 – 3.4               | 2.8 – 5.7                | 3.2                       | 2.6                           | 3.6 – 6.4               | 5.6 – 4.15               | 2.2                  | 3.8                |
| Sulphate                        | mg/kg | 7.5 – 11.3              | 6.3 – 12.4               | 8.5                       | 11.8                          | 10.6 – 16.5             | 8.9 – 14.1               | 11.5                 | 10.8               |
| 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                  | 1.12               |
| Total Organic Carbon<br>(TOC)   | %     | 0.25 – 0.74             | 0.18 – 0.37              | 1.2                       | 0.06                          | 0.75 – 1.25             | 0.12 – 1.30              | 1.01                 | 0.16               |
| 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*

**Soil pH**

Soil pH during the dry season ranged from 6.2–6.9 at the surface layer (0–15 cm) and 5.4–6.5 at the subsurface layer (15–30 cm), while the wet season recorded slightly higher values of 6.5–6.7 and 6.4–6.9, respectively. The control values were generally comparable, though slightly lower in some dry-season subsurface soils. The results indicate that soils were generally slightly acidic to near neutral, which is favorable for nutrient availability and microbial activities.

**Electrical Conductivity (EC)**

Electrical conductivity values increased from the dry season to the wet season. Dry season values ranged from 95–128  $\mu\text{S}/\text{cm}$  (0–15 cm) and 140–166  $\mu\text{S}/\text{cm}$  (15–30 cm), whereas wet season values increased to 126–208  $\mu\text{S}/\text{cm}$  and 170–262  $\mu\text{S}/\text{cm}$ , respectively. Compared with the control, wet season soils exhibited relatively higher EC values, especially at subsurface depth.

**Soil Temperature**

Soil temperature was higher during the dry season (33.0–36.5°C) compared to the wet season (32.5–32.8°C) at the surface layer. Similar trends occurred at the subsurface depth. The elevated dry season temperature reflects intense solar radiation and low soil moisture, whereas wet season temperatures were moderated by rainfall and increased moisture retention.

**Nitrate**

Nitrate concentrations were relatively low in both seasons but showed higher variability during the wet season. Dry season concentrations ranged from 0.25–0.68 mg/kg (surface) and 0.10–0.51 mg/kg (subsurface), while wet season values increased to 0.15–1.24 mg/kg and 0.10–1.40 mg/kg, respectively.

**Ammonia**

Ammonia concentrations were higher during the wet season than in the dry season. Dry season values ranged from 0.41–1.12 mg/kg and 0.12–1.97 mg/kg, while wet season concentrations increased to 1.40–2.20 mg/kg and 1.20–2.15 mg/kg.

**Phosphate**

Phosphate concentrations showed clear seasonal enrichment during the wet season. Dry season concentrations ranged from 1.2–3.4 mg/kg at the surface and 2.8–5.7 mg/kg at depth, while wet season values increased to 3.6–6.4 mg/kg and approximately 4.15–5.6 mg/kg.

**Sulphate**

Sulphate concentrations were moderately higher during the wet season. Dry season values ranged from 7.5–11.3 mg/kg and 6.3–12.4 mg/kg, while wet season values increased to 10.6–16.5 mg/kg and 8.9–14.1 mg/kg.

**Chloride**

Chloride concentrations were generally low but slightly higher during the wet season. Dry season values ranged from 0.8–1.9 mg/kg and 1.0–2.5 mg/kg, whereas wet season values ranged from approximately 1.2–1.5 mg/kg and 1.0–1.8 mg/kg.

**Total Organic Carbon (TOC)**

TOC values were generally higher during the wet season. Dry season concentrations ranged from 0.25–0.74% at the surface and 0.18–0.37% at depth, while wet season values increased to 0.75–1.25% and 0.12–1.30%. The wet season increase suggests enhanced accumulation and decomposition of organic residues under moist conditions. Surface soils generally contain higher TOC than subsurface soils

because organic matter accumulates primarily in the upper soil horizon. Compared with the control, some sampled locations showed reduced TOC values, possibly due to organic matter degradation or anthropogenic disturbances.

### **Moisture Content**

Moisture content exhibited the most obvious seasonal variation. Dry season values ranged from 4.8–7.5% and 5.2–7.2%, while wet season values increased substantially to 6.5–12.2% and 1.1–15.6%. The significantly higher wet season moisture content reflects increased rainfall infiltration and water retention within the soil profile. Control soils also showed elevated moisture during the wet season, confirming the dominant influence of climatic conditions. Higher moisture availability during the wet season contributed to the observed increases in nutrient mobility and microbial activity.

**Table 4.5: Major Cations**

| Parameter | Unit  | Dry Season<br>(0–15 cm) | Dry Season<br>(15–30 cm) | Control Mean<br>(0–15 cm) | Control Mean<br>(15–30 cm) | Wet Season<br>(0–15 cm) | Wet Season<br>(15–30 cm) | Control (0–<br>15 cm) | Control (15–<br>30 cm) |
|-----------|-------|-------------------------|--------------------------|---------------------------|----------------------------|-------------------------|--------------------------|-----------------------|------------------------|
| Magnesium | mg/kg | 1.2 – 9.1               | 5.5 – 8.2                | 3.3                       | 32.1                       | 24.1 – 39.6             | 28.4 – 42.5              | 33.8                  | 36.4                   |
| Potassium | mg/kg | 1.1 – 2.5               | 2.6 – 5.1                | 3.2                       | 2.2                        | 2.8 – 3.7               | 2.5 – 4.8                | 5.7                   | 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                  | 15.9                   |

**Table 4.6: Heavy Metals**

| Parameter | Unit  | Dry Season<br>(0–15 cm) | Dry Season<br>(15–30 cm) | Control<br>Mean<br>(0–15<br>cm) | Control<br>Mean<br>(15–30<br>cm) | Wet Season (0–15 cm) | Wet Season<br>(15–30 cm) | Control (0–15<br>cm) | Control (15–30<br>cm) |
|-----------|-------|-------------------------|--------------------------|---------------------------------|----------------------------------|----------------------|--------------------------|----------------------|-----------------------|
| Copper    | mg/kg | 1.1 – 2.3               | 1.2 – 2.4                | 3.9                             | 4.8                              | 2.4 – 4.6            | 3.0 – 5.2                | 3.6                  | 4.1                   |
| Iron      | mg/kg | 105 – 152               | 112 – 145                | 133                             | 120                              | 140 – 215            | 175 – 208                | 118                  | 110                   |
| Lead      | mg/kg | 0.05 – 0.42             | 0.10 – 0.55              | 0.13                            | 0.11                             | 0.30 – 0.82          | 0.45 – 0.96              | 0.78                 | 0.91                  |
| Zinc      | mg/kg | 1.5 – 1.8               | 1.2 – 2.5                | 0.4                             | 1.4                              | 1.9 – 1.6            | 1.8 – 2.4                | 1.7                  | 1.3                   |
| Manganese | mg/kg | 0.4 – 1.5               | 0.7 – 1.8                | 1.3                             | 1.0                              | 1.2 – 2.7            | 1.6 – 3.1                | 2.4                  | 2.8                   |

## Cations

The concentrations of exchangeable cations showed clear seasonal and depth-related variations across the study area. Magnesium concentrations during the dry season were relatively low, ranging from 1.2–9.1 mg/kg at the surface layer (0–15 cm) and 5.5–8.2 mg/kg at the subsurface layer (15–30 cm), compared with higher control values, especially at depth (32.1 mg/kg). During the wet season, magnesium concentrations increased substantially to 24.1–39.6 mg/kg and 28.4–42.5 mg/kg, closely matching the control values. The increase during the wet season may be attributed to enhanced mineral weathering, dissolution, and improved nutrient mobility due to rainfall infiltration.

Potassium concentrations were generally low in both seasons, with dry season values ranging from 1.1–2.5 mg/kg at the surface and 2.6–5.1 mg/kg at depth. Wet season concentrations showed slight improvement, ranging from 2.8–3.7 mg/kg and 2.5–4.8 mg/kg, respectively. However, the control soils recorded comparatively higher potassium levels, particularly in the surface soil during the wet season (5.7 mg/kg). The relatively lower potassium concentrations in sampled soils may indicate nutrient uptake by vegetation, leaching losses, or reduced potassium reserves within the soil matrix.

Sodium concentrations were higher during the wet season than in the dry season. Dry season values ranged from 5.7–10.9 mg/kg and 5.2–7.5 mg/kg, while wet season concentrations increased to 11.4–14.7 mg/kg and 12.9–18.7 mg/kg at the surface and subsurface layers, respectively. These wet season values were comparable to the control soils, which recorded 14.9 mg/kg and 15.9 mg/kg. The elevated sodium content during the wet season may be linked to increased dissolution and transport of soluble salts through rainfall and infiltration processes.

## Heavy Metals

Heavy metal concentrations showed slight seasonal variations, with generally higher values during the wet season than the dry season. Copper concentrations increased from 1.1–2.4 mg/kg in the dry season to 2.4–5.2 mg/kg in the wet season, approaching the control values. Iron was the most abundant metal, rising from 105–152 mg/kg and 112–145 mg/kg in the dry season to 140–215 mg/kg and 175–208 mg/kg during the wet season, indicating enhanced mobilization under wetter conditions.

Lead concentrations remained low in both seasons, though slightly higher values were recorded during the wet season (0.30–0.96 mg/kg) compared to the dry season (0.05–0.55 mg/kg). Zinc showed only minor seasonal variation, while manganese increased noticeably from the dry season (0.4–1.8 mg/kg) to the wet season (1.2–3.1 mg/kg).

## 4.3 Vegetation Studies

The vegetation around the University of Ilorin is predominantly characteristic of the Guinea savanna ecological zone of Nigeria. The area is mainly composed of tall grasses interspersed with scattered trees and shrubs, reflecting a tropical savanna vegetation type (see **Table 4.7**). Common tree species identified on the university campus include *Daniellia oliveri*, *Gmelina arborea*, *Azadirachta indica* (Neem), and other indigenous and exotic species adapted to the savanna environment.

Studies conducted within the university campus recorded considerable plant diversity, with about 54 tree species and 2,468 individual trees identified across different sections of the campus. *Daniellia oliveri* was reported as the dominant species, followed by *Gmelina arborea*. The vegetation serves important ecological functions such as erosion control, carbon sequestration, microclimatic regulation, aesthetic enhancement, and biodiversity conservation within the campus environment.

In terms of conservation status, the vegetation of the university area can be described as moderately disturbed but relatively conserved due to ongoing landscaping and tree management practices. However, pressures from urban expansion, infrastructural development, deforestation, bush burning, and human activities pose threats to native plant diversity. Conservation efforts within the university include tree planting, landscaping programs, periodic vegetation inventory, and environmental awareness initiatives aimed at sustaining biodiversity. Researchers have recommended continuous monitoring, afforestation, and stakeholder participation to improve long-term conservation of the campus vegetation resources.

The Dogoyaro tree is the common Nigerian name for *Azadirachta indica*, widely known as the Neem tree. It is a fast-growing evergreen tree commonly found across northern and southwestern Nigeria, including in Ilorin and around the University of Ilorin campus

**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 exhibited typical Guinea savanna ecological characteristics, with the presence of grasses, shrubs, and scattered trees adapted to tropical climatic conditions (see **Table 4.8**). Vegetation growth was more pronounced during the wet season due to increased soil moisture and nutrient availability, while the dry season was characterized by reduced plant vigor and higher temperatures. Soil conditions were generally suitable for plant and microbial activities, supporting nutrient cycling and ecological productivity. Moderate human activities such as construction, farming, bush burning, and waste disposal were observed and may contribute to habitat disturbance, soil degradation, and biodiversity loss. However, the presence of birds, insects, and other small fauna indicates that the ecosystem still maintains some level of ecological balance. Tree planting and landscaping activities within the area also suggest ongoing efforts toward environmental conservation and sustainability.

**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 the University of Ilorin reflects the Guinea savanna ecosystem, supporting small mammals, reptiles, birds, and insects adapted to tropical savanna conditions (see **Table 4.9**). Most species are currently classified as Least Concern, indicating relatively stable populations. However, species such as the straw-colored fruit bat and African rock python face increasing pressure from habitat loss, urban expansion, hunting, and human disturbance. Continued habitat protection, tree planting, and reduction of bush burning and indiscriminate land clearing are important for maintaining biodiversity within the university 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**

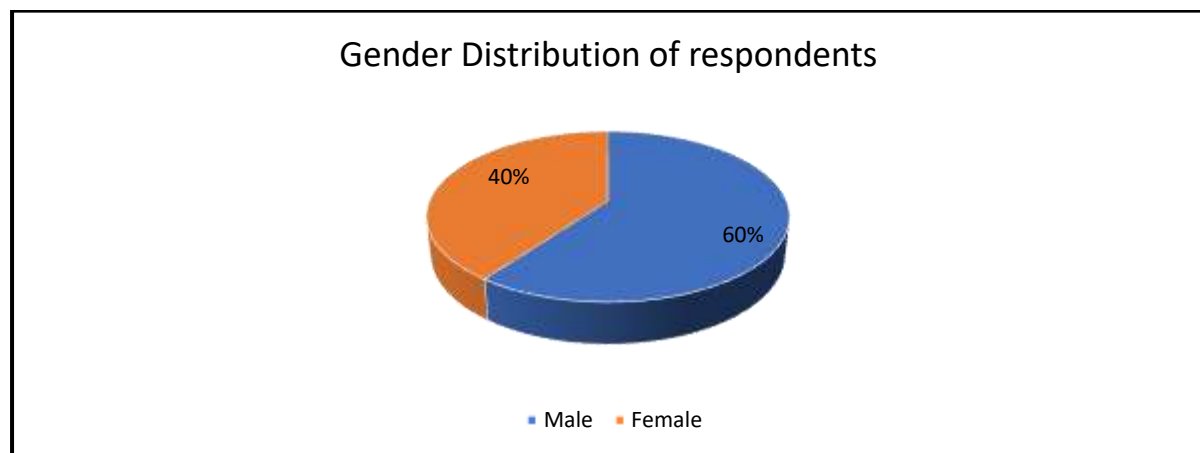
This chapter presents the results and analysis of the survey questionnaire conducted as part of the Environmental and Social Impact Assessment (ESMP) for the proposed hybrid solar power plant. A total of 40 respondents completed and submitted the questionnaire, providing comprehensive information on 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 University of Ilorin 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.



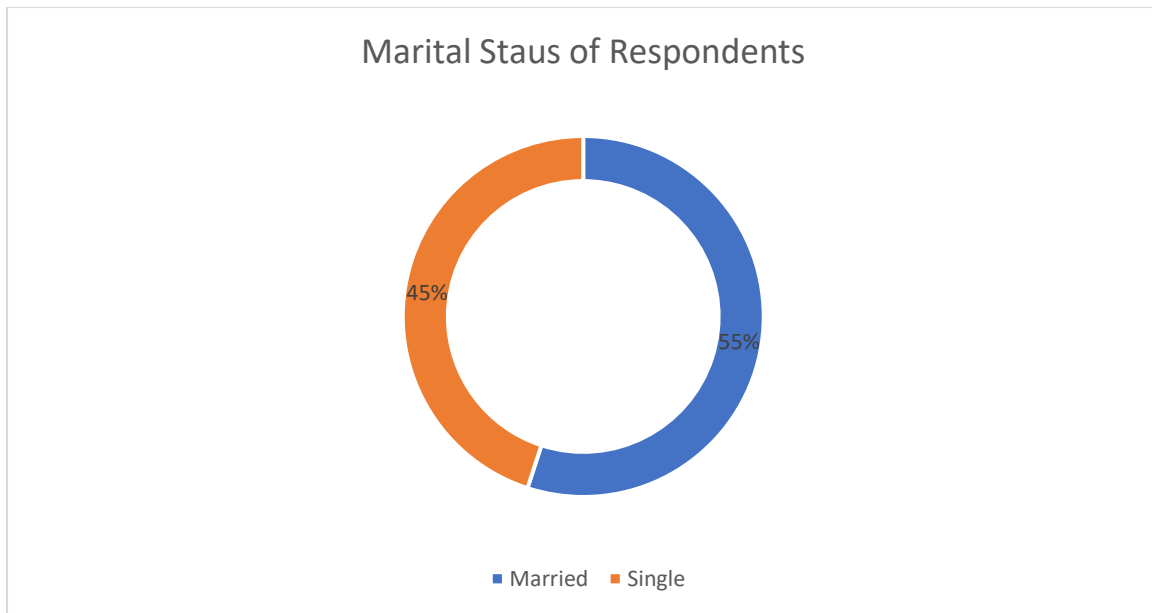
**Figure 4.1: Gender Distribution in the Study Area**

##### Age Distribution

The age distribution shows that the majority of respondents (65%) fall within the 18-45 years age bracket, representing 26 individuals. This is followed by 30% in the 46-65 years category (12 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

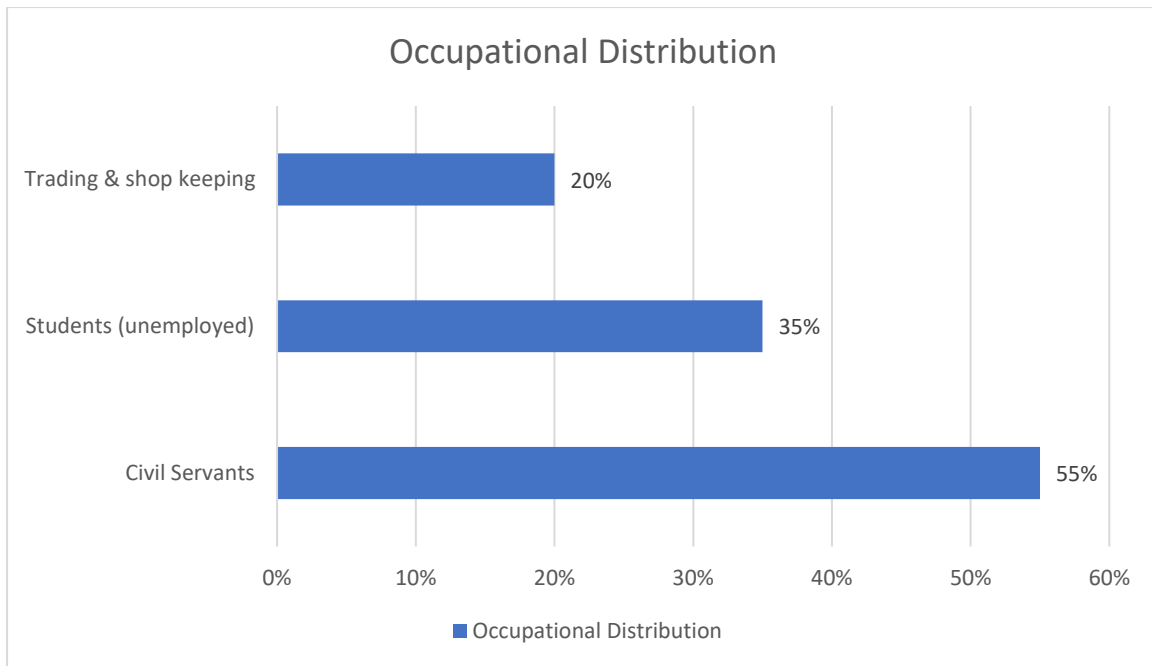
The study population showed that 55% of the respondents were married, the single population represented 45% while no respondent indicated divorce or widowed as their marital status (see **Figure 4.2**). A significant population of the students were single as expected of undergraduate, while the married population were predominantly staff and business operators within the university community.



**Figure 4.2: Depicts the Marital Status of Respondents**

#### **4.4.2 Occupation Distribution**

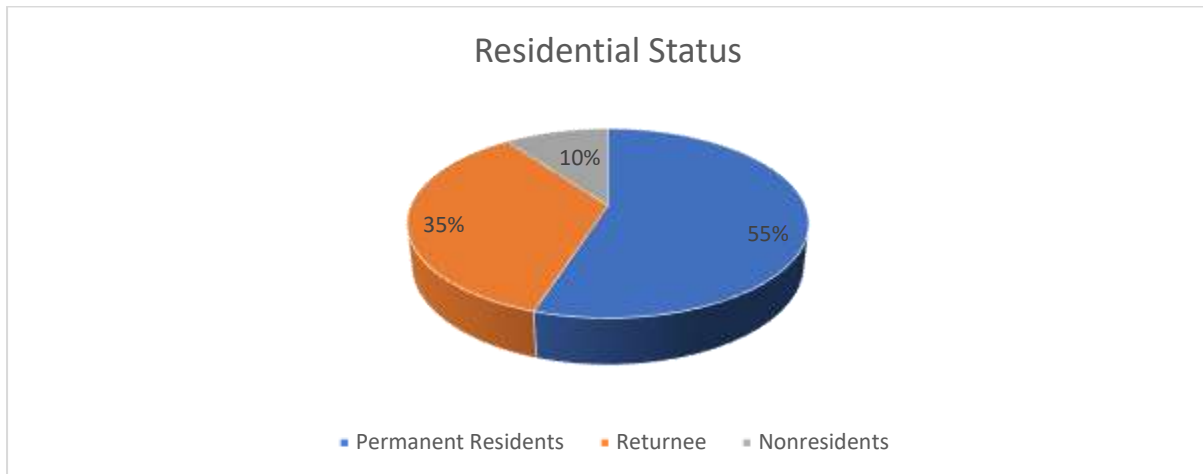
The occupational distribution in a university community is highly specialized, dominated by professional, educational, and service-oriented roles, while also featuring a large, temporary, and often part-time student workforce. These communities typically consist of a high concentration of knowledge-based occupations, with a mix of academic, administrative, and support staff, as well as businesses serving the student population. The occupational distribution of the study population showed that the Civil servants constitute 45% (18 respondents), Students accounted for 35% (14 respondents), while trading and shopkeeping represents 20% (8 respondent). This occupational distribution indicated a mixed occupational distribution typical of a university system (**Figure 4.3**). The Civil Servants comprised of both academic and non-academic staff of the University, while the students were unemployed.



**Figure. 4.3: Occupational Distribution of the Study Area**

#### 4.4.3 Residential Status

The majority of respondents (55%) are permanent residents, indicating strong community ties and long-term investment in the area. Returnees constitute 35% of the population, while only 10% are non-residents (see **Figure 4.4**). This residential pattern suggests a stable community with established roots in the area.



**Figure 4.4: Residential Status of Respondents**

#### 4.4.4 Ethnic Group Distribution

The primary ethnic group in Ilorin and the surrounding Kwara State is Yoruba, making it the dominant local culture within the university community. The ethnic composition shows significant diversity, with

Hausa-Yoruba representing the largest group representing 70%, Hausa-Fulani represent 15% Ibos represent 10%, among others.

#### 4.4.5 Religious Distribution

Ilorin is a predominantly Muslim, culturally rich city in Nigeria often described as *Ilu Alfa* (City of Scholars), characterized by a strong, deeply rooted Islamic heritage alongside a significant, minority Christian population. Islam is practiced by 65% of respondents (26 respondents), while Christianity is practiced by 35% (14 respondents). No respondents indicated adherence to traditional religion. This religious composition is reflective of the demographic patterns in Kwara State, which is predominantly Muslim.

#### 4.4.6 Relationship to Household Head

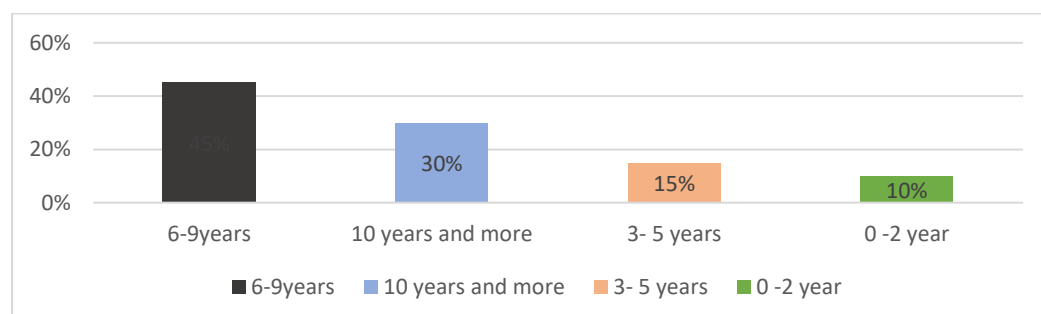
Relationship to household head defines a person's familial or functional connection to the primary decision-maker/breadwinner in a household. The relationship with the head of household is such that 45% of the respondents were the actual household head, 20% are spouses of the household head, 35% are 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 Ilorin, Kwara 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, as shown in **Figure 4.5** indicates 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**

Educational attainment is notably high among respondents. University graduates represent 65%, university postgraduates 25%, while secondary school 10%. No respondents indicated having no formal education or only primary school education. 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**

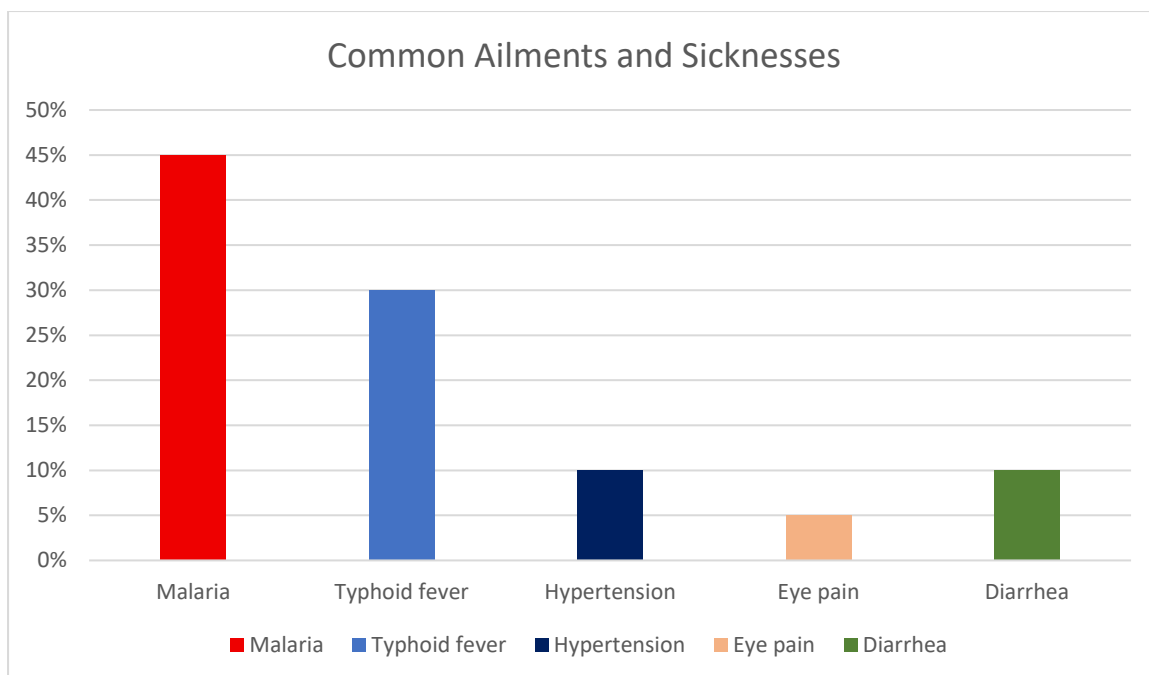
An overwhelming majority of respondents (90%) indicated that they attend hospitals or clinics when sick, demonstrating good health-seeking behavior. Only 10% reported buying drugs from nearby chemists without professional consultation. This pattern suggests adequate awareness of the importance of professional medical care and likely indicates reasonable access to healthcare facilities.

##### **4.5.2 Hospital/Clinic Visit Frequency**

The health care facilities that exist in the study area include the University of Ilorin 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 Sickness in the study area**

#### **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**

The most common house types within Ilorin are bungalows (ranging from 2-bedroom to 4-bedroom), which are popular for being easier to build and maintain. Other prevalent residential building types include blocks

#### **4.6.2 Housing Characteristics**

The most common house types within Ilorin are bungalows (ranging from 2-bedroom to 4-bedroom), which are popular for being easier to build and maintain. Other prevalent residential building types include blocks of flats (apartments), duplexes (fully detached and semi-detached), and terraced houses. However, the predominant housing type in the study areas were constructed with cement, blocks and plastered walls, indicating good quality housing infrastructure. The interior compartments each household consist of an average of 3-4 rooms, which represent 55%, while 1-2 rooms households

represent 35%. Majority of the students occupies single room hostel apartments on campus while others share 2-bedroom apartments usually off campus.

#### **4.6.3 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.

#### **4.6.4 Housing and Land Tenure**

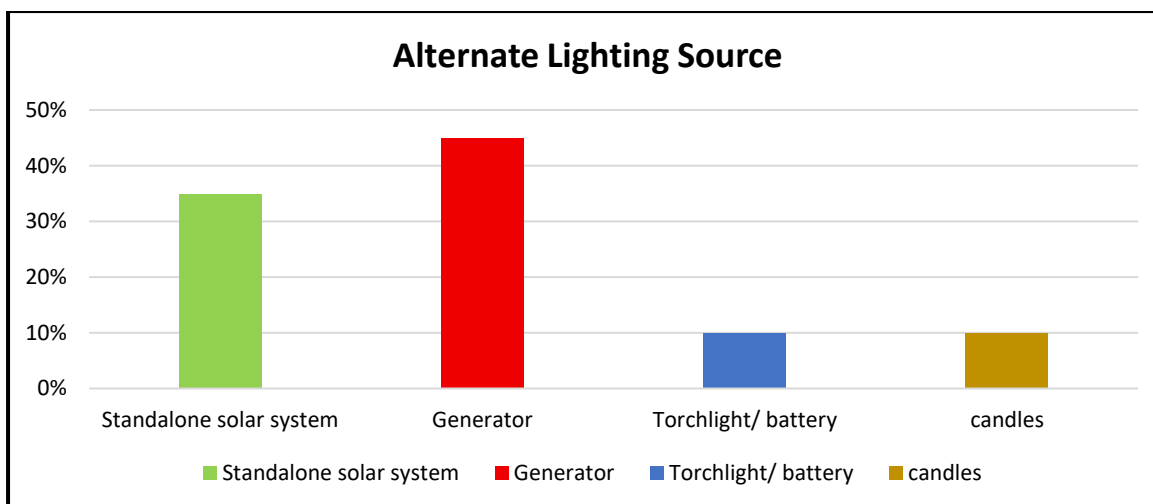
Housing tenure shows that 65% of respondents rented their accommodation while 25% own their homes while 10% did not indicate their housing tenure. The land tenure distribution mirrors this pattern exactly, with 65% renting and 25% owning land. This split between ownership and rental suggests a mixed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

#### **4.6.5 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, 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 represent 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 off 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.

#### **4.6.6 Source of Lighting**

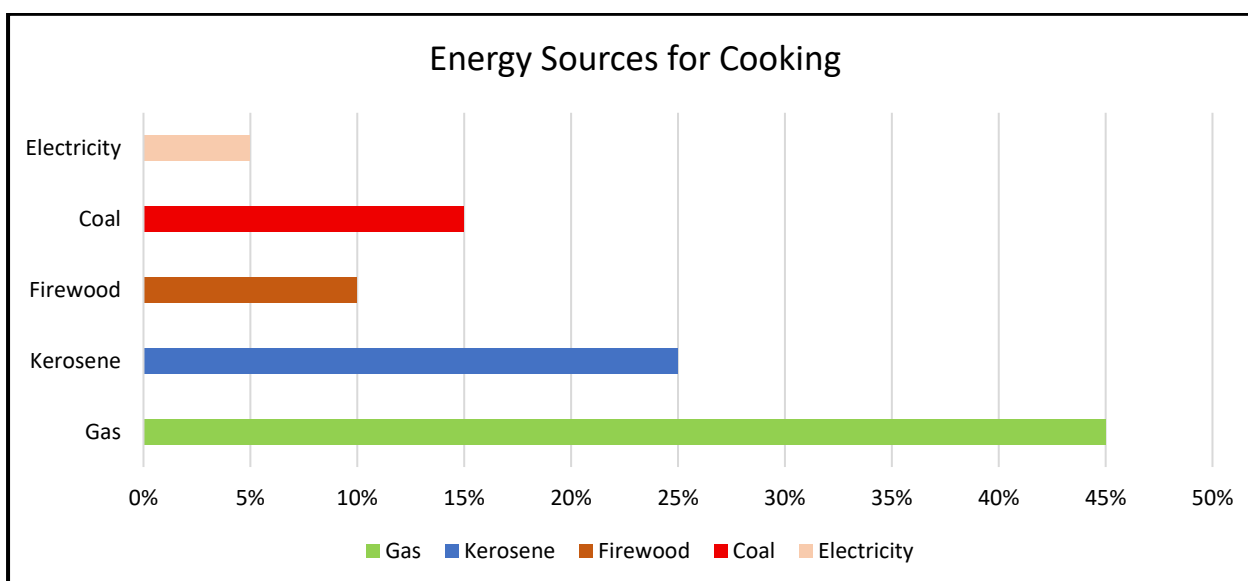
All respondents (100%) indicated access to electricity from the nation grid, through the Ibadan Distribution Company (IBDC), although the duration and quality of supply vary due to the Band scheme of IBDC which specify the number of hours of electricity available to users per day. Alternative lighting sources include torchlight/battery (10%), standalone Solar system (35%) candles (10%), and generators (45%) as shown in **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**

#### 4.6.7 Energy Sources for Cooking

The predominant energy for cooking is gas, which represent 45%, kerosene stove represents 25% and firewood represent 10%, Coal represents 15% while electricity users constitute 5% (see **Figure 4.8**). This heavy reliance on biomass fuels (coal and firewood) indicates significant potential for environmental impact and suggests that improved electricity access could lead to cleaner cooking practices.



**Figure 4.8: Energy Sources for Cooking**

#### 4.6.8 Income Distribution

Income distribution measures the spread of income across different groups (households, individuals, or income sources) within an economy, rather than just the average income. Unfortunately, 40% of the respondents refused to disclose their monthly income for personal reasons. However, 20% of the

respondents earn a monthly income of 200,000 only, 25% earns less than 150,000 monthly while 15% earn 100,000 and below. **Table 4.10** shows the income distribution of the study area

**Table 4.10: Income distribution of the study area**

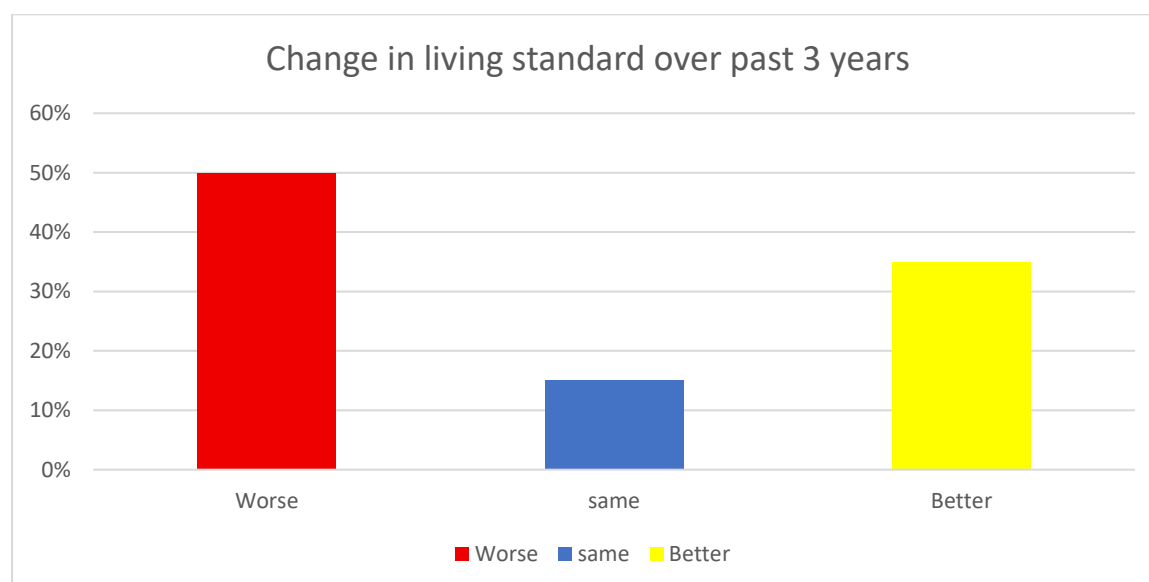
| S/No | Monthly income    | Percentage distribution |
|------|-------------------|-------------------------|
| 1    | 100,000 and below | 15%                     |
| 2    | 101,000 – 150,000 | 25%                     |
| 3    | 200,000 and above | 20%                     |
| 4    | Non-disclosure    | 40%                     |

#### 4.6.9 Remittances

Only 20% of respondents receive financial support from family members living elsewhere, with amounts ranging from N20,000-30,000 per month. The majority (80%) do not receive remittances, suggesting that most households are self-sufficient or primary income earners for their families.

#### 4.6.10 Changes in Standard of Living

When asked about changes in standard of living over the previous three years, 50% indicated that it had nosedive tremendously impacting livelihood negatively. 35% of the respondent reported marginal improvement (better), while 15% indicated similar situation (same). This mixed response suggests varying economic experiences within the community, which could be attributable to the earning opportunities peculiar to the different respondents. **Figure 4.9** depicts the change in standard of living over a period of 3 years.



**Figure 4.9: Change in living standard over past 3 years**

#### 4.6.11 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 90% of respondents, with 10% not responding. Among those who acknowledged prostitution criminalization, opinions varied on who bears criminal responsibility: 30% said the sex worker, 30% said the procurer and/or customer, 20% said both, and 20% did not respond. This data reflects the legal and social framework regarding these issues in the community.

### **4.7.3 Measures for Women's Safety**

Women in Ilorin face significant safety challenges in public spaces and transportation, driven by poorly maintained infrastructure, long wait times, and risks of harassment. Key issues include physical discomfort in crowded vehicles, verbal and physical abuse, and inadequate lighting at night, which particularly affect women. In the study area, the majority of respondents (60%) 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 40% had no idea.

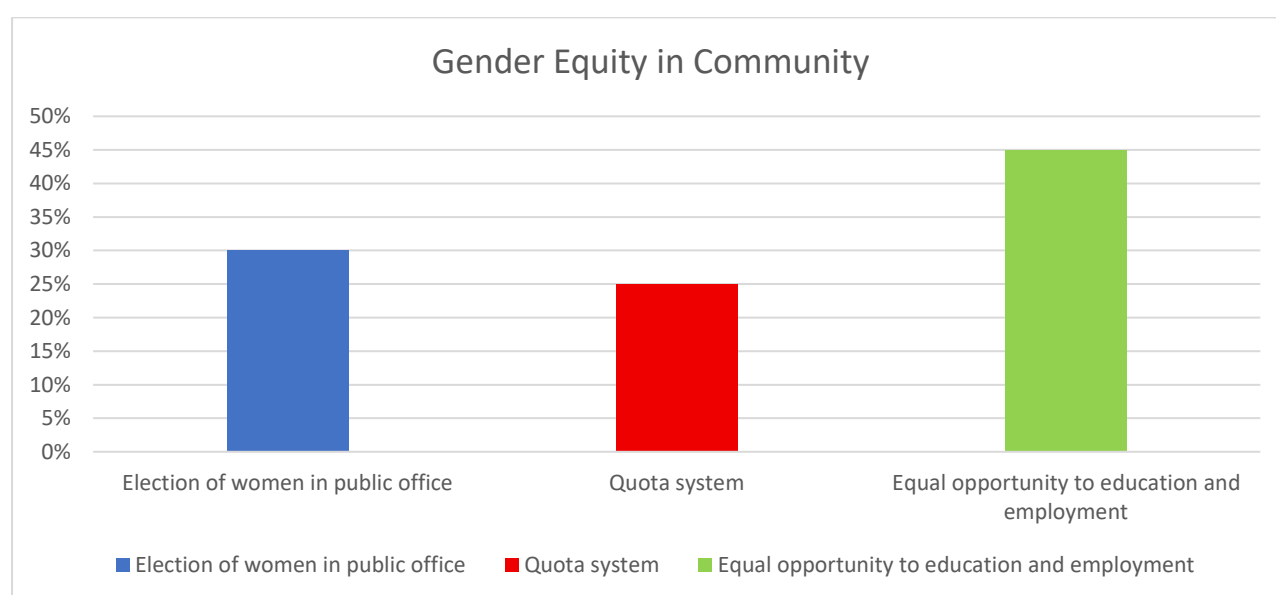
### **4.7.4 Training on Gender-Based Discrimination**

The university community developed its gender policy in 2019 and recently revised in 2024. The policy is geared toward preventing and responding to gender-based violence, such as sexual harassment and assault among others. 80% of respondents indicated that there are specific training programs for medical and legal professionals on gender-based discrimination in health and safety. While 20% were unaware of such training programmes.

### 4.7.5 Gender Equity in the Community

The Nigeria Constitutional Provisions (Section 42): Nigeria's Constitution 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 areas, gender equality is being promoted in line with the University Gender policy 2024.

When asked how gender equity is ensured, 30% of respondents indicated that Women are elected into public office, 25% indicated that quotas on genders are ensured in leadership of community-based organizations, while 45% of the respondent 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 4.10**.



**Figure 4.10: Gender Equity in Community**

### 4.7.6 Vulnerable Group

Vulnerable groups are individuals or populations who, due to certain conditions or circumstances, are at a higher risk of harm, discrimination, or exclusion from social, economic, educational, or health opportunities. They often need special protection, support, or attention in policies, institutions, and community programs to ensure fairness and inclusion. At a university level, vulnerable groups may include Students with disabilities, Students from extremely poor backgrounds, Female students facing gender-related challenges, international students or minorities, Students with mental health difficulties. Support mechanisms at universities typically include Scholarship or bursary programs, Counseling and health services, Inclusive education accommodations (e.g., assistive technology, extended exam time), Protective policies against harassment or discrimination among others. The Vulnerable groups within the University community primarily include students living with disabilities (PLWD) facing accessibility challenges, and economically disadvantaged individuals (urban poor) within the surrounding Ilorin metropolis. 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 urge 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 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.

The University developed and ratified its “Disability Policy, 2024” to help people with disabilities thrive within the university community, this policy seeks to guarantee that they have equal access to administrative, extracurricular, and educational opportunities as well as that the university complies with applicable local, national, and international disability rights laws. The policy is applicable to every visitor, employee, and student at the University of Ilorin.

#### **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 will not affect any valued resource, cultural, or archaeological property in their area. Rather, it will enhance the appeal of the community and its valued resources. This is consistent with the project being located on a virgin land belonging to the university that is not currently in use and has no known cultural or archaeological significance.

#### **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, 60% learned about it from colleagues in the Works Department, 30% 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 an individual (staff or student) has regarding: Academic issues (e.g., grading, supervision, examination results), Administrative matters (e.g., delays, misconduct). Workplace conditions (for staff) Harassment, discrimination, or unfair treatment. The Grievance Redress Mechanism (GRM) at the University of Ilorin provides a structured

process for students and staff to seek resolution when they encounter unfair treatment, academic issues, or administrative problems. The University ensures that the GRM is guided by: Fairness and impartiality, Confidentiality, Timeliness, Non-retaliation (no punishment for filing a genuine complaint) and documentation of every step for accountability.

## **Step-by-Step Process of Grievance Redress at UNILORIN**

### **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**

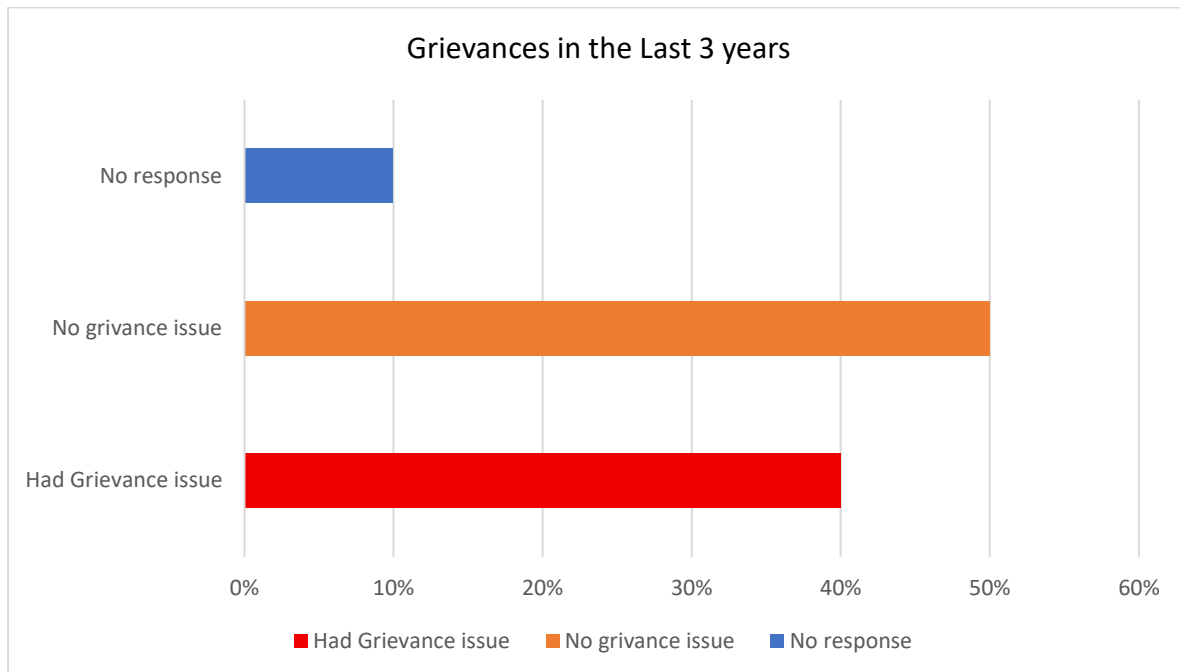
If internal mechanisms fail, the complainant may seek redress through external bodies such as the National Universities Commission (NUC), the Federal Ministry of Education Or, in exceptional cases, the courts.

The university environment like other communities 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 respondents did not indicate because they could not remember and did not want to give a misleading view on the question. This is shown in **Figure 4.11** below

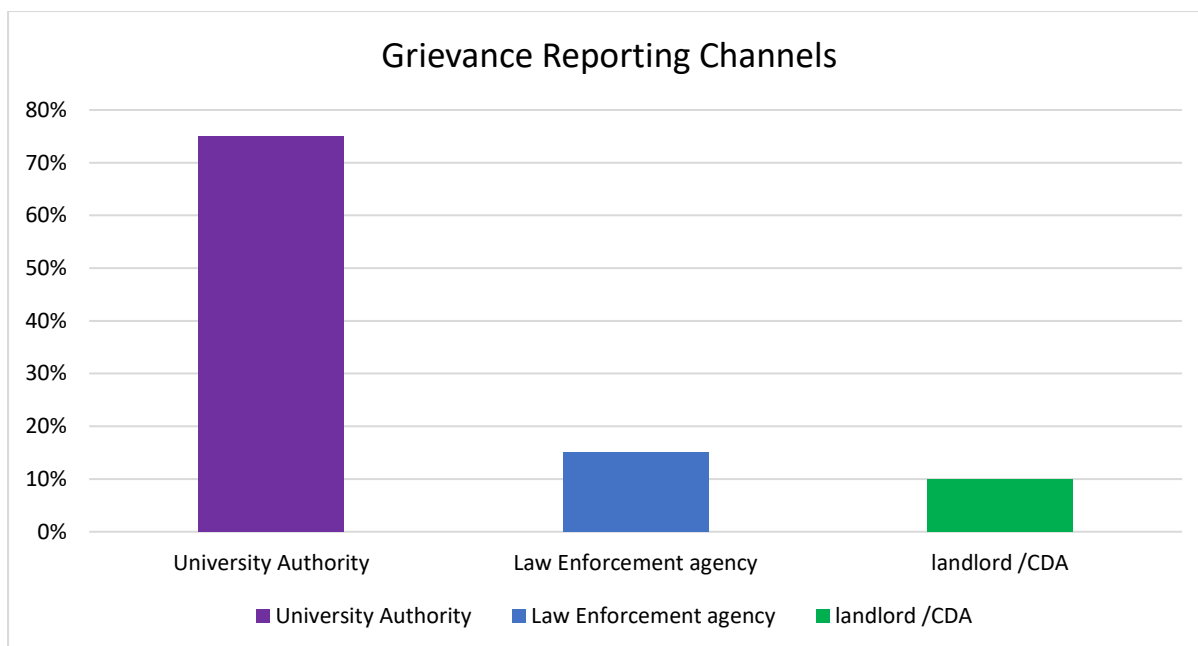


**Figure 4.11: Grievances in the last 3 years**

#### 4.10.2 Grievance Reporting Channels

The University of Ilorin 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.

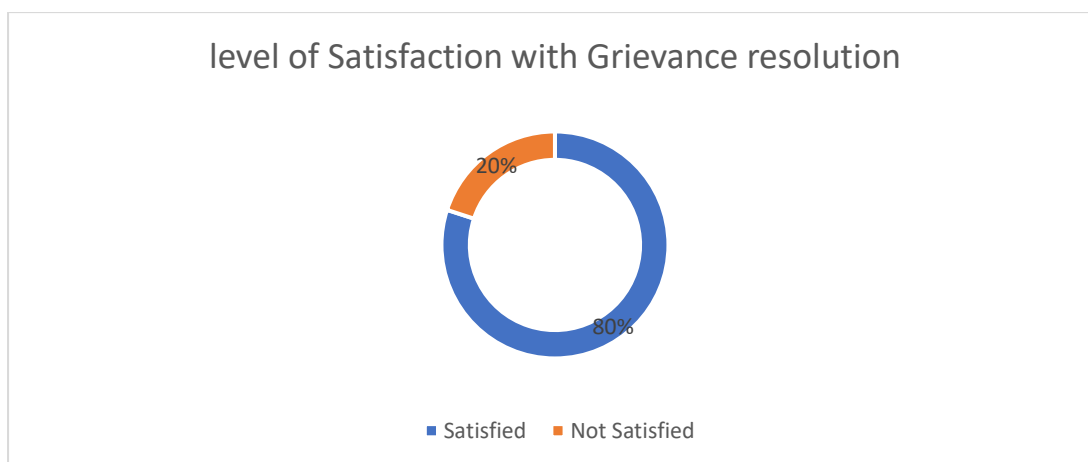
When asked where they would report grievances, 75% indicated they would approach the school authority/management, 10% would go to landlord/ CDA, and 15% would approach the law enforcement agency (see **Figure 4.12**). This distribution shows that the university administration is seen as the primary authority for addressing concerns, which is appropriate given the institutional context.



**Figure 4.12: 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 (see **Figure 4.13**). However, there are opportunities for improvement in the existing redress mechanism.



**Figure 4.13: Level of Satisfaction with Grievance Resolution**

#### 4.10.4 Specific Concerns About the Project

Concerns and fears about developmental projects are part of every developmental process. Concerns and fear stem from little knowledge about the project design, its impacts and scope among others. However, the beneficiaries of the proposed projects and respondents expressed specific concerns regarding the proposed intervention project, primarily focusing on the durability and proper

maintenance of the solar power plant. They emphasized the need for adequate security measures to protect against theft and vandalism. The age distribution shows that the majority of respondents (65%) fall within the 18-45 years age bracket, representing 26 individuals. This is followed by 30% in the 46-65 years category (12 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.

## **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 University of Ilorin and a section of Ilorin metropolis.

##### **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 works 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 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 | UNILORIN 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        | UNILORIN community          | Human health will be protected from pollution arising from the use of fossil fuels                                                                                                                                                                                                                                                                                             | Moderate     |
| Construction of renewable energy training centre                              | UNILORIN Community members. | Provide capacity development through learning renewable energy technologies and practices in the University and consequently, the                                                                                                                                                                                                                                              | Moderate     |

| Activity                                                                                                  | Receptor                          | Associated Impact                                                                                                      | Significance |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                                                                           |                                   | certification of trained individuals                                                                                   |              |
| The installation of streetlights                                                                          | UNILORIN 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 | UNILORIN 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 |
|--------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Pre-construction Phase</b>                                |                               |                                                                                                                                                                                                                            |              |
| Site Selection/land                                          | Existing crop farming on site | <ul style="list-style-type: none"> <li>Loss of land for farming activities due to land</li> <li>Take for the Project</li> </ul>                                                                                            | Moderate     |
| Site clearing and preparation                                | Terrestrial flora and fauna   | <ul style="list-style-type: none"> <li>Vegetation loss</li> <li>Direct impacts on vegetation and soil-dwelling organisms; indirect impacts on fauna species in the immediate surroundings of the Project site</li> </ul>   | Minor        |
|                                                              | Soil                          | <ul style="list-style-type: none"> <li>Loss of topsoil</li> <li>Soil compaction and degradation</li> <li>Increased erosion potential</li> <li>Reduction in structural stability and percolative ability of soil</li> </ul> | Minor        |
|                                                              | Air Quality and Noise         | <ul style="list-style-type: none"> <li>Air quality impacts due to emissions from site clearing equipment</li> <li>Increase in ambient noise levels</li> </ul>                                                              | Minor        |
|                                                              | Workers Safety                | <ul style="list-style-type: none"> <li>Injuries and accidents to workers during site clearing and preparation.</li> </ul>                                                                                                  | Minor        |
| Mobilization of construction equipment and materials to site | Air Quality and Noise         | <ul style="list-style-type: none"> <li>Air quality impacts from vehicular emissions (TSP, NOx, CO, SOx)</li> <li>Increase in noise levels</li> </ul>                                                                       | Minor        |
|                                                              | Infrastructure (road)         | <ul style="list-style-type: none"> <li>Increase in vehicular movement and traffic including potential for road accident</li> </ul>                                                                                         | Minor        |

| Activity                                             | Receptor                                   | Associated Impact                                                                                                                                                                                                                                    | Significance |
|------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                                                      | Workers Safety                             | • Injuries and accidents to workers during loading and offloading of construction materials.                                                                                                                                                         | Minor        |
| <b>Construction Phase</b>                            |                                            |                                                                                                                                                                                                                                                      |              |
| Movement of Equipment, Personnel and Plant Materials | Air Quality                                | <ul style="list-style-type: none"> <li>• Vehicular emissions (CO, SO<sub>2</sub>, NO<sub>2</sub>) from exhaust</li> <li>• Contribution to global warming and ozone layer depletion</li> <li>• Dust emissions from construction activities</li> </ul> | 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                                | <ul style="list-style-type: none"> <li>• Emissions from construction equipment (SPM, NO<sub>x</sub>, CO, SO<sub>x</sub>)</li> <li>• Dust from land clearing and stockpiles</li> </ul>                                                                | Minor        |
|                                                      | Ambient Noise                              | • Increased noise levels from construction activities                                                                                                                                                                                                | Minor        |
|                                                      | Soil                                       | <ul style="list-style-type: none"> <li>• Increased erosion from excavation</li> <li>• Reduced soil stability and permeability due to compaction</li> </ul>                                                                                           | Moderate     |
|                                                      | Terrestrial Flora and Fauna                | <ul style="list-style-type: none"> <li>• Loss of plant species due to invasive species</li> <li>• Loss of fauna due to human activity and noise</li> </ul>                                                                                           | Minor        |
|                                                      | Groundwater                                | <ul style="list-style-type: none"> <li>• Depletion of groundwater from abstraction (e.g., concrete mixing, washing)</li> <li>• Increased sediment load from erosion</li> <li>• Increased runoff and drainage formation from hard surfaces</li> </ul> | 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        |
| <b>Commissioning Phase</b>                           |                                            |                                                                                                                                                                                                                                                      |              |
| 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   |
| <b>Operational Phase</b>                             |                                            |                                                                                                                                                                                                                                                      |              |
| Power Generation and Distribution                    | Noise                                      | • Noise from batteries and inverters during power generation and evacuation                                                                                                                                                                          | Negligible   |
|                                                      | Gender                                     | • Discrimination of women during employment                                                                                                                                                                                                          | Minor        |

| Activity                      | Receptor                                              | Associated Impact                                                                                                                                           | Significance |
|-------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                               |                                                       | • GBV (sexual harassment, assault, poor working conditions)                                                                                                 |              |
|                               | 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<br>• 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 AND 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.

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 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                              | location                        | Cost           |
|-------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------|----------------|
| <b>Pre-construction Phase</b> |                               |                                                                                                                                        |                                                                                                                                                                                           |                                             |                                 |                |
| 1                             | Site selection/Land           | Loss of land for farming activities                                                                                                    | REA shall:<br>• Engage affected communities through consultation and participation                                                                                                        | Director of Works and Physical Planning/PIU | Project site/affected community | 850,000        |
| 2                             | Site clearing and preparation | <ul style="list-style-type: none"> <li>Vegetation loss</li> <li>Direct and indirect impacts on flora and fauna</li> </ul>              | REA shall:<br>i. Minimize clearing footprint<br>ii. Conduct pre-clearance ecological surveys<br>iii. Avoid clearing during breeding seasons<br>iv. Implement biodiversity management plan | Site Engineer                               | Project footprint               | 1,275,000      |
|                               |                               | <ul style="list-style-type: none"> <li>Loss of topsoil</li> <li>Soil compaction and erosion</li> <li>Reduced soil stability</li> </ul> | REA shall:<br>• Strip and store topsoil<br>• Restrict heavy machinery movement<br>• Implement erosion control (mulching, silt fences)<br>• Progressive restoration                        | Site Engineer                               | Site clearing areas             | 1,020,000      |
|                               |                               | <ul style="list-style-type: none"> <li>Air emissions from equipment</li> <li>Increased noise levels</li> </ul>                         | REA shall:<br>• Maintain machinery regularly<br>• Apply dust suppression (water spraying)<br>• Limit work to daytime<br>• Provide PPE for noise protection                                | Site Engineer                               | Project site                    | <b>765,000</b> |
|                               |                               | Injuries and accidents                                                                                                                 | REA shall:<br>• Implement OHS procedures (ILO standards)<br>• Provide PPE<br>• Conduct safety training/toolbox talks                                                                      | HSE                                         | Project site                    | 1,360,000      |

| No                        | Project Activities                                 | Potential Environmental and Social Impacts                                                                                             | Proposed Mitigation Measures/Actions                                                                                                                                                                                                            | Responsibility                        | location                        | Cost      |
|---------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------------------|-----------|
|                           |                                                    |                                                                                                                                        | • Enforce supervision                                                                                                                                                                                                                           |                                       |                                 |           |
| 3                         | Mobilization of Construction Equipment & Materials | <ul style="list-style-type: none"> <li>• Vehicular emissions (TSP, NOx, CO, SOx)</li> <li>• Increased noise levels</li> </ul>          | REA shall: <ul style="list-style-type: none"> <li>• Maintain vehicles to emission standards</li> <li>• Optimize logistics</li> <li>• Enforce speed limits and reduce idling</li> <li>• Use low-sulfur fuels</li> </ul>                          | Site engineer                         | Access roads/project site       | 850,000   |
| <b>Construction Phase</b> |                                                    |                                                                                                                                        |                                                                                                                                                                                                                                                 |                                       |                                 |           |
| 1                         | Movement of Equipment, Personnel & Materials       | <ul style="list-style-type: none"> <li>• Vehicular emissions (CO, SO<sub>2</sub>, NO<sub>2</sub>)</li> <li>• Dust emissions</li> </ul> | REA shall: <ul style="list-style-type: none"> <li>• Maintain vehicles regularly</li> <li>• Use low-sulfur fuels</li> <li>• Apply dust suppression (water spraying, covering trucks)</li> <li>• Limit idling and enforce speed limits</li> </ul> | Site Engineer                         | Access roads/project site       | 1,020,000 |
|                           |                                                    | <ul style="list-style-type: none"> <li>• Increased traffic and congestion</li> </ul>                                                   | REA shall: <ul style="list-style-type: none"> <li>• Implement Traffic Management Plan</li> <li>• Schedule deliveries off-peak</li> <li>• Use designated routes</li> <li>• Community awareness and signage</li> </ul>                            | Site Engineer/Traffic Control Officer | Access roads/nearby communities | 1,275,000 |
|                           |                                                    | <ul style="list-style-type: none"> <li>• Risk of accidents</li> </ul>                                                                  | REA shall: <ul style="list-style-type: none"> <li>• Train drivers</li> <li>• Enforce speed limits</li> <li>• Conduct vehicle inspections</li> <li>• Use traffic marshals and signage</li> </ul>                                                 | Site Engineer/HSE                     | Haulage/access routes           | 850,000   |

| No | Project Activities                      | Potential Environmental and Social Impacts                                                                              | Proposed Mitigation Measures/Actions                                                                                                                                                                                                                                                                                                                                        | Responsibility                                                                    | location                     | Cost      |
|----|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------|-----------|
| 2  | Civil & Electrical Works / Installation | <ul style="list-style-type: none"> <li>• Air emissions and dust generation</li> <li>• Increased noise levels</li> </ul> | REA shall: <ul style="list-style-type: none"> <li>• Maintain equipment</li> <li>• Apply dust suppression</li> <li>• Limit work during high winds</li> <li>• Provide PPE</li> </ul> REA shall: <ul style="list-style-type: none"> <li>• Restrict work to daytime</li> <li>• Use silencers</li> <li>• Provide hearing protection</li> <li>• Establish buffer zones</li> </ul> | Site Engineer                                                                     | Construction areas           | 1,275,000 |
|    |                                         | <ul style="list-style-type: none"> <li>• Soil erosion and compaction</li> </ul>                                         | REA shall: <ul style="list-style-type: none"> <li>• Install silt fences and drainage</li> <li>• Restrict machinery movement</li> <li>• Rehabilitate progressively</li> <li>• Proper grading</li> </ul>                                                                                                                                                                      | Site Engineer                                                                     | Civil works/excavation areas | 1,275,000 |
|    |                                         | <ul style="list-style-type: none"> <li>• Loss of flora and fauna</li> </ul>                                             | REA shall: <ul style="list-style-type: none"> <li>• Minimize clearing</li> <li>• Control invasive species</li> <li>• Restrict worker movement</li> <li>• Implement biodiversity plan</li> </ul>                                                                                                                                                                             | Site Engineer                                                                     | Project footprint            | 1,020,000 |
|    |                                         | <ul style="list-style-type: none"> <li>• Groundwater depletion and contamination</li> </ul>                             | REA shall: <ul style="list-style-type: none"> <li>• Use water efficiently</li> <li>• Monitor abstraction</li> <li>• Install sediment traps</li> <li>• Prevent contamination</li> </ul>                                                                                                                                                                                      | Site Engineer                                                                     | Project site/water points    | 850,000   |
|    |                                         | <ul style="list-style-type: none"> <li>• GBV and discrimination risks</li> </ul>                                        | REA shall: <ul style="list-style-type: none"> <li>• Implement Gender &amp; GBV Action Plans</li> <li>• Enforce code of conduct</li> <li>• Awareness training</li> <li>• Grievance mechanism</li> </ul>                                                                                                                                                                      | State Ministry of Women's Affairs & Social Development (GBV/SEA Service Provider) | Site/host community          | 1,700,000 |

| No                  | Project Activities | Potential Environmental and Social Impacts                                                      | Proposed Mitigation Measures/Actions                                                                                                                                                                                                                                      | Responsibility                    | location                 | Cost      |
|---------------------|--------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------------|-----------|
|                     |                    | • Spread of STDs                                                                                | REA shall: <ul style="list-style-type: none"><li>• Carry out Health awareness programs</li><li>• Provide testing access</li><li>• Enforce worker conduct</li><li>• Collaborate with health agencies</li></ul>                                                             | Director of Physical planning/PIU | Site/host community      | 1,020,000 |
|                     |                    | • Road damage and congestion                                                                    | REA shall: <ul style="list-style-type: none"><li>• Traffic management plan</li><li>• Maintain roads</li><li>• Control vehicle loads</li><li>•Coordinate with authorities</li></ul>                                                                                        | Site Engineer                     | Project access roads     | 1,700,000 |
|                     |                    | • Worker injuries and accidents                                                                 | REA shall: <ul style="list-style-type: none"><li>• Implement OHS system (ILO aligned)</li><li>• Provide PPE</li><li>• Conduct training</li><li>•Emergency preparedness</li></ul>                                                                                          | SITE Engineer/HSE                 | Construction site        | 2,040,000 |
| Commissioning Phase |                    |                                                                                                 |                                                                                                                                                                                                                                                                           |                                   |                          |           |
|                     | Plant Testing      | • Increase in ambient noise levels during testing activities                                    | REA shall: <ul style="list-style-type: none"><li>• Restrict testing to daytime hours</li><li>• Use well-maintained equipment with noise suppression features</li><li>• Notify nearby occupants in advance</li><li>• Provide hearing protection (PPE) to workers</li></ul> | Director of Physical planning/PMU | Testing/plant area       | 510,000   |
|                     |                    | • Occupational health and safety hazards (injuries, electrocution due to incorrect connections) | REA shall: <ul style="list-style-type: none"><li>• Implement electrical safety procedures (lockout/tagout)</li><li>• Use certified personnel only</li><li>• Provide PPE (insulated gloves, boots)</li></ul>                                                               | Site Engineer/HSE                 | Electrical installations | 1,020,000 |

| No                       | Project Activities              | Potential Environmental and Social Impacts                                                             | Proposed Mitigation Measures/Actions                                                                                                                                                                                                                                       | Responsibility                               | location                           | Cost      |
|--------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------------------------------|-----------|
|                          |                                 |                                                                                                        | <ul style="list-style-type: none"> <li>Conduct safety checks and supervision</li> <li>Ensure emergency response readiness</li> </ul>                                                                                                                                       |                                              |                                    |           |
|                          |                                 | • Risk of electrocution to campus occupants                                                            | REA shall: <ul style="list-style-type: none"> <li>Restrict access to testing areas</li> <li>Install warning signage and barriers</li> <li>Ensure proper grounding and insulation</li> <li>Supervise all testing activities</li> </ul>                                      | Site Engineer                                | Plant/site boundary                | 680,000   |
| <b>Operational Phase</b> |                                 |                                                                                                        |                                                                                                                                                                                                                                                                            |                                              |                                    |           |
| 1                        | Power Generation & Distribution | • Discrimination of women in employment<br>• GBV (sexual harassment, assault, poor working conditions) | REA shall: <ul style="list-style-type: none"> <li>Implement Gender Action Plan &amp; GBV prevention (World Bank aligned)</li> <li>Enforce equal opportunity employment</li> <li>Worker code of conduct &amp; training</li> <li>Confidential grievance mechanism</li> </ul> | PMU/Site Engineer                            | Plant/workplace                    | 1,020,000 |
|                          |                                 | • Electric shock and injuries<br>• Workplace discrimination                                            | REA shall: <ul style="list-style-type: none"> <li>Implement OHS system (ILO aligned)</li> <li>Install LOTO systems &amp; signage</li> <li>Provide PPE (insulated gloves, boots)</li> <li>Conduct training &amp; audits</li> <li>Enforce fair labor practices</li> </ul>    | PMU/Site Engineer/Director of Physical works | Generation/distribution facilities | 680,000   |
| 2                        | Routine Maintenance             | • Soil contamination from batteries and inverters                                                      | REA shall: <ul style="list-style-type: none"> <li>Store hazardous materials in sealed/labeled containers</li> <li>Implement hazardous waste plan</li> <li>Use certified waste handlers</li> <li>Install secondary containment &amp; spill response</li> </ul>              | PMU/Site Engineer                            | Battery/inverter area              | 1,700,000 |

| No                           | Project Activities               | Potential Environmental and Social Impacts                                                                      | Proposed Mitigation Measures/Actions                                                                                                                                                                                                     | Responsibility                          | location                 | Cost      |
|------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------|-----------|
|                              |                                  | <ul style="list-style-type: none"> <li>Groundwater use for panel cleaning</li> </ul>                            | REA shall: <ul style="list-style-type: none"> <li>Use water-efficient/dry-cleaning methods</li> <li>Harvest/reuse rainwater</li> <li>Monitor abstraction &amp; comply with permits</li> <li>Apply water conservation measures</li> </ul> | Site Engineer                           | Solar array/water source | 1,020,000 |
| 3                            | Waste Generation & Disposal      | <ul style="list-style-type: none"> <li>Electric shock and injuries during maintenance</li> </ul>                | REA shall: <ul style="list-style-type: none"> <li>Enforce LOTO procedures</li> <li>Provide PPE &amp; insulated tools</li> <li>Conduct competency-based training</li> <li>Routine inspection &amp; supervision</li> </ul>                 | Site Engineer                           | Operational facilities   | 680,000   |
| <b>Decommissioning Phase</b> |                                  |                                                                                                                 |                                                                                                                                                                                                                                          |                                         |                          |           |
| 1                            | Dismantling of Plant & Equipment | <ul style="list-style-type: none"> <li>Dust emissions</li> <li>Emissions from machinery and vehicles</li> </ul> | REA shall: <ul style="list-style-type: none"> <li>Apply dust suppression (water spraying)</li> <li>Use low-emission equipment</li> <li>Cover haulage trucks</li> <li>Limit idling</li> </ul>                                             | Director of Public Works/ Site Engineer | Decommissioning site     | 1,020,000 |
|                              |                                  | <ul style="list-style-type: none"> <li>Increased noise levels</li> </ul>                                        | REA shall: <ul style="list-style-type: none"> <li>Restrict daytime hours</li> <li>Use silencers</li> <li>Provide hearing PPE</li> <li>Notify nearby communities</li> </ul>                                                               | Director of Public Works/ Site Engineer | Plant/nearby receptors   | 680,000   |
|                              |                                  | <ul style="list-style-type: none"> <li>Injuries and electrocution risks</li> </ul>                              | REA shall: <ul style="list-style-type: none"> <li>Implement OHS procedures (ILO aligned)</li> <li>Apply LOTO systems</li> <li>Provide PPE</li> <li>Use trained personnel</li> <li>Emergency preparedness</li> </ul>                      | Director of Public Works/ Site Engineer | Plant/electrical areas   | 1,700,000 |

| No | Project Activities                         | Potential Environmental and Social Impacts    | Proposed Mitigation Measures/Actions                                                                                                                | Responsibility                          | location                          | Cost      |
|----|--------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------------------|-----------|
| 2  | Removal of Foundations & Civil Works       | • Soil disturbance, erosion, compaction       | REA shall:<br>• Minimize excavation footprint<br>• Implement erosion controls<br>• Reinststate topsoil<br>• Progressive rehabilitation              | Director of Public Works/ Site Engineer | Former plant footprint            | 1,020,000 |
|    |                                            | • Groundwater contamination risks             | REA shall:<br>• Proper storage of fuels/chemicals<br>• Spill prevention & response plan<br>• Prevent contaminant discharge<br>• Regular inspections | Director of Public Works/ Site Engineer | Decommissioning area              | 680,000   |
| 3  | Waste Generation & Disposal                | • Soil & groundwater contamination from waste | REA shall:<br>• Implement waste management plan<br>• Use licensed contractors<br>• Secure hazardous waste storage<br>• Comply with regulations      | Director of Public Works/ Site Engineer | Site/approved disposal facilities | 1,360,000 |
|    |                                            | • Pressure on waste infrastructure            | REA shall:<br>• Coordinate with approved facilities<br>• Schedule transport efficiently<br>• Promote recycling and recovery                         | Director of Public Works/ Site Engineer | Approved waste facilities         | 1,700,000 |
| 4  | Transportation of Decommissioned Materials | • Emissions and noise from vehicles           | REA shall:<br>• Maintain vehicles<br>• Optimize logistics<br>• Enforce speed limits<br>• Use designated routes                                      | Director of Public Works/ Site Engineer | Haulage routes                    | 2,550,000 |
|    |                                            | • Traffic congestion and road safety risks    | REA shall:<br>• Traffic Management Plan<br>• Trained drivers & signage<br>• Off-peak scheduling<br>• Repair road damage                             | Director of Public Works/ Site Engineer | Access/public roads               | 1,275,000 |
|    |                                            | • Community accident risks                    | REA shall:<br>• Community awareness programs                                                                                                        | Director of Public Works/ Site Engineer | Communities along haulage routes  | 1,020,000 |

| No | Project Activities                | Potential Environmental and Social Impacts | Proposed Mitigation Measures/Actions                                                                                                                                                                            | Responsibility                          | location                      | Cost      |
|----|-----------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------|-----------|
|    |                                   |                                            | <ul style="list-style-type: none"> <li>• Warning signs and barriers</li> <li>• Escort oversized loads</li> <li>• Enforce safety protocols</li> </ul>                                                            |                                         |                               |           |
| 5  | Site Restoration & Rehabilitation | • Habitat loss prior to restoration        | REA shall: <ul style="list-style-type: none"> <li>• Re-vegetate with native species</li> <li>• Restore habitat conditions</li> <li>• Monitor ecological recovery</li> <li>• Prevent invasive species</li> </ul> | Director of Public Works/ Site Engineer | Entire disturbed project area | 2,550,000 |
|    |                                   | • Loss of employment post-closure          | REA shall: <ul style="list-style-type: none"> <li>• Worker transition programs</li> <li>• Skills training</li> <li>• Job placement support</li> <li>• Stakeholder engagement</li> </ul>                         | Director of Public Works/ Site Engineer | Workforce/host community      | 1,700,000 |

### 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 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/<br>Social Component | Monitoring Parameters                                                                                                                                                                                                                                                                                                                         | Monitoring Site                                                                                     | Frequency                                     | Responsibility<br>(Implementation/<br>Supervision)                                     | Cost Estimate/<br>Year (NGN) |
|-----|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------|------------------------------|
| 1.  | Soil impacts                       | <ul style="list-style-type: none"> <li>• Presence of habitats or vegetation at the site</li> </ul>                                                                                                                                                                                                                                            | Construction site                                                                                   | Daily<br>(throughout the construction period) | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant                  |                              |
| 2.  | Air quality/ Noise                 | <ul style="list-style-type: none"> <li>• Observation of air borne particulates (dust) and exhaust fumes</li> <li>• Records of dust level measurements (dust concentration should be below 150µg/m<sup>3</sup>)</li> <li>• Records of dampening of construction sites and routes for vehicles/trucks</li> <li>• Daily noise levels.</li> </ul> | <ul style="list-style-type: none"> <li>• Construction site</li> <li>• Immediate environs</li> </ul> | Daily<br>During Peak construction period      | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant                  | 500,000.00                   |
| 3.  | Vibration and noise nuisance       | <ul style="list-style-type: none"> <li>• Complaints on noise nuisance</li> </ul>                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Construction site</li> <li>• Immediate environs</li> </ul> | Daily (during construction)                   | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant                  |                              |
| 4.  | Visual Intrusion                   | <ul style="list-style-type: none"> <li>• Hoarding in place</li> <li>• Condition of areas around construction site</li> </ul>                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• Construction site</li> <li>• Immediate environs</li> </ul> | Daily (during construction)                   | PIU Safeguards Specialist, Project Contractor /Engineering consultant                  | No additional costs          |
| 5.  | Waste Management                   | <ul style="list-style-type: none"> <li>• Transportation for monitoring of the provision and use of bins in project area</li> <li>• Records on frequency and location of waste disposal site of domestic and construction waste</li> </ul>                                                                                                     | Construction site                                                                                   | Monthly (during construction)                 | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant, FMEnv, KWSMEnv, | 500,000.00                   |
| 6.  | Occupational Health and Safety     | <ul style="list-style-type: none"> <li>• Transportation for monitoring workers' awareness of Contractor's health and safety policy</li> <li>• Availability and proper use of PPEs</li> </ul>                                                                                                                                                  | Construction site                                                                                   | Daily (during construction)                   | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant                  |                              |

| No. | Environmental/<br>Social Component           | Monitoring Parameters                                                                                                                                                                                                                                                                                                                                                                    | Monitoring Site        | Frequency                    | Responsibility<br>(Implementation/<br>Supervision)                                                                       | Cost Estimate/<br>Year (NGN) |
|-----|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------|
|     |                                              | <ul style="list-style-type: none"> <li>• Availability and proper use of warning signs</li> <li>• Availability of first aid kit</li> <li>• Adherence to health and safety procedures</li> <li>• Records on frequency, type and source of illness/accident/injury</li> <li>• Records on non-compliances</li> <li>• Absence of unauthorized persons at active construction sites</li> </ul> |                        |                              |                                                                                                                          |                              |
| 7.  | Public safety and traffic issues             | <ul style="list-style-type: none"> <li>• Transportation for monitoring availability and proper use of warning signs</li> <li>• Hoarding of site</li> <li>• Use of caution tape around trenches/ excavations</li> <li>• Records on frequency, type and source of illness/accident/injury</li> <li>• Absence of unauthorized persons at active construction sites</li> </ul>               | Construction Site      | Daily (during construction)  | PIU Safeguards Specialist, Project Contractor/Engineering consultant                                                     | 150,000                      |
| 8.  | Sanitation issues, health and safety impacts | <ul style="list-style-type: none"> <li>• Availability and use of bins</li> <li>• Records on frequency and location of waste disposal site of domestic and construction waste</li> <li>• Mobile toilet facilities in place</li> <li>• Presence of stagnant water in trenches</li> </ul>                                                                                                   | Construction site      | Daily (during construction)  | PIU Safeguards Specialist, Project Contractor/ Engineering Consultant                                                    |                              |
| 9.  | Public Complaints/ Grievances Redress        | <p>Transportation for monitoring of Grievance Redress issues, which will include such elements as:</p> <ul style="list-style-type: none"> <li>• Lodging and registration of PAPs grievance by grievance redress committee;</li> </ul>                                                                                                                                                    | Project host community | Weekly (during construction) | KWMEEnv, PIU Safeguards Specialist, Project Contractor/ Engineering Consultant/school heads/medical director of hospital |                              |

| No.          | Environmental/<br>Social Component | Monitoring Parameters                                                                                                                                                                                                                                 | Monitoring Site                 | Frequency                    | Responsibility<br>(Implementation/<br>Supervision)                                                                                                   | Cost Estimate/<br>Year (NGN) |
|--------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
|              |                                    | <ul style="list-style-type: none"> <li>Redress decision, feedback and implementation;</li> <li>Dissatisfaction and alternative action; and</li> <li>Monitoring and evaluation</li> </ul>                                                              |                                 |                              |                                                                                                                                                      | 150,000.00                   |
| 10.          | Monitoring of Social Impacts       | <ul style="list-style-type: none"> <li>Transportation to monitor impacts such as, labor influx, GBV and SEA, VAC and STDs. Potential temporary physical or economic displacement, if any and provide</li> </ul>                                       | Project host Community          | Weekly (during construction) | KWMEEnv, PIU Safeguards Specialist, Project Contractor/Engineering Consultant/medical director of hospital, Community Liaison Officer/Health centers |                              |
| 11           | Routine Maintenance                | <ul style="list-style-type: none"> <li>Implementation of hazardous waste plan</li> <li>Implementation of Gender Action Plan and GBV prevention</li> <li>Worker code of conduct and training</li> <li>Provide PPE (insulated gloves, boots)</li> </ul> | Project site and host community | Quarterly (during operation) | PIU and PMU                                                                                                                                          | 350,000                      |
| <b>TOTAL</b> |                                    |                                                                                                                                                                                                                                                       |                                 |                              |                                                                                                                                                      | <b>1,650,000.00</b>          |

**Table 6.3: Specific Environmental Monitoring Plan**

| Impact Parameter    | Project Phase                                                    | Impact Indicator | FMEnv Limits  | Sampling Location                           | Sampling Frequency                                                       | Sampling Method     | Monitoring Duration | Monitoring Personnel                |
|---------------------|------------------------------------------------------------------|------------------|---------------|---------------------------------------------|--------------------------------------------------------------------------|---------------------|---------------------|-------------------------------------|
| Ambient Air Quality | Site preparation, Construction and Operation and decommissioning | TSP              | 600µg/m³      | Receiving air - upwind and downwind of site | Daily, during site preparation, construction; Quarterly during operation | Air Sampler         | Short-term          | PMU-REA Contractor KWMEnv and FMEnv |
|                     |                                                                  | NO₂              | 100 µg/m³     |                                             |                                                                          |                     | Long-term           |                                     |
|                     |                                                                  | SO₂              | 300 µg/m³     |                                             |                                                                          |                     |                     |                                     |
|                     |                                                                  | 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                  |

| Impact Parameter | Project Phase                      | Impact Indicator                                                                    | FMEnv Limits                                   | Sampling Location                    | Sampling Frequency                                          | Sampling Method                                    | Monitoring Duration | Monitoring Personnel                    |
|------------------|------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------|-------------------------------------------------------------|----------------------------------------------------|---------------------|-----------------------------------------|
|                  |                                    |                                                                                     |                                                |                                      |                                                             |                                                    |                     | KWMEEnv and FMEnv                       |
| Soil             | Site Preparation and construction. | Particle Size, TOC, Oil and Grease Heavy Metals, Nutrients,                         | As specified in FMEnv Guidelines               | Within and around construction area. | Once, before and after construction                         | Visual Inspection and Soil auger                   | Short-term          | PIU-REA Contractor KWMEEnv & FMEnv      |
| Socio-economics  | Construction stage                 | Absence of Contractor/community conflict, increase/ decrease in economic activities | National/ World Bank guidelines and procedures | Host UNILORIN community              | Monthly during construction                                 | Socio-economic survey, observations and interviews | Short term          | PIU-NUWSRP3 Contractor KWSMEnv, & FMEnv |
| Health           | Construction and operation         | Presence/ absence of alien diseases                                                 | National health survey guidelines              | Host UNILORIN community              | Monthly at construction and bi-annually at operation stages | Interview and medical examinations and records     | Long term           | PIU-REA KWMEEnv                         |

#### 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 shall 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 the ESMP issues and any health and safety issues identified in the course of the month. Non-compliances identified during monitoring should reviewed and corrective actions taken. The capacity building plan proposed to achieve this is provided in **Table 6.3**.

**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 (ESM) (ESMP, safeguards, monitoring, reporting) | PMU, Environmental & Social Safeguard Officers | 3 days (annually) | Consultant / PMU     | 4,500    |
| 2.  | ESMP Implementation Training (mitigation measures, roles & responsibilities, monitoring procedures)       | Project Team (PMU, Site Engineer, Supervisors) | 3 Days (annually) | Consultant / PMU     | 1,500    |

| No.          | Activity                                                                                                    | Target Group/Participants                                     | Timeline/Duration  | Proposed Facilitator               | Cost USD      |
|--------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------|------------------------------------|---------------|
| 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/Traffic Specialist / PMU | 1,200         |
| 5            | GBV/SEA/SH Prevention & Response Training (Code of Conduct, reporting channels, survivor-centered approach) | Project Team, Safeguard Officers, Contractors                 | 3Days (biannually) | GBV Specialist / Consultant / PMU  | 2,500         |
| 6            | Grievance Redress Mechanism (GRM) Training (complaint handling, documentation, resolution process)          | GRC Members (project & management levels), PMU                | 3days (biannually) | Consultant / PMU                   | 2,000         |
| <b>Total</b> |                                                                                                             |                                                               |                    |                                    | <b>13,000</b> |

**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         |
| <b>Total</b>                        | <b>13,200</b> |

### 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)
- Kwara State Ministry of Lands
- Ilorin East 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 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. **Table 6.4** indicates the roles and Responsibilities of the Stakeholders in the Implementation, Monitoring and Review of the ESMP.

| <b>Table 6.6: The Roles and Responsibilities of the Stakeholders in the Implementation, Monitoring and Review of the ESMP</b> |                                                                                                                                                                                                                                                    |                                                                                                                                                                                        |                                                                                                                                                                       |                                                                                                                                                                                |                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Stakeholder</b>                                                                                                            | <b>Pre-Construction Phase</b>                                                                                                                                                                                                                      | <b>Construction Phase</b>                                                                                                                                                              | <b>Commissioning Phase</b>                                                                                                                                            | <b>Operational Phase</b>                                                                                                                                                       | <b>Decommissioning Phase</b>                                                                                                                                       |
| <b>Director of Works / Physical Planning</b>                                                                                  | <ul style="list-style-type: none"> <li>• Approve site and land use</li> <li>• Review ESMP and ensure institutional commitment</li> <li>• Appoint &amp; train Site Engineer</li> <li>• Ensure livelihood restoration before mobilization</li> </ul> | <ul style="list-style-type: none"> <li>• Supervise ESMP implementation</li> <li>• Ensure contractor compliance</li> <li>• Address grievances and enforce corrective actions</li> </ul> | <ul style="list-style-type: none"> <li>• Oversee safe plant testing</li> <li>• Ensure stakeholder communication</li> <li>• Confirm readiness for operation</li> </ul> | <ul style="list-style-type: none"> <li>• Review ESMP reports</li> <li>• Recommend improvements to PMU/O&amp;M</li> <li>• Ensure safeguards (OHS, GBV, environment)</li> </ul>  | <ul style="list-style-type: none"> <li>• Oversee decommissioning activities</li> <li>• Ensure site restoration</li> <li>• Support livelihood transition</li> </ul> |
| <b>REA – PMU</b>                                                                                                              | <ul style="list-style-type: none"> <li>• Approve ESMP and integrate into contracts</li> <li>• Coordinate stakeholders and regulators</li> <li>• Allocate ESMP budget</li> </ul>                                                                    | <ul style="list-style-type: none"> <li>• Monitor compliance and conduct audits</li> <li>• Report to regulators</li> <li>• Enforce corrective actions</li> </ul>                        | <ul style="list-style-type: none"> <li>• Ensure compliance during testing</li> <li>• Approve transition to operation</li> </ul>                                       | <ul style="list-style-type: none"> <li>• Oversee ESMP implementation</li> <li>• Ensure monitoring, audits, reporting</li> <li>• Address non-compliance</li> </ul>              | <ul style="list-style-type: none"> <li>• Supervise dismantling compliance</li> <li>• Ensure waste management</li> <li>• Prepare closure reports</li> </ul>         |
| <b>Site Engineer</b>                                                                                                          | <ul style="list-style-type: none"> <li>• Support ESMP planning</li> <li>• Participate in training</li> </ul>                                                                                                                                       | <ul style="list-style-type: none"> <li>• Implement ESMP daily on-site</li> <li>• Monitor EHS compliance</li> <li>• Maintain records and reports</li> </ul>                             | <ul style="list-style-type: none"> <li>• Supervise testing</li> <li>• Ensure safety procedures (LOTO, PPE)</li> <li>• Report incidents</li> </ul>                     | <ul style="list-style-type: none"> <li>• Monitor operations &amp; maintenance</li> <li>• Ensure ESMP compliance</li> <li>• Report environmental &amp; safety issues</li> </ul> | <ul style="list-style-type: none"> <li>• Supervise dismantling</li> <li>• Monitor waste handling</li> <li>• Support site rehabilitation</li> </ul>                 |
| <b>NESREA / FMEnv Representatives</b>                                                                                         | <ul style="list-style-type: none"> <li>• Review and approve ESMP/ESMP</li> <li>• Issue environmental permits</li> </ul>                                                                                                                            | <ul style="list-style-type: none"> <li>• Monitor ESMP implementation (environmental compliance)</li> <li>• Conduct inspections and enforce regulations</li> </ul>                      | <ul style="list-style-type: none"> <li>• Monitor compliance during commissioning</li> <li>• Verify environmental and safety readiness</li> </ul>                      | <ul style="list-style-type: none"> <li>• Monitor ESMP implementation (environmental compliance)</li> <li>• Conduct periodic audits and inspections</li> </ul>                  | <ul style="list-style-type: none"> <li>• Monitor decommissioning activities</li> <li>• Verify environmental restoration</li> </ul>                                 |

|                                                                                   |                                                                                                                                           |                                                                                                                                                                                                    |                                                                                                                                                                     |                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                                                                                                                                           | <ul style="list-style-type: none"> <li>• Engage stakeholders on compliance issues</li> </ul>                                                                                                       |                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• Discuss ESMP improvements with PMU, Director, and O&amp;M Contractor to address non-compliance and emerging risks</li> </ul>                                                                                              | <ul style="list-style-type: none"> <li>• Approve closure compliance</li> <li>• Recommend corrective actions where necessary</li> </ul>                                                                                     |
| State Ministry of Women's Affairs & Social Development (GBV/SEA Service Provider) | <ul style="list-style-type: none"> <li>• Review Gender/GBV Action Plans</li> <li>• Support stakeholder engagement on GBV risks</li> </ul> | <ul style="list-style-type: none"> <li>• Monitor implementation of gender and GBV mitigation measures</li> <li>• Provide GBV/SEA support services</li> <li>• Conduct awareness programs</li> </ul> | <ul style="list-style-type: none"> <li>• Monitor GBV risk during commissioning activities</li> <li>• Ensure reporting and response mechanisms are active</li> </ul> | <ul style="list-style-type: none"> <li>• Monitor Gender Action Plan implementation</li> <li>• Handle GBV/SEA cases confidentially</li> <li>• Provide survivor support services</li> <li>• Engage with PMU, Director, and Gender Officer on improvements</li> </ul> | <ul style="list-style-type: none"> <li>• Monitor GBV risks during workforce demobilization</li> <li>• Support vulnerable groups and affected persons</li> <li>• Ensure proper closure of GBV cases and services</li> </ul> |

## 6.6 Estimated Budget for ESMP Implementation

**Table 6.2** 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                            |
|     | <b>TOTAL</b>            | <b>57,300</b> |                                                                                                        | <b>Cost reflects full lifecycle ESMP implementation aligned with international standards</b>                |

## 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. **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.
3. **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.
4. **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; o 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)**

| No. | Activity                                                                                                                | Identified Stakeholders                                                                                                                                                                                                                                 | Focus of Consultation/ Engagement                                                                                                                                      | Timelines/ Frequency               | Forms of communication                                                                                                                                                                                                          | Facilitator                            |
|-----|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1.  | <b>Preparation of ESMP/ Project design</b>                                                                              | <ul style="list-style-type: none"> <li>State Project Coordinating Unit</li> <li>Federal Ministry of Environment</li> <li>State Ministry of Environment</li> <li>Community and Community Based Organisations</li> <li>FMF</li> <li>World Bank</li> </ul> | Large scale forum<br>Key stakeholders' interviews<br>Mapping of community interests and concerns<br>Communities need to know what the project is all about.            | Throughout the ESMP study period   | <ul style="list-style-type: none"> <li>Focus Group Discussion/workshops</li> <li>Phone calls</li> <li>One on one interview</li> <li>Distribution of pamphlets</li> <li>Public meetings</li> <li>Newspapers/magazines</li> </ul> | REA                                    |
| 2.  | <b>Site preparation prior to excavation, construction &amp; pipe laying work</b>                                        | <ul style="list-style-type: none"> <li>SPIU</li> <li>Contractor</li> <li>Supervising Engineers</li> <li>Consultant</li> <li>FME</li> </ul>                                                                                                              | <ul style="list-style-type: none"> <li>Information Disclosure at Federal Ministry of Environment, State Ministry of Environment and Local Government level.</li> </ul> | Two weeks prior to construction    | <ul style="list-style-type: none"> <li>Through Radio and Newspapers</li> </ul>                                                                                                                                                  | REA<br>Federal Ministry of Environment |
| 3.  | <b>Start of excavation, construction &amp; pipe laying work</b>                                                         | <ul style="list-style-type: none"> <li>SPIU</li> <li>Contractors</li> <li>Supervising Engineers</li> <li>Consultant</li> <li>Suppliers</li> <li>Businessmen</li> <li>NGOs/vulnerable groups</li> <li>Communities</li> </ul>                             | <ul style="list-style-type: none"> <li>Affected Communities</li> <li>Government Officials</li> <li>World Bank</li> </ul>                                               | Throughout the construction period | <ul style="list-style-type: none"> <li>Phone calls</li> <li>Newspapers</li> <li>Radios</li> <li>Pamphlets</li> <li>One on One</li> </ul>                                                                                        | REA<br>FMF<br>WORLD BANK               |
| 4.  | <b>End of excavation, construction &amp; pipe laying work / Decommissioning of construction equipment and machinery</b> | <ul style="list-style-type: none"> <li>SPIU</li> <li>Government Officials</li> <li>Affected Communities</li> <li>World Bank</li> </ul>                                                                                                                  | <ul style="list-style-type: none"> <li>Government Officials</li> <li>Affected Communities</li> </ul>                                                                   | Decommissioning phase              | <ul style="list-style-type: none"> <li>Phone calls</li> <li>Televisions</li> <li>Radios</li> <li>Newspapers</li> <li>Emails</li> <li>Pamphlets</li> </ul>                                                                       | Government Officials<br>REA            |

| No. | Activity                                     | Identified Stakeholders                                                                                               | Focus of Consultation/ Engagement                                                                                 | Timelines/ Frequency                    | Forms of communication                                                                                                 | Facilitator |
|-----|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.  | <b>Commissioning and handing over</b>        | <ul style="list-style-type: none"> <li>Government Officials</li> <li>SPIU</li> <li>Beneficiary Communities</li> </ul> | <ul style="list-style-type: none"> <li>Government Officials</li> <li>Benefitting Communities</li> <li></li> </ul> | Prior to operation of the facility      | <ul style="list-style-type: none"> <li>Newspapers</li> <li>Television</li> <li>Radio</li> </ul>                        | REA         |
| 6.  | <b>Operation and maintenance of facility</b> | <ul style="list-style-type: none"> <li>Beneficiary Communities</li> </ul>                                             | <ul style="list-style-type: none"> <li>Beneficiary Communities</li> </ul>                                         | During operation and maintenance period | <ul style="list-style-type: none"> <li>One on one</li> <li>Workshops/FGD</li> <li>Television</li> <li>Radio</li> </ul> | REA         |
|     |                                              | <ul style="list-style-type: none"> <li>REA</li> </ul>                                                                 | <ul style="list-style-type: none"> <li>UNILORIN Community</li> </ul>                                              | 3 times a week                          | <ul style="list-style-type: none"> <li>Visits</li> </ul>                                                               | REA         |
|     |                                              | <ul style="list-style-type: none"> <li>REA</li> <li>Government Officials</li> </ul>                                   | <ul style="list-style-type: none"> <li>UNILORIN Community</li> <li>UNILORIN Community</li> </ul>                  | Fortnightly                             | <ul style="list-style-type: none"> <li>Visits</li> </ul>                                                               |             |
|     |                                              | <ul style="list-style-type: none"> <li>World Bank</li> </ul>                                                          | <ul style="list-style-type: none"> <li>Beneficiary communities</li> </ul>                                         | Once a term                             | <ul style="list-style-type: none"> <li>Visits</li> </ul>                                                               |             |

All consultation activities were properly documented, including relevant data, supporting evidence, participant lists with contact information, and photographic records. Information disclosure was in compliance 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 WB 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 Kwara State Ministry of Environment,
- The University of Ilorin
- 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)
- Kwara State Ministry of Environment
- Ilorin East Local Government Area
- University of Ilorin /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

**Table 9.2: Engagement with Staff of the University of Ilorin**

| S/N | Comments / Questions Raised                                                                                                                                                                                                                                                                      | Responses / Clarifications                                                                                                                                                                                                                                                                                                                                               |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Prof. M.A. Alfamla (Registrar) requested clarification on the expected timeline and schedule for the implementation of the proposed Solar Power Plant Project. He expressed interest in understanding when the University should expect the commencement of physical activities on site.         | Dr. Charles Ebojei (Charlton Consult Limited) explained that the implementation process would commence immediately after the completion of the preliminary studies, Environmental and Social Impact Assessment (ESIA), and other regulatory procedures. He assured the management that the project sponsors were committed to ensuring timely delivery of the project.   |
| 2   | Mr. Emmanuel Osamiewenfan (Charlton Consult Limited) sought confirmation from the University management on whether the proposed project site was free from encumbrances, ownership disputes, compensation claims, or any form of land-related conflict that could hinder project implementation. | Prof. Omopupa K. Tunde, speaking on behalf of the Vice Chancellor, confirmed that the University possesses adequate land for the proposed project and that there were no existing disputes, compensation claims, or encumbrances associated with the proposed project location. He assured the consulting team that the land was suitable and available for the project. |
| 3   | Mr. Emmanuel Osamiewenfan further enquired whether the University management had responded to the requests for documents and relevant information contained in the introductory letter issued by the Rural Electrification Agency (REA).                                                         | Prof. Omopupa K. Tunde responded that the requested information would likely have been forwarded to the REA already. However, he noted that the University management would obtain the necessary internal clearance before officially sharing the documents and information directly with the consulting team from Charlton Consult Limited.                             |
| 4   | Members of the University management acknowledged the importance of uninterrupted electricity supply to the institution, particularly in supporting teaching, research activities, water supply systems, security lighting, and the operation of equipment and machinery across the campus.      | The consulting team appreciated the University's concerns and reiterated that the proposed Solar Power Plant Project was designed to provide reliable, affordable, and sustainable electricity supply in line with the objectives of the REA, the Federal Government, and the World Bank-supported DARES programme.                                                      |
| 5   | The University management expressed appreciation to the Federal Government, the Rural Electrification Agency (REA), the World Bank, and Charlton Consult Limited for initiating the project and engaging stakeholders through consultation.                                                      | The consulting team thanked the University management for their cooperation, warm reception, and willingness to collaborate throughout the ESIA process and subsequent implementation stages of the project.                                                                                                                                                             |



**Plate 9.1: Stakeholders Engagement with the Management of Unilorin**



**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, 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 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 project implementation.

The primary objective of the GRM is to provide affected persons and stakeholders 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 help to improve communication between the project proponents, the University management, the Rural Electrification Agency (REA), contractors, and surrounding communities.

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 should 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 representatives, 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 with confidentiality to encourage openness and protect complainants from fear of retaliation.

Upon receipt of the grievance, the complaint shall be formally registered and acknowledged within a reasonable timeframe. The Grievance Redress Committee will then 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. In situations where the complainant is dissatisfied with the decision reached, an appeal process shall be provided to allow for further review of the grievance.

All grievances and their resolutions shall be documented in a grievance register containing details such as the nature of the complaint, date received, actions taken, resolution status, and date of closure. Periodic monitoring and reporting of grievances will help improve transparency, accountability, and overall project performance. Continuous awareness creation and stakeholder engagement will also be carried out to ensure that all affected people understand the grievance process and can access it without difficulty.

### **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 Grievance Redress Mechanism Process**

The key steps in the GRM process are as follows

1. Grievance Submission – Complaint is lodged through available channels.
2. Acknowledgment & Registration – Complaint is recorded and acknowledged.
3. Screening & Assessment – Issue is reviewed and categorized.
4. Investigation – Facts and evidence are collected.
5. Resolution – Appropriate corrective action or solution is provided.
6. Appeal/Escalation – Unresolved complaints may be reviewed at a higher level.
7. Closure & Documentation – Case is closed and documented for future improvement.

### **9.6.5 Acknowledgment of Grievance**

Once the grievance has been recorded, the stakeholder will receive an acknowledgment 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 REA 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 University of Ilorin, Kwara, 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.
- 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 Ilorin



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15<sup>th</sup> April 2026

| Parameter                    | Unit  | Season | Depth    | SP1  | SP2  | SP3  | Control |
|------------------------------|-------|--------|----------|------|------|------|---------|
| pH                           | -     | Dry    | 0–15 cm  | 6.2  | 6.5  | 6.9  | 5.7     |
|                              | -     | Dry    | 15–30 cm | 5.4  | 5.9  | 6.5  | 5.4     |
|                              | -     | Wet    | 0–15 cm  | 6.5  | 6.6  | 6.7  | 6.8     |
|                              | -     | Wet    | 15–30 cm | 6.4  | 6.6  | 6.9  | 6.5     |
| Electrical Conductivity (EC) | µS/cm | Dry    | 0–15 cm  | 95   | 112  | 128  | 109     |
|                              | µS/cm | Dry    | 15–30 cm | 140  | 153  | 166  | 106     |
|                              | µS/cm | Wet    | 0–15 cm  | 126  | 165  | 208  | 147     |
|                              | µS/cm | Wet    | 15–30 cm | 170  | 216  | 262  | 187     |
| Temperature                  | °C    | Dry    | 0–15 cm  | 33.0 | 34.8 | 36.5 | 34.7    |
|                              | °C    | Dry    | 15–30 cm | 32.8 | 33.7 | 34.9 | 33.9    |
|                              | °C    | Wet    | 0–15 cm  | 32.5 | 32.6 | 32.8 | 32.4    |
|                              | °C    | Wet    | 15–30 cm | 32.9 | 33.8 | 34.7 | 32.8    |
| Nitrate                      | mg/kg | Dry    | 0–15 cm  | 0.25 | 0.46 | 0.68 | 0.21    |
|                              | mg/kg | Dry    | 15–30 cm | 0.10 | 0.30 | 0.51 | 0.31    |
|                              | mg/kg | Wet    | 0–15 cm  | 0.15 | 0.70 | 1.24 | 0.92    |
|                              | mg/kg | Wet    | 15–30 cm | 0.10 | 0.82 | 1.40 | 0.81    |
| Ammonia                      | mg/kg | Dry    | 0–15 cm  | 0.41 | 0.76 | 1.12 | 1.25    |
|                              | mg/kg | Dry    | 15–30 cm | 0.12 | 1.05 | 1.97 | 1.16    |
|                              | mg/kg | Wet    | 0–15 cm  | 1.40 | 1.85 | 2.20 | 1.95    |
|                              | mg/kg | Wet    | 15–30 cm | 1.20 | 1.68 | 2.15 | 1.76    |
| Phosphate                    | mg/kg | Dry    | 0–15 cm  | 1.2  | 2.3  | 3.4  | 3.2     |
|                              | mg/kg | Dry    | 15–30 cm | 2.8  | 4.1  | 5.7  | 2.6     |
|                              | mg/kg | Wet    | 0–15 cm  | 3.6  | 5.0  | 6.4  | 2.2     |
|                              | mg/kg | Wet    | 15–30 cm | 4.15 | 4.90 | 5.60 | 3.8     |
| Sulphate                     | mg/kg | Dry    | 0–15 cm  | 7.5  | 9.4  | 11.3 | 8.5     |
|                              | mg/kg | Dry    | 15–30 cm | 6.3  | 9.2  | 12.4 | 11.8    |
|                              | mg/kg | Wet    | 0–15 cm  | 10.6 | 13.2 | 16.5 | 11.5    |
|                              | mg/kg | Wet    | 15–30 cm | 8.9  | 11.5 | 14.1 | 10.8    |
| Chloride                     | mg/kg | Dry    | 0–15 cm  | 0.8  | 1.3  | 1.9  | 0.4     |
|                              | mg/kg | Dry    | 15–30 cm | 1.0  | 1.7  | 2.5  | 0.1     |
|                              | mg/kg | Wet    | 0–15 cm  | 1.5  | 1.3  | 1.2  | 1.4     |
|                              | mg/kg | Wet    | 15–30 cm | 1.0  | 1.4  | 1.8  | 1.12    |
| Total Organic Carbon (TOC)   | %     | Dry    | 0–15 cm  | 0.25 | 0.48 | 0.74 | 1.2     |
|                              | %     | Dry    | 15–30 cm | 0.18 | 0.28 | 0.37 | 0.06    |
|                              | %     | Wet    | 0–15 cm  | 0.75 | 1.00 | 1.25 | 1.01    |
|                              | %     | Wet    | 15–30 cm | 0.12 | 0.71 | 1.30 | 0.16    |
| Moisture Content             | %     | Dry    | 0–15 cm  | 4.8  | 6.1  | 7.5  | 7.3     |
|                              | %     | Dry    | 15–30 cm | 5.2  | 6.0  | 7.2  | 5.1     |
|                              | %     | Wet    | 0–15 cm  | 6.5  | 9.4  | 12.2 | 12.3    |
|                              | %     | Wet    | 15–30 cm | 1.1  | 8.3  | 15.6 | 13.1    |

## 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 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 last did you 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)<br>PHCN | (b)<br>Generator | (c) Lantern | (d) Candle | (e)<br>Palm<br>Oil<br>Lamp | (f)<br>Torchlight<br>Battery | (g)<br>Wood | (h)<br>Kerosene | (i) Gas |
|-------------|------------------|-------------|------------|----------------------------|------------------------------|-------------|-----------------|---------|

- 2.2 Using the method in 2.1, indicate major source of energy for cooking?

|                     |          |                 |                    |                           |         |                                 |        |
|---------------------|----------|-----------------|--------------------|---------------------------|---------|---------------------------------|--------|
| (a)<br>Fire<br>Wood | (b) Coal | (c)<br>Kerosene | (d)<br>Electricity | (e)<br>Animal<br>dropping | (f) Gas | (g)<br>Crop<br>Residue/saw dust | Others |
|---------------------|----------|-----------------|--------------------|---------------------------|---------|---------------------------------|--------|

## 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 ensures in leadership of community-based organizations (d) Others specify.....

#### SECTION E: Resources/ Cultural Property

1. Please indicate the environmental problems which 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 which 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 AT THE UNIVERSITY OF ILORIN, KWARA STATE WITH THE MANAGEMENT OF THE UNIVERSITY.**

|                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Title</b>                                                | Stakeholder's Consultation meeting for the Environmental and Social Impact Assessment for the Deployment of the Proposed Solar Power Plant Project in the University of Ilorin, kwara State, Nigeria.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Date</b>                                                 | Thursday 12 <sup>th</sup> February, 2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Language</b>                                             | English language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Location</b>                                             | Vice Chancellor's Conference Hall, University of Ilorin, kwara State                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Participants</b>                                         | Prof. Omopupa k. Tunde (University librarian), Prof. M.A., Alfa (Registrar); R.K. Amoo (Director, Works), Tosin Obafemi (Deputy Director, Works), Azeezzat Ibrahim (Deputy Director), Dauda A.; Emmanuel Osamiewenfan (Charlton Consult Limited); Dr. Charles Ebojei (Charlton Consult Limited).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Introduction</b>                                         | <p>The Director of Works, Engr. Amoo introduced the management team of the University of Ilorin, he stated that the Vice Chancellor and the Deputy Vice Chancellors were unavoidably absent due to prior engagement out of the University Community. However, the Vice Chancellor was ably represented by the Registrar.</p> <p>Engr. Amoo affirmed that the University was in receipt of a letter dated 15<sup>th</sup> of January, 2026 from the Rural Electrification Agency (REA) introducing the Charlton Consult limited as one of its consultants to undertake the preliminary studies and design for the proposed Solar Power Plant project, however, the letter did not specify the precise date for the engagement.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Presentation by Charlton Consult Limited</b>             | <p>The team lead, Emmanuel Osamiewenfan, congratulated the University for been selected to benefit from the Distributed Access through Renewable Electricity Scale-up (DARES) programme of the REA in collaboration with the World bank. He stated that access to uninterrupted, reliable and affordable electricity was germane to industrialization and in particular, a must for universities to strive as centers of excellence for research and academic purposes. He mentioned that the proposed project was in line with the Energy Transition Programme and aligns with the SDG 7.</p> <p>He posited that stakeholder's engagement is a mandatory aspect of the Environmental and Social Impact Assessment (ESIA) process, aimed at informing the stakeholders of the Federal Government intention in regard to the deployment of the Solar power plant, securing stakeholders support and buy-in and to share ideas on how best to implement the proposed project among others.</p> <p>Furthermore, he mentioned that the project sponsors were critical about the land administration, ensuring that the proposed project location is free from all forms of dispute.</p>                                                                                                                                                                                                                                                                                              |
| <b>Address by the Representative of the Vice Chancellor</b> | <p>Prof. Omopupa welcomed the Consulting team from Charlton Consult Limited on behalf of the Vice Chancellors Prof. Wahab Olasupo Egbewole, SAN and his management team.</p> <p>He appreciated the Federal Government and the REA for the laudable initiative. He mentioned that the University had series of electricity challenges in 2025, ranging from inadequate supply to humongous electricity bills which had eaten deep into the institution's finances. He posited that access to uninterrupted electricity supply was critical in keeping to the mandate of the institution which are teaching, learning and other engagement. They have tried to mitigate some of the cost, unfortunately the challenges persist. He mentioned that the project is a blessing to the institution and they are pleased having a robust stakeholder's engagement in that regard.</p> <p>He commented that all the critical aspect of human lives revolves around access to adequate electricity supply, especially in the face of insecurity, where the institution needs electricity for street lightening at night; pump water, power equipment and machines among other.</p> <p>Finally, he appreciated the project conceiver, the REA and World Bank for the project which promises to address pending electricity challenges in the University. He assured the team that they are ready to partner collaboratively with the REA for a seamless implementation of the project.</p> |
| <b>Comments and Questions</b>                               | <p>Prof. M.A., Alfa, enquired about the schedule for the project implementation.</p> <p>Mr. Emmanuel, enquired if the proposed project location is from encumbrances and land dispute, also if the requested document and information contained in the letter from the REA had been responded to.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                   |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Responses<br/>Stakeholders</b> | <b>by</b> | <p>Prof Omopupa responded that the information would have been sent to the REA, however, they will get clearance from the school management to share them with the consulting team. Also, he posited that the university has adequate land for the project, and that there were no pending compensation issues or dispute related to the ownership of the proposed project location.</p> <p>Dr. Charles posited that the project will be implemented in the shortest time possible, once the preliminary studies are concluded.</p> |
| Closing                           |           | The meeting came to a close by 2.30 pm.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |



Name of University 1 LORIN  
Location WORKS  
Date 12/2/2020

[illegible]

Name of University ILORIN  
Location UNILORIN VC  
Date 12/2/2026

| s/n | Name                       | Designation        | Contact            | Signature                  |
|-----|----------------------------|--------------------|--------------------|----------------------------|
| 1   | Eng. J. S. Adeniyi         | Deputy Director    | Workshop 1, Unilag | J. S. Adeniyi              |
| 2   | Mrs. C. O. Bolarinwa       | Blowman            | Shop 1, Square     | C. O. Bolarinwa            |
| 3   | Mr. Abubakar Kariyado A.   | Blowman            | Shop 2, Square     | Abubakar Kariyado A.       |
| 4   | Olayinka Af-Amosun D       | Human Rights       | tel 7692037        | Olayinka Af-Amosun D       |
| 5   | Olumide Gbana              | H.K.C              | 09064730344        | Olumide Gbana              |
| 6   | OLUPEHIN O. OJIKI          | H.K.C              | 09069151966        | OLUPEHIN O. OJIKI          |
| 7   | Mrs M. Z. Adeniyi          | Blowman            | 09023674935        | Mrs M. Z. Adeniyi          |
| 8   | MR Adeniyi SA              | Technical          | 08037704470        | MR Adeniyi SA              |
| 9   | Abimbola Sambo             | A.E. Student       | 09032123089        | Abimbola Sambo             |
| 10  | Tosin Olayinka             | Deputy Director    | 0906333356         | Tosin Olayinka             |
| 11  | Eng. Dr. Jemima M. B.      | Director           | 08035660079        | Eng. Dr. Jemima M. B.      |
| 12  | Eng. Olatunbosun F. O.     | Assistant Director | 08033412441        | Eng. Olatunbosun F. O.     |
| 13  | Prof. Mohammed B. Abubakar | Acting MD          | 08065754335        | Prof. Mohammed B. Abubakar |
| 14  | D. B. R. Olatunbosun       | MD (H.E)           | 08033407266        | D. B. R. Olatunbosun       |