ELECTRICITY DISTRIBUTION AND SUPPLY AUTHORITY (EDSA)

ENERGY SECTOR UTILITY REFORM PROJECT (ESURP AF)

Environmental Social and Health Impact Assessment (ESHIA)

Final Report

March 2019

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Abbreviations/Acronyms

AF : Additional Financing
AIDS : Acquired Immune Deficiency Syndrome
ANSI : American National Standards Institute
BDL : Below Detection Limit
CBOs : Community Based Organizations
CDC : Community Development Committee
CHC : Community Health Center
CLSG : Cote d'Ivoire, Liberia, Sierra Leone and Guinea
CR : Construction and Rehabilitation
CRP : Construction and Rehabilitation Project
dB : Decibel
DC : Direct Current
EA : Environmental Assessment
EDSA : Electricity Distribution and Supply Authority
EGTC : Electricity Generation and Transmission Company
EHS : Environmental Health and Safety
EIA : Environmental Impact Assessment
EMF : Electromagnetic Fields
EPA : Environmental Protection Agency
EPA-SL : Environnemental Protection Agency – Sierra Leone
ESF : Environmental and Social Framework
ESHIA : Environmental Social and Health Impact Assessment
ESMP : Environmental and Social Management Plan
ESS : Environmental and Social Standards
ESURP : Energy Sector Utility Reform Project
FAO : Food and Agriculture Organization
FCC : Freetown City Council
FGD : Focus Group Discussions
GDP : Gross Domestic Product
GII : Gender Inequality Index
GoSL : Government of Sierra Leone
GPS : Global Positioning System
GRC : Grievance Redress Committee
GRM : Grievance Redress Mechanism
HCB : Hexachlorobenzene
HDI : Human Development Index
HIV : Human Immunodeficiency Virus
IEC : International Electro-technical Commission
IFC : International Finance Corporation

IP : International Protection Making
IPF : Investment Project Financing
IsDB : Islamic Development Bank
ITF : Inter-Tropical Front
IUCN : International Union for Conservation of Nature and Natural Resources
Kv : Kilo Volt
L&FS : Life and Fire Safety
MDA : Ministries, Departments and Agencies
MEAS : Multilateral Environmental Agreements
MLHE : Ministry of Lands, Housing, and Environment
Mn : Manganese
MoE : Ministry of Energy
NaCEF : National Commission for Environment and Forestry
NEP : National Environmental Policy
NGO : Non-Governmental Organization
NO2 : Nitrogen Dioxide
Nox : Nitrogen Oxides
NPA : National Power Authority
O&M : Operation and Maintenance
oC : Degree Celsius
OP : Operational Policy
OVC : Orphans, and Vulnerable Children
PAP : Project Affected Person
PCBs : Polychlorinated Biphenyls
PCR : Physical Cultural Resources
PM : Particulate Matter
PMU : Project Management Unit
POPS : Persistent Organic Pollutants
PPE : Personal Protective Equipment
ppm : Part Per Million
PRSP II : Poverty Reduction Strategy Paper II
QA : Quality Assurance
RAP : Resettlement Action Plan
RIC : Resettlement Implementation Committee
RoW : Right-of-Way
SLCB : Sierra Leone Commercial Bank
SLM : Sound Level Metre
SLRA : Sierra Leone Roads Authority
SLRSA : Sierra Leone Road Safety Authority
SO2 : Sulphur dioxide
SO4 : Sulphate
STIs : Sexually Transmitted Infections
TSPM : Total Suspended Particulate Matter

ToR : Terms of Reference
UNAIDS : United Nations Program on HIV and AIDS
UNDP : United Nations Development Programme
UNICEF : United Nations International Children's Emergency Fund
WARD C : Western Area Rural District Council
WBG : World Bank Group
WHO : World Health Organization

Executive Summary

A. Project Overview

The electricity access (about 12% predominantly in Freetown) and consumption in Sierra Leone is among the lowest in Africa. The existing distribution network is limited and dilapidated making electricity supply unreliable. Development partners, World Bank, Africa Development Bank (AfDB), DFID, the Japanese International Cooperation Agency (JICA) and the Islamic Development Bank (IsDB) has made some interventions to address the distribution challenges but to more work is required. It is the intention of EDSA therefore to construct new 33 kV subtransmission network to enhance the evacuation of power, rehabilitee and extend the 11 kV and Low Voltage (LV) distribution network and customer connections to new areas.

The objective of the proposed project is to improve the operational performance of EDSA so that the people of Freetown can enjoy a more reliable and affordable electricity. The project has three main components with the following main activities:

Component 1: ***Distribution utility capacity enhancement and performance improvement***. This supports the acquisition of modern Management Information System to assist EDSA to improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers;

Component 2: Improvement of electricity supply in urban areas

Sub-Component 2-A: ***Primary medium voltage distribution network reinforcement and extension.*** This is for the construction of four new 33/11 kV substations to replace the existing distribution transformer substations, upgrade of one 11kV switching station to a 33/11kV substation as well as construction of about 46km, 33kV subtransmission lines to link the proposed substations;

Sub-Component 2-B: ***Secondary and low voltage distribution network reinforcement and extension.*** This would finance the rehabilitation of existing 11kV and Low Voltage distribution network in some parts of Freetown, extend the distribution network to major unserved residential, commercial and industrial centers in Freetown and the installation of prepaid meters to replace all existing faulty meters, non-STS meters and postpaid meters for large consumers, including government entities, to reduce commercial losses and increase collection rate;

Sub-Component 2-C: ***Project Implementation Support***: This sub-component will cover the cost of strengthening the capacity of the project implementing team in EDSA to manage and monitor project implementation. It will include the financing of the necessary safeguard studies, including site specific RAP studies.

Sub-Component 2-D: ***Compensation of Project Affected Populations (Co Financed by EDSA)***. This is meant to cover the cost associated with compensation payments to persons that would be affected by the investment activities under sub components 2.A and 2.B of the project.

Activities under Component 1 and Subcomponents 2C and 2D involves technical assistance to improve the managerial capacity of EDSA. These activities pose negligible or no social and environmental risks and do not invoke the application of environmental and social management policies. However, activities under component 2A (construction of 33/11kV substations and 33 kV lines) and component 2B (11/0.4kV network rehabilitation and extension) are expected to present moderate environmental and social risks. As such, and in accordance with the Environmental assessment regulations of Sierra Leone and the applicable safeguards policies of the World Bank, this Environmental Social and Health Impact Assessment (including ESMP) covers only activities to be implemented under subcomponents 2A and 2B.

Alternatives: A number of project alternatives were considered. These alternatives included a no action alternative, technological alternatives, route variations and design alternatives, such as using underground and or marine cables, insulated overhead transmission line, and comparison between lattice towers and steel tubular or concrete poles. The no-action alternative (i.e. not to construct the proposed sub transmission network) would have no impact to the local environment. However, the direct and indirect economic and social benefits that would have been accrued to the local communities because of an increase in electricity supply, and the provision of labor opportunities would not be realized. In addition, without the project, particularly the 33kV network, EDSA would not be able to evacuate and distribute the expected power import from the World Bank funded Cote d'Ivoire, Liberia, Sierra Leone and Guinea (CLSG) transmission line.

Design alternatives were considered, with the choice of using Steel Tubular Poles that requires around 800mm diameter footprint in the heavily built up areas (with limited road RoW as against steel lattice towers (that require a minimum footprint of 3.5 m x 3.5 m) to limit the negative environmental and socio-economic impact.

During the study, the environmental and social impacts of the project were assessed and no significant impacts are anticipated. It is believed that there will be many benefits from the project that could over-weigh its limited environmental and social impacts such as providing regular and sustainable power supply to the consumers, in addition to the developmental and socio-economic benefits. Therefore, the no action alternative was not considered.

Specific Objectives: The ESHIA seeks to meet the following specific objectives:

- ✓ detail out the ESHIA process including the statutory provisions and policies governing the conduct and review process of ESHIA in Sierra Leone;
- ✓ describe and detail out the project and its activities including alternatives considered;
- ✓ assess the environmental and social impact of Sub-transmission and Distribution Network along the project footprint;

- ✓ identify the significant potential positive and negative impacts of project activities;
- ✓ propose mitigation measures and plans for managing the identified impacts. ;
- ✓ engage and consult stakeholders on project activities and integrate their concerns in the assessment;
- ✓ establish the site-specific biophysical, health status and socio-economic baseline conditions of the project area i.e. receiving environment;
- ✓ incorporate the recommendations of the Environmental and Social Health Impact Assessment (ESHIA) process into detailed project design and decisions.;

B. Description of the project location

This ESHIA covers the construction of substations, subtransmission and distribution lines within the western urban and western rural districts respectively.

The line routes around the Western Urban District are proposed along the Right-of-Way (RoW) of the roads but these routes have a high density of occupancy with residential houses, kiosks, and makeshift structures. The line routes are only tentative and the RoW on either side of the road could be used depending on the obstacles on the RoW. The exact location of the poles and towers for the lines would be determined during the detailed design stage. As such, the ESHIA considered the general corridors of the lines, rather than specific design-mapped sites. All the proposed substations are on lands that is either owned by Government Agencies or by EDSA. The proposed 33kV subtransmission line routes and 33/11kV substation sites are as follows and shown in Figure 1-1:

- 6.8km, 33kV subtransmission line from Kingtom to Aberdeen
- 2.5km, 33kV subtransmission line from Kingtom to Falcon Bridge
- 3km, 33kV subtransmission line from Falcon Bridge to Cline Town
- 1.1km, 33kV subtransmission line from Cline Town to Blackhall Road
- 12.8km, 33kV subtransmission line from Jui to Regent
- 13.2km Double Circuit, Lattice Towers line from Wellington to Jui
- 6.6km Double Circuit, Lattice Towers line from Jui to Waterloo
- proposed substations at Aberdeen, Falcon Bridge, Cline Town, Jui, Waterloo

Legal Framework

The legal and institutional framework governing ESHIA usually provides guidelines with a view of ensuring the protection of the environment and sustainable development. The legal provisions are found in the Environment Protection Act, 2008 as amended 2010 and other related legislation nationally. International policies like the World Bank operational policy are detailed in this report.

The following policies, legal instruments, relevant multilateral Environmental Agreements, World Bank Environmental Safeguards policies and other international conventions to which Sierra Leone has signed up to are also detailed in this report:

- ✓ Constitution of Sierra Leone, 1991;
- ✓ Environment Protection Agency Act 2008 as amended in 2010;
- ✓ National Electricity Act of 2011;
- ✓ Nuclear Safety and Radiation Protection Act of 2012;
- ✓ The Sierra Leone Electricity and Water Regulatory Commission;
- ✓ Sierra Leone Roads Authority (Amendment) Act of 2010;
- ✓ Public Lands Ordinance;
- ✓ Unoccupied Lands Ordinance;
- ✓ The Protectorate Land ordinance;
- ✓ The Concessions Ordinance, 1931;
- ✓ Sierra Leone National Land Policy 2015;
- ✓ The National Environmental Policy (NEP) 1994;
- ✓ Factories Act, 1974;
- ✓ Local Government Act, 2004;
- ✓ World Bank safeguard policies: OP/BP 4.01 Environmental Assessment; OP/BP 4.11 Physical Cultural Resources and OP/BP 4.12 Involuntary resettlement.

Environmental and Social Impacts

The Environmental and Social Impact Assessment (ESHIA) is a process used to identify and evaluate the significance of potential impacts on various environmental and social receptors because of planned activities during (preconstruction, construction and operation) phase of the project. Furthermore, the analysis of environmental and social impacts is important to detail an effective management and monitoring plan, which will minimize negative impacts and maximize positives. Study was carried out at different levels to ensuring that accurate selection of the most appropriate technology, the most environmental and socioeconomic advantageous and the suitable mitigation measures are presented to minimize the negative impacts and optimize the positive impacts.

Positive Impacts

The project will result in positive impacts through the provision of job opportunities. During construction phase, direct job opportunities will be created for semi-skilled and unskilled laborers. A lot of indirect benefits are expected to be sensed in the project areas due to the need for more supporting services to the workers and contractors. These could include accommodation, food supply, transport, security etc.

Negative Impacts

The project may present the following negative impacts:

i. Impacts during preconstruction stage

Preconstruction stage involves activities like undertaking of line route surveys, preparation of detailed engineering designs, procurement and delivery of materials to warehouse prior to commencement of construction which does not present significant negative environmental and social impact

- ✓ Impact on noise from truck movements;
- ✓ Impact on air quality due to emissions and dusts from vehicle;

ii. Impacts during construction stage

The construction phase involves clearing of substation sites, excavation, foundation works, tower and equipment erection, lines stringing etc. all these activities presents different degrees of environmental and social impacts as outline below:

- ✓ Noise: Noise levels may intermittently exceed international noise level standards mainly from the operations of heavy equipment at the substation sites.
- ✓ air quality: air quality around the project area will be temporarily impacted because of air emissions generated by construction activities like combustion emissions generated by on-site equipment and particulate emissions from dusty site compounds;
- ✓ possible road accidents;
- ✓ waste: solid waste and hazardous materials (oil leakage, used batteries): waste resulting mainly from excavation for foundation works, packaging debris from imported equipment, solid waste generated by workers have the potential to pollute the environment;
- ✓ damage to road surface and exposure of soils to erosion and degradation from runoff;
- ✓ damage to private structures and properties, disruption of livelihoods and economic activities;
- ✓ occupational health and safety: accident occurrence (direct and indirect) to workers on-site, pedestrians, and machine operators or passengers, and exposure to hazardous substances or dangerous situations;
- ✓ potential impact on archeological and cultural sites, although unlikely;
- ✓ Spread of STD and teenage pregnancy due to labor influx to the project sites is not likely because all the sites are within Freetown and camping is not possible;
- ✓ creation of job opportunities and flourishing of economic activities.

iii. Impacts during operation stage

The operational phase of the project will involve the commissioning of the line and maintenance of the RoW, the power lines, towers and the substation equipment. The main activities to be carried out during the operating life of the transmission line and substation include surveillance of the condition of the transmission line, towers and RoW; routine and emergency maintenance and repairs; and vegetation control.

- ✓ possible oil leakage from power transformer could pollute nearby water bodies;

- ✓ possible explosion of power transformers (due to the large volume of transformer oil pose fire risk to nearby houses to substations. Construction of fire walls could reduce this risk;
- ✓ noise from transformer humming could be above acceptable noise level for residential area (35 ~ 40dB);
- ✓ effect of electric and magnetic field on radio signals and on people health are minimal because the voltage level for this project is limited to 33kV;
- ✓ access to substations and to 33kV towers could pose risk of electrocution.

Stakeholder Engagement and Consultation

Public consultations were held in 2018 with the residents of Aberdeen community, Rokel, Kissi Brook (black hall road), Cline Town, Fourah bay, Colbot, Lower Bombay, Susan's Bay, Kroo Bay, Koleh town and Crab town communities. Consultations were also held with the personnel of regulatory agencies and the following Ministry Department and Agencies (MDAs): (a) EPA-SL; (b) the Ministry of Lands, Housing, and Environment (MLHE); (c) MoE; (d) EDSA; (e) The SLRA; (f) The Freetown City Council (FCC); and Western Area Rural District Council (WARD C). This provided relevant and adequate information about the project to the to enable them understand project risks, impacts, and opportunities

From the various consultation activities conducted, there was no major concerns or worries raised by the surrounding communities rather than the provision of job opportunities for unskilled workers. All the project-affected communities welcomed the project and promised giving their support to its fruition.

Environmental, Social Management and Monitoring Plan

A monitoring plan is proposed for the construction and operational phases of the project. Institutional responsibility and cost estimates are proposed for the various management and monitoring phases of the project.

To ensure that proper environmental management is maintained at construction sites for substations and transmission and distribution lines, the following measures are proposed:

- ✓ control of encroachment into the RoW;
- ✓ construct temporary barriers at construction sites;
- ✓ public education and awareness raising;
- ✓ provide waste disposal sites for waste generated during substation cleanup.

During the construction phase, equipment and materials have to be transported to site, RoW have to be cleared, foundations have to be excavated for erecting poles, poles have to be replaced and lines have to be strung, substations have to be constructed and new transformers and equipment installed. EDSA's monitoring capacity has to be strengthened during this

phase. Visual intrusion, waste generation mostly metals and insulators, health and safety risks of the workers, noise, dust, soil erosion, oil leaks are among the issues that have to be monitored. Waste segregation and recycling of waste, provision of PPEs and adoption of safety measures are among the monitoring measures recommended in this ESMP.

The operational phase of the project may also cause health and safety issues; loss of income from fruit trees that may be pruned; waste may be generated during line route and substation maintenance; special public health and safety hazards related to insulating oils in transformers if not properly disposed. It is against this background that a hazards management, waste management and management of transformer oil leaks are proposed. Training and monitoring, as proposed in this ESMP, of these parameters is crucial for the successful operation of the project. The Environmental and Social Management Specialist (ESMS) at the PMU, the Environmentalist at EDSA and the Prevention and Maintenance Department of EDSA are very critical in ensuring effective monitoring of these parameters. The ESMP recommends that monitoring process may include collection of data on the various parameters, inspection of records, personnel evaluation and assessment and periodic assessment of progress. Monthly and quarterly reports, as recommended in this ESMP, shall be submitted to EDSA management for appropriate actions to be taken to mitigate these impacts. The initial estimated cost of the ESMP is about US$33,000.00 and the major proposed measures includes among others:

Air quality: Ensure adequate maintenance and repair of construction machinery and vehicles to prevent emissions, maintain minimal traffic speed on-site and on access roads to the site;

Noise Level: Use of physical barriers such as material stockpiles, well-maintained equipment with silencers or mufflers to reduce vibration; provide ear protection equipment to workers and ensure only power transformers with acceptable noise level are procured;

Waste: arrange proper disposal of excavated material, segregate, label and stored chemical wastes in designated areas in corrosion resistant containers, store general refuse in enclosed bins to be collected by solid waste collectors;

labor influx: ensure that labor camps are not created by contractors;

Grievance Redress Mechanism

The objective of the Grievance Redress Mechanism (GRM) is to ensure that procedures are in place to allow affected people to lodge a complaint or a claim without cost and with the assurance of a timely and satisfactory resolution of that complaint or claim. The GRM is also to ensure that vulnerable groups including women have equal access to grievance redress procedures.

The sources of grievance can range from rates of compensation and eligibility criteria to the location of possible resettlement sites and the quality of services at those sites.

Grievance related to any aspect of the project will be handled through negotiations, which will be aimed at achieving consensus following the procedures outlined below:

i. grievances will be filed by the person affected by the project with the Grievance Redress Committee (GRC), which will act within 15 days on receipt thereof;
ii. if no understanding or amicable solution can be reached, or if the affected person does not receive a response from the GRC within 15 days of the registry of the complaint, he/she can appeal to the Resettlement Implementation Committee (RIC) (if set up) which should act on the complaint/grievance within 15 days of the day of its filing;
iii. another 15 days will be given for mediation between the complainant and the RIC;
iv. if the affected person is not satisfied with the decision of the RIC, he/she, as a last resort, may submit the complaint to a court of law.

Report Format

The ESHIA report is divided into nine sections which are summarized below:

Section 1 – Introduction

This section provides a brief description of Project background, the objectives of the ESIA, and the scope and organization of the study and format of this report.

Section 2 – Legal and Administrative Framework, and World Bank Safeguard Policies

This section provides information on policy, legal and administrative framework applicable to the Project. The section defines major legal provisions required for the Project.

Section 3 – Project Description & Alternatives

This section presents a detailed description of the Project components, the various phases of the Project including the mobilization, construction, operation, and decommissioning, and the workforce required.

Section 4 – Project Alternatives

This section also presents the alternatives evaluated to determine if there was a preferable alternative to the proposed action. The alternatives considered included the fuel supply alternatives, decontamination alternatives, and no-action alternative

Section 5– Impact Assessment and Identification

This section identifies and discusses the potential environmental and socioeconomic impacts of the proposed transmission line Project. This discussion will form the basis for the environmental management plan.

Section 6 – Mitigation Measures

This section identifies the mitigation measures to minimize or eliminate the negative environmental impacts due to the construction and operation of the transmission line.

Section 7 – Environmental Management and Monitoring Plan

This section outlines the Environmental Management and Monitoring Plan (EMMP), taking into consideration identified impacts and mitigation measures, monitoring program, and the proposed organizational structure for the operational phase.

Section 8 – Public Consultation

This section presents the results of concerns, suggestions and other findings from the series of consultations held in 2018. The consultations were held with people that are interested in and those who could be directly or indirectly affected by the Project's activities, together with appropriate regulations and requirements.

1.0 INTRODUCTION

1.1 Project Background

The Energy Sector Utility Reform Project (ESURP) that is ongoing is geared towards rehabilitating the 11 kV and Low Voltage (LV) distribution lines around the Greater Freetown Area.

The Electricity access and consumption in Sierra Leone is among the lowest in Africa. The electricity access rate is about 12 percent, with about 90 percent of the 170,000 customers located in the urban parts of Freetown. The connected customers suffer from daily and long hours of power cuts due to the dilapidated nature of the distribution network. Currently, the distribution network has the capacity to evacuate and deliver a maximum of around 74 MW out of the about 140 MW installed capacity to the customers with supply reliability well below internationally accepted standards. To address these challenges in the electricity sector, the Government of Sierra Leone (GoSL) mobilized development partners, World Bank, Africa Development Bank (AfDB), DFID, the Japanese International Cooperation Agency (JICA) and the Islamic Development Bank (IsDB) to implement a Network Investment Master Plan. The Network Investment Master Plan proposed investments in both rehabilitation and expansion of the existing 11kV and LV distribution network as well as constructing new 33kV sub transmission network to enhance the evacuation capacity of the network. Seeks to

On December 18, 2013, the World Bank approved SDR 26.1 million (US$40 million equivalent) for the Sierra Leone Energy Sector Utility Reform Project (ESURP) which became effective on December 15, 2014. The Project Development Objective is to improve the operational performance of the national electricity distribution utility. The project is currently under implementation but construction work on the distribution network is yet to commence pending the completion of the site specific ESMP (recently approved by the World Bank) and the RAP studies.

The ESURP could not meet all the investment needs envisaged in the original project, particularly expansion of the 33kV sub transmission network. Therefore, the Government of Sierra Leone (GoSL) requested for Additional Financing (AF) to ESURP to finance the expansion of the 33kV sub transmission network (33/11kV Substations and 33kV lines), rehabilitation and extension of the 11kV and Low LV distribution network to major unserved residential, commercial and industrial centers in Freetown and support to improve the operational and financial performance of EDSA. The ESURP AF project is meant to enhance the impact of the project development objective of component 1 and 2 of the parent projects being implemented by the EDSA as follows:

Component 1: Distribution utility capacity enhancement and performance improvement. This supports the acquisition of modern Management Information System to assist EDSA to improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers;

Component 2: Improvement of electricity supply in urban areas. It includes the following sub-components:

Sub-Component 2-A: Primary medium voltage distribution network reinforcement and extension. This sub-component finances the construction of four new 33/11kV substations and upgrade of one existing 11 kV switching station to a 33/11 kV substation as well as construction of new 33 kV sub transmission lines to link the proposed substations. This would help to increase the capacity of the network to evacuate power from the bulk electricity supply point to the distribution network;

Sub-Component 2-B: Secondary and low voltage distribution network reinforcement and extension. This sub-component includes investments on rehabilitation and extension of the 11 kV and Low Voltage network and customer connections, complementary to those in the original project, to major unserved residential, commercial and industrial centers, which are the most critical constraints to increase the distribution capacity and supply reliability of the network in Freetown. The increased network capacity is critical for the national distribution network to take and distribute the expected new generation capacity, including power import from the WAPP CLSG interconnection. The extension of electricity services to new high demand industrial and commercial customers will also help improve EDSA's revenue base. The subcomponent would also finance the supply and installation of prepaid meters to replace all existing faulty meters, non-statistical meters and postpaid meters for large consumers, including government entities, to reduce commercial losses and increase collection rate;

Sub-Component 2-C: Project Implementation Support. This sub-component is newly added and will cover the cost of strengthening the capacity of the project implementing team in EDSA to manage and monitor project implementation. It will include the financing of the necessary safeguards studies including site specific RAP and the costs of employing specialized consultants (technical, financial, procurement, audit, etc.), including young professionals to support the project management team.

Sub-Component 2-D: Compensation of Project Affected Populations (Co Financed by EDSA). This is meant to cover the cost associated with compensation payments to persons that would be affected by the investment activities under sub components 2.A and 2.B of the project.

Component 3 Sector Planning assistance, project implementation support and monitoring and evaluation (US$2.0 million). The additional activities include consulting services for preparing and implementing strategies and projects for electrification through mini-grid solution, training, study tours and other capacity building for MOE and other sector players like EWRC.

Activities under Component 1, Component 3 and Subcomponents 2C and 2D involves technical assistance to improve the managerial capacity of EDSA. These activities pose negligible or no social and environmental risks and do not invoke the application of environmental and social management policies. However, activities under component 2A (construction of substations, overhead lines, and underground cables) and component 2B (network reinforcement) are expected to present moderate environmental and social risks. As such, and in accordance with the Environmental assessment regulations of Sierra Leone and the applicable safeguards policies of the World Bank, this Environmental Social and Health Impact Assessment (including ESMP) covers only activities to be implemented under subcomponents 2A and 2B.

1.1.1 Site Specific Description

The line route around the Western Urban District is proposed along the RoW of the roads but these routes have a high density of occupancy with residential houses, kiosks, and makeshift structures. The following 33 kV sub transmission line routes and 33/11 kV substation sites had been proposed. The line routes are only tentative and the RoW on either side of the road could be used depending on the obstacles on the RoW. The exact location of the poles and towers for the lines would be determined during the detailed design stage. As such the ESHIA considered the general corridors of the lines, rather than specific design-mapped sites.

33 kV Lines

- ✓ Kingtom – Aberdeen 33kV Line: this is a 6.8km 33kV sub transmission line to convey power from the bulk supply substation to the proposed substation at Aberdeen. The line would be constructed along the narrow RoW of the main road. The line route stretches from Murray Town to Congo Town, somewhere between Kingtom and Connaught hospital passes through the coastal low land. It is proposed to be a single circuit line mounted on 13m Steel Tubular Poles to limit the environmental and social impacts. An alternate solution was to use marine cable through the sea. Even though this appears to be a shorter route, the cost associated was too high and the safety of the cable from ships could not be guaranteed by the ministry of transport authorities;

- ✓ Kingtom – Falcon Bridge: this is also a 2.5km, Single Circuit line on Steel Tubular Poles as above. This line is necessary to reinforce power supply in the business district;

- ✓ Falcon Bridge – Cline Town: part of the line route (about 1km) is along a street that has been turned into a market. The proposal is to use overhead insulated conduct on steel tubular poles or underground cables in this portion of the line. The right technology to be used would be determined at the detailed design stage;
- ✓ Cline Town – Blackhall Road: this would be a 1.1km, Single Circuit line on Steel Tubular Poles. A large portion of the line route passes through the Granville Brook dumpsite;

- ✓ Jui – Regent: This 12.3km proposed line would be constructed within the RoW of the recently constructed highway. It would be a single circuit overhead line on steel tubular poles.

- ✓ Wellington – Jui: The 13.2km Double Circuit, Lattice Towers line is proposed to be constructed within the RoW of the recently constructed highway. It would help to link the existing substation at Wellington and the proposed substation in rural Freetown;

- ✓ Jui - Waterloo: This is also a 6.6km Double Circuit, Lattice Towers line that is proposed to be constructed on either side of the RoW of the recently constructed highway.

33/11 kV Substations

- ✓ Kingtom Substation: This is the main bulk electricity supply point for EDSA. It is located in a walled land belonging to EDSA. The expansion works would enable the termination of the Aberdeen and Falcon Bridge 33kV lines;
- ✓ Aberdeen Substation: The proposed Aberdeen substation would be an upgrade of the existing EDSA transformer substation, which is a small building (3m x 4m housing a distribution transformer). It is located on a piece of land owned by the Ministry of Interior (the national police). The substation would benefit the numerous large-scale restaurants, hotels, beach and other tourist facilities as well as the upper class residential apartments. The substation has been designed to have a customer service center to serve the residential neighbourhood;
- ✓ Falcon Bridge Substation: the proposed Falcon Bridge substation would be an upgrade of the existing EDSA 11kV switching station (within the walled EDSA premises) to a 33/11kV substation. All the construction works are expected to be within the walled compound;
- ✓ Cline Town Substation: the Cline Town substation is proposed to be constructed on a piece of land within a walled premises belonging to the Ministry of Transport.
- ✓ Jui Substation: The proposed Jui substation is an upgrade of the dilapidated EDSA transformer substation (3m x 4m building) that is providing electricity to the government teacher training college. It is located within the walled premises of the college. The college authorities have agreed to provide more lands (about 30m x 25m) for the expansion works. The substation would be very beneficial to the school and the surrounding communities as it would greatly improve the quality of the power supply. The substation has also been designed to have a customer service center that would provide reliable and timely customer service to the customers in the surrounding communities;
- ✓ Waterloo Substation: The substation is proposed to be constructed on a piece of land that has been acquired by the ministry of energy for the construction of the 225/33 kV substation under an Indian Exim Bank facility. This substation and the double circuit lines are very critical, as they would be the main conduit for evacuating power from the WAPP CLSG line to urban Freetown.

11 kV and Low Voltage Distribution Network

This would consist of the continuation of the ongoing rehabilitation of the low voltage distribution under the parent project and extension of the 11kV and LV network and customer connection to communities around the Cline Town, Jui and Waterloo substation to provide them with the essential electricity services. A map showing the tentative 33kV line routes and proposed substation sites is provided in Figure 1-1

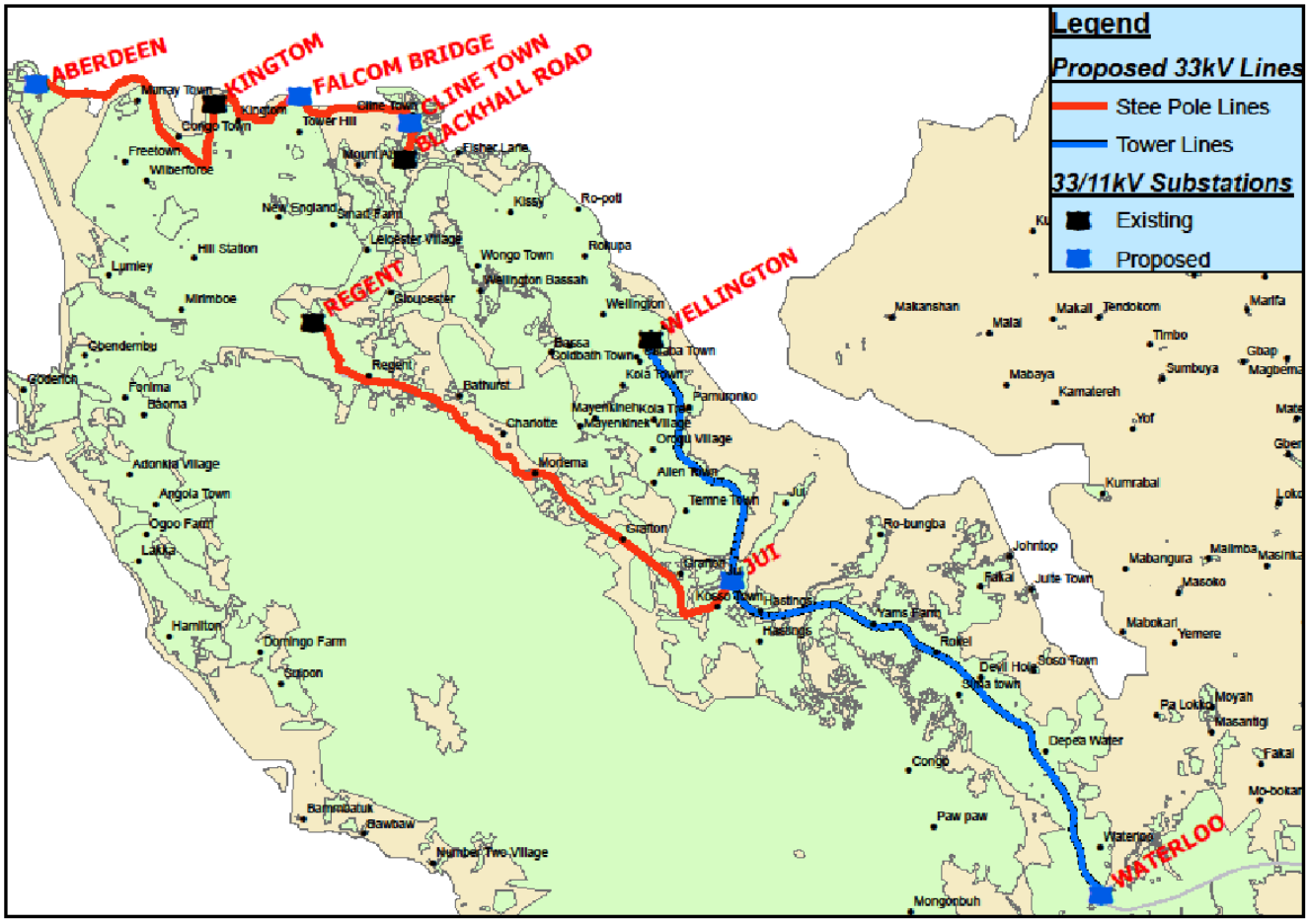

Figure 1-1: Tentative line routes and proposed substation sites

1.1.2 Substation Layouts

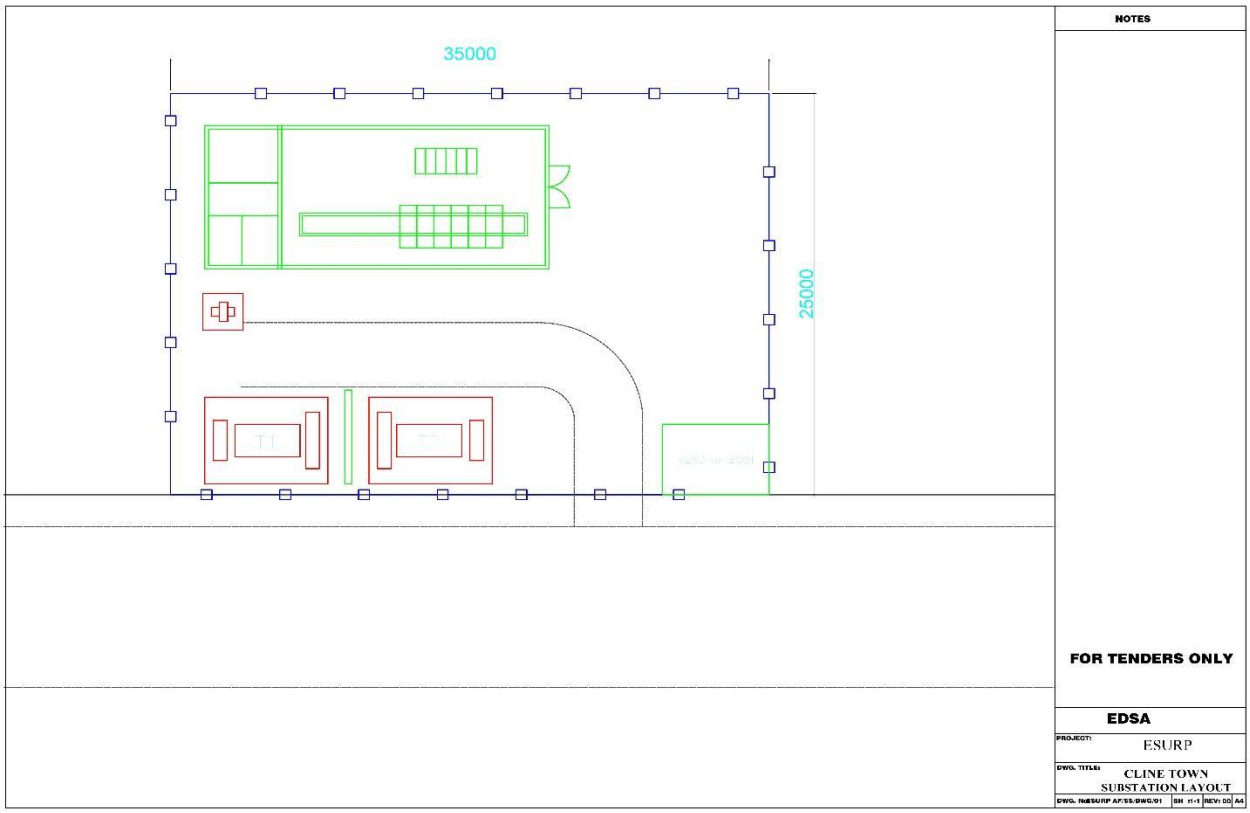

Figure 1-2: Cline Town Substation Layout

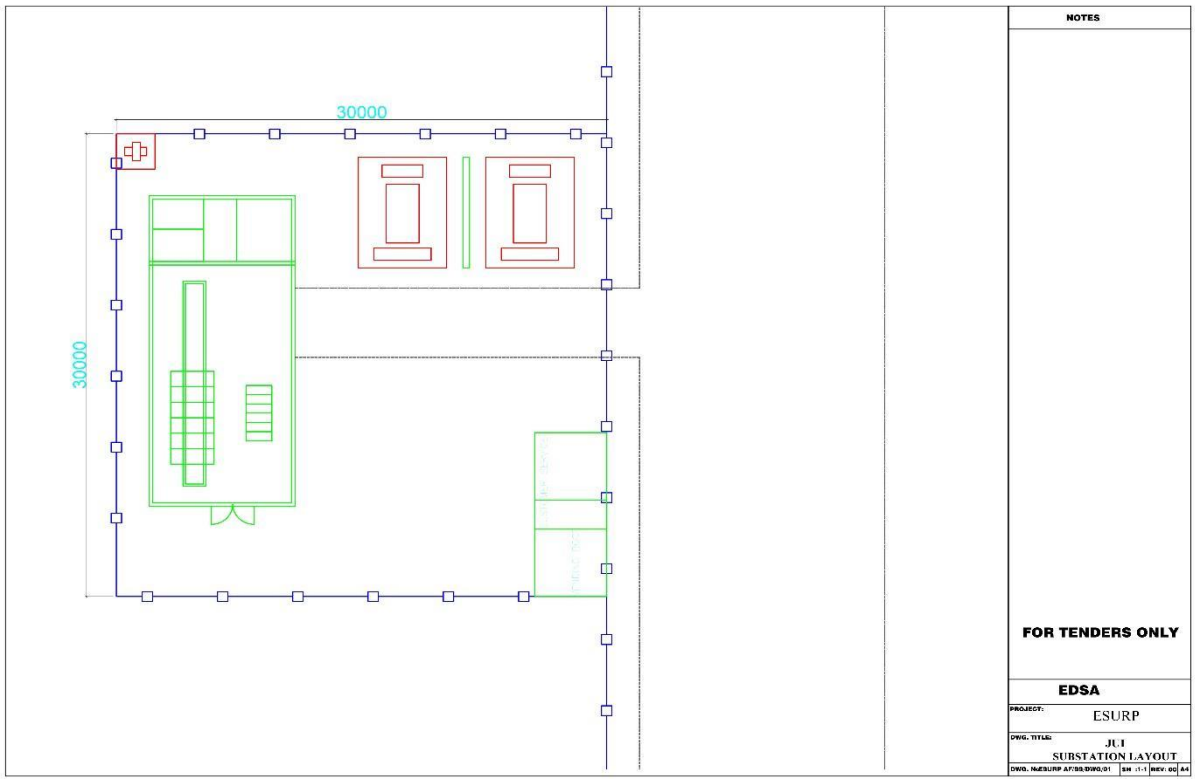

Figure 1-3: Jui Substation Layout

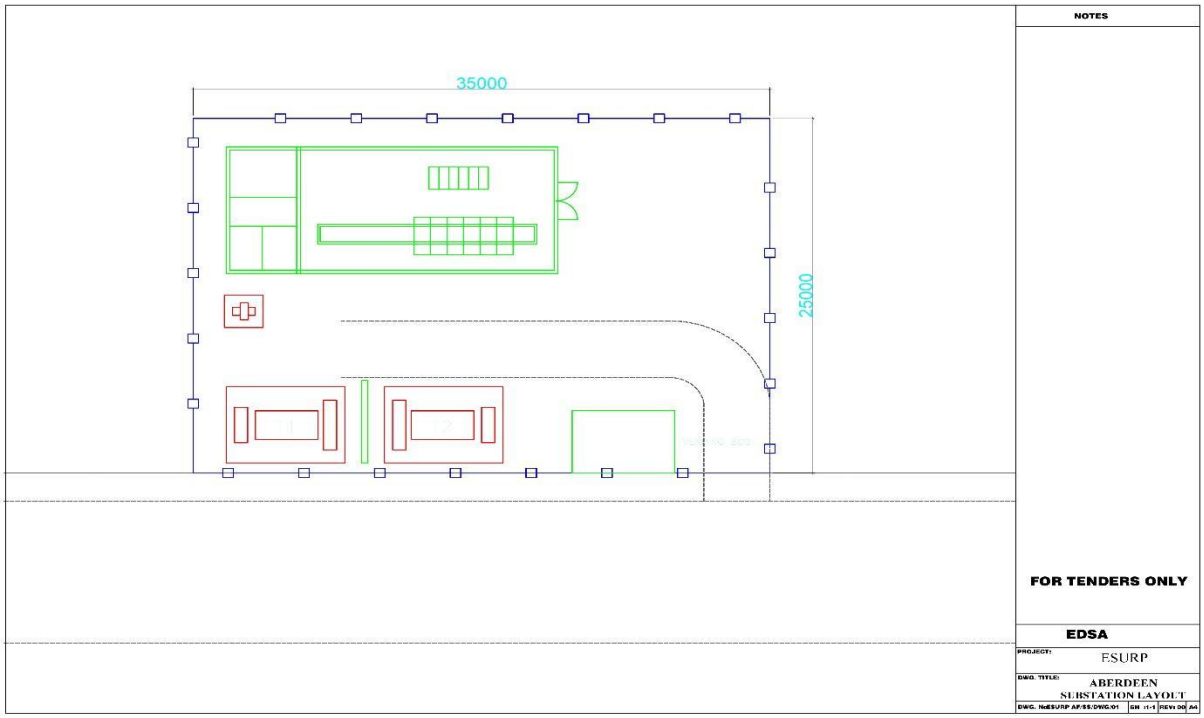

Figure 1-4: Aberdeen Substation Layout

1.2 Objectives of the Project

The proposed subtransmission and distribution network is an important component in the revitalization of Sierra Leone, a country desperately attempting to rebuild its infrastructure, rehabilitate its economy, attract investment, and improve the livelihood of its citizens following years of civil unrest and civil conflict. The GoSL is taking great strides to develop strategies and policies to promote sustainable development and sound environmental management. Infrastructure constraints or non-availability of power, water, and communications services are major impediments to economic recovery and growth.

Achieving a reliable and environmentally sound supply of electrical energy is central to sustainable development that the GoSL is endeavoring to promote and develop. Improvements made in the energy sector will be instrumental in:

- establishing a major infrastructure component for the supply of vitally needed electricity;
- improving health and sanitation;
- reducing poverty and hunger;
- establishing employment, training, human resource development, and technology transfer opportunities;
- increasing earning potential;
- enabling industrial and commercial growth;
- encouraging community and rural developments; and
- contributing to the national treasury through tax payments.

Increasing population and demand for fuel wood (firewood) and charcoal place great pressure on environmental resources and threatens biodiversity and forests due to the unsustainable manner in which these traditional fuels are produced. Improvements in the energy sector will play a crucial role in stabilizing and developing the social and economic welfare of the country and its people. Energy is central to reducing poverty and hunger, improving health, and increasing literacy and education. Insufficient and unreliable electricity sources will further inhibit economic growth and foreign investment.

The proposed Project will create substantial improvements in the country's energy delivery and will provide positive socioeconomic benefits through the creation of jobs, and education and training programs.

1.3 The Need for an ESHIA

Because the nature of the project activities and the expected impacts (especially adverse impacts) that may result from the activities, an ESHIA is mandatory as per the provisions of the Environmental Protection Agency – Sierra Leone (EPA-SL) Act of 2008 as amended in 2010.

Part IV, section 23 subsection 1 of the Act stipulates that projects, as outlined in the First Schedule, require an EIA as a condition of permit to commence works and operation. The Second Schedule of the Act further highlights the factors determining whether a project requires an EIA. Briefly highlight those factors and relate to the anticipated activities under the ESURP AF.

In addition, the project is financed by World Bank (WB). As part of the conditions of financing, the Bank triggered a number of its Environmental and Social Safeguards policies for this project: OP/BP 4.01 – Environmental Assessment; OP/BP 4.11 – Physical Cultural Resources; and OP/BP 4.12- Involuntary resettlement. The ESHIA will demonstrate compliance to the requirements of these policies especially the OP/BP 4.01.

The Environmental and Social Health Impact Assessment (ESHIA) seeks to meet the following specific objectives:

- ✓ detail out the ESHIA process including the statutory provisions and policies governing the conduct and review process of ESHIA in Sierra Leone;
- ✓ describe and detail out the project and its activities including alternatives considered;
- ✓ assess the environmental and social impact of Sub-transmission and Distribution Network along the project footprint;
- ✓ identify the significant potential positive and negative impacts of project activities;
- ✓ propose mitigation measures and plans for managing the identified impacts. In essence, the ESMP;
- ✓ engage and consult stakeholders on project activities and integrate their concerns in the assessment;
- ✓ establish the site-specific biophysical, health status and socio-economic baseline conditions of the project area i.e. receiving environment;
- ✓ incorporate the recommendations of the ESHIA process into detailed project design and decisions.

1.4 The ESHIA Process

Following the requirements for securing an EIA license as stipulated in the EPA Act, 2008 as amended in 2010, a checklist indicating the processes on obtaining the EIA license is prepared by EPA. The proponent had earlier sent an application to the EPA, and a Screening process was initiated via filling out a screening form, which has been sent to the EPA and the proponent awaits response. In brief, the processes are:

1. The proponent or developer as the applicant begins the process by registering the project proposal through an application where a screening form is filled and submitted to the agency. The agency at this stage makes a decision whether an EIA is required or not and the project is categorized once an EIA is required.
2. A detail scoping report (which identifies the important issues and prepare Terms of Reference (ToR) is to be prepared and submitted to the agency.
3. Upon approval of the screening form, the proponent is then informed that he can proceed in conducting the ESHIA studies. At the end of the study, findings will be presented in an EIA report. This report is submitted to the EPA

4. Once this report is approved, the client is requested to carry out a public disclosure meeting with concerned stakeholders to inform and consult with them and the outcome in-cooperated into the report. The completed report is finally submitted to the EPA for a decision on the issuance of an EIA license.
5. The project will proceed to the implementation stage if a license is issued. Environmental Monitoring and Auditing of the project's activities, while it lasts, is undertaken to ensure that the terms and conditions of the EIA licenses issued are met in accordance with the EPA Act, 2008 as amended in 2010.

The ESHIA report is in fulfillment of the EPA Act of 2008 (as Amended in 2010) as a project of this nature would have environmental and social impacts on the environment and the affected community both positively and negatively. The workflow for the ESHIA is provided in Figure 1-4.

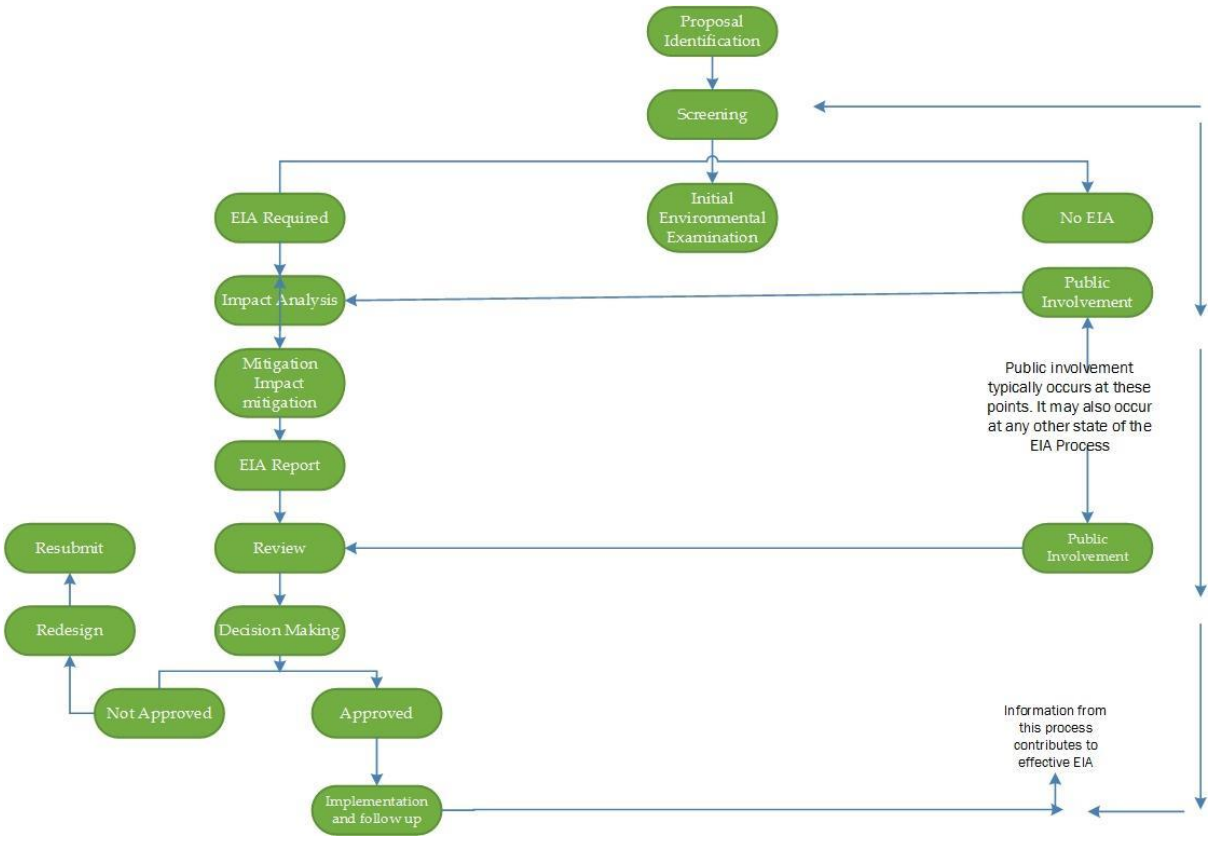

Figure 1-5: EIA Workflow Process

1.5 Approach and Methodology of the Study

Based on the ToR, the methodology used for the study consist of the following:

- ✓ literature review/ Desk research: Documentation on policies, laws, regulations, and guidelines related to environmental management, workplace safety, waste management, land use EIA process etc., at both the national and international levels.
- ✓ data collection: Through site visitation, the required qualitative, quantitative data were collected, and observations made. Questionnaires were administered, water samples were collected for laboratory analysis, noise and air quality observations were made.
- ✓ stakeholders' consultation: Focus group discussions and interview with key partners were conducted and analyzed to find out their involvement, role, and responsibilities in this project.
- ✓ mapping of the site: All the SSs visited were mapped using Global Positioning System (GPS) device and maps were produced using ArcGIS desktop software.

The study was done primarily to meet the EPA-SL's local requirements for securing the EIA license and in line with the World Bank Safeguards Policies to enhance compliance with international guidelines.

2.0 LEGAL AND INSTITUTIONAL FRAMEWORK

The legal and institutional framework governing ESHIA usually provides guidelines with a view of ensuring the protection of the environment and sustainable development. The legal provisions are found in the EPA Act and other related legislations nationally. International policies like the World Bank operational policy were also considered.

2.1 National Policies

2.1.1 Sierra Leone National Land Policy 2015

This Policy highlights Land distribution (acquisition and allocation), access to land by all Sierra Leoneans and investors, land tenure systems, land use planning and regulations, land management and administration systems and land adjudication systems.

The following are policy statements in the National Land Policy:

A. After the coming into force of this Policy the sovereign title to Government/State lands and public lands shall vest in the National Lands Commission as follows: -
   I. as to Government/State lands in trust for the citizens of Sierra Leone as a whole; and
   II. as to public lands in trust for the citizens of Sierra Leone as a whole or in trust for the particular community that originally owned the land as prescribed by the statute or other law creating the same; and

B. The sovereign title to private lands shall henceforth vest as follows: -
   I. as to land held under freehold tenure in the Western Area in the individual, group of individuals or Corporate entity absolutely;
   II. as to communal lands in the Provinces in the new Chiefdom Lands Committee (instead of the Chiefdom Council) in trust for the particular community concerned;
   III. as to family lands held under family tenure in the Province in the family as a unit;
   IV. as to land held under Customary tenure in the Provinces in the Chiefdom Lands Committee/Village Area Lands Committee or the family which made the grant of usufructuary rights in perpetuity to the groups or individuals or corporate entity subject to the grantor's residuary rights.

According to the policy, the acquisition must be necessary for the interest of: -

- ✓ defense;
- ✓ public safety;
- ✓ public order;
- ✓ public morality;
- ✓ public health;
- ✓ town and country planning; and

- ✓ the development and utilization of the property to promote the public benefit.

In context, this policy aims at managing land, proving guidelines on land categorization and its natural resources in accordance with sustainable resource management principles, which is important to this ESURP project in the area of land acquisition for substation construction.

2.1.2 The National Environmental Policy (NEP) 1994

The NEP recognizes the importance of:

- ✓ conservation and sustainable utilization of the national biological resources;
- ✓ establishing environmental protection standards, monitoring changes in, and publishing relevant data on environmental quality and resource use;
- ✓ providing for prior EIA of proposed activity likely to have an adverse effect on the environment;
- ✓ cooperation with other countries and agencies for optimal use, prevention or
- ✓ abatement and protection from the transboundary transfer of natural resources and
- ✓ raising public awareness and promote understanding of environmental issues and problems and to encourage individual and community participation in environmental improvement efforts which are all essential in addressing the issues of Biosafety.

The following sectoral policies are highlighted within the NEP:

- ✓ Land Tenure, Land Use, and Soil Conservation;
- ✓ Water Resources Management;
- ✓ Forestry and Wildlife;
- ✓ Biodiversity and Cultural Heritage;
- ✓ Air Quality and Noise;
- ✓ Sanitation and Waste Management;
- ✓ Toxic and Hazardous Substances;
- ✓ Mining and Mineral Resources;
- ✓ Coastal and Marine Resources;
- ✓ Working Environment (Occupational Health and Safety);
- ✓ Energy Production and Use.

This project involves the rehabilitation of existing lines and the construction of new transmission lines will raise some environmental concerns, which the NEP speaks to for the attainment of sustainable development through the implementation of sound environmental management systems.

2.1.3 Energy Efficiency Policy of Sierra Leone 2016

This Policy aims to improve on energy access while transforming the energy sector towards greater sustainability, which aims at reducing inefficient consumption, frees up power supply capacity, and provide greater access to electricity for consumers.

The vision of the energy efficiency policy is for Sierra Leone to achieve a modern, reliable, cost-effective, sustainable and efficient energy system by 2030, which is based on a diversified energy mix, a vibrant energy technology industry and provides modern energy services at affordable prices to end consumers.

2.2 National Legislations and Regulations

2.2.1 The constitution of Sierra Leone 1991

The 1991 constitution of Sierra Leone is a set of fundamental rules and precedents, which governs Sierra Leone. This constitution has fourteen chapters with numerous parts, sections (S) and subsections (ss). It sets the framework for the three arms of government, which are the Executive, Legislature and the Judiciary.

Our 1991 constitution is silent on Environmental related issues, which was not topical in our jurisdiction at that material time hence it was over sighted. However, Section 21, subsection 1 paragraph 'a' talks about the acquisition of land for public interest in an event a particular development will affect the lives of most Sierra Leoneans, as is the case of this ESURP project. From 2013 to 2016, the country undertook a constitutional review process where the environment or EIA made headlines in that document. The country still awaits a referendum to make it the new rulebook on Environmental and natural resources management.

2.2.2 Environment Protection Agency Act 2008 as amended in 2010

The key legislation governing the EIA/ESHIA process is currently the Environment Protection Agency Act, 2008 (EPAA 2008) (as amended in 2010). This Act establishes the role of the EPA-SL and sets out its functions and management. The EPA ACT 2008 is the overarching legislation that deals with the protection of the environment. They are responsible for monitoring the implementation of national environmental policies relating to Sierra Leone and deal with all activities and requirements of an EIA. Since this project will include some excavation work and the influx of employees from other location to the project area, some Environment, social and health issues will erupt where the Impact needs to be identified and assessed.

Section. 2 subsection 1 of the Environment Protection Agency (EPA) Act of 2008 establish a body cooperates that is responsible for the effective protection of the Environment for sustainable development.

Part IV of the EPA's Act of 2008 highlights the concept of EIA. Section.23 subsection.1 state that individuals or bodies corporate are required to undertake an EIA for any project that causes:

a. substantial changes in renewable resource use (e.g. conversion of land to agricultural production, forestry or to pasture land, rural development, timber production);
b. substantial changes in farming and fisheries practices (e.g. introduction of new crops, large-scale mechanization or use of chemicals in agriculture);
c. exploitation of hydraulic resources (e.g. dams, drainage and irrigation projects, water basin development, water supply);

d. infrastructure (e.g. roads, bridges, airports, harbours, transmission lines, pipelines, railways);
e. industrial activities (e.g. metallurgical plants, wood processing plants, chemical plants, power plants, cement plants, refinery and petrochemical plants, agro-industries);
f. extractive industries (e.g. mining, quarrying, extraction of sand, gravel, salt, peat, oil, and gas);
g. waste management and disposal (e.g. sewerage systems and treatment plants, landfills, treatment plants for household and hazardous waste);
h. housing construction and development schemes;
i. establishment of places of entertainment, motor repair garages, and welding shops;
j. Importation of second-hand vehicles. Etc.

Any individual or corporate body that skip this process, commits an offence and will be punished as per the prescription of the law in the EPA's Act of 2008.

2.2.1 National Electricity Act of 2011

This Act unbundled the former National Power Authority (NPA) to two separate entities thus:

a. Electricity Generation and Transmission Company (EGTC) and
b. Energy Distribution and Supply Authority (EDSA)

Part VI outlines EDSA's cardinal function as the supply, distribution and retail sale of electricity for the entire country except in areas where a license has been issued to another qualified entity.

Part X of the National Electricity Act of 2011 deals with land acquisition and related environmental practices. This Act gives the Minister of Energy Power to acquire land for EGTC, EDSA, or both even if the land is private or some private interest in the land subject to payment of adequate compensation. Compensation of such land is paid by the GoSL firstly and the Authority or company will reimburse government later.

During the life of the project, EGTC, EDSA, or both will at any time decide to sell, lease or dispose of any land easement, property or interest in any land or waterway in a proper manner.

This Act gives the authority for breaking streets for laying any supply line at any height across any street or road and the erection of poles and any other erections for the purpose. The company or Authority should consult the relevant ministry before breaking any street and they should make good the street or road after the breakage. This Act is relevant to this project, as we will see breaking of street (RoW) for laying underground cables and for the erection of poles.

Section 58 of the National Electricity Act 2011 gives the power to cut or lop any tree shrub or hedge, which obstructs or interfere with any supply line of the company or the authority, the laying or erection of any supply line or proposed route of the supply. A fourteen days' notice should be given to the occupier of the land before the lopping and cutting of any tree, shrub or hedge.

Section 59 and Section 60 of the said Act talk about the power to enter land acquired by the Authority or company for a certain purpose; given reasonable notice to the occupier of any land with the intention to enter and notice of the intention to enter and construct respectively.

Electric cables should not be placed across any navigable waterway whether above or below or underground without the consent and approval of the Minister.

Finally, all companies or independent power producers should comply with all environmental health and safety legislations as per Section 62 of the Act.

2.2.3 Sierra Leone Roads Authority (Amendment) Act of 2010

Sierra Leone Roads Authority (SLRA) Act of 2010 is an amendment of the SLRA Act of 1992. The Authority has the legal mandate to set out the width of the right of way as per the amendment of Act No.2 of 1992, Section 5, subsection 2 paragraph C which states in part "…. For the attainment of the object stated in subsection 1, the Authority shall set the width of the Right of Way (RoW) for roads which forms part of the national network". The proposed medium voltage line will run through the RoW of the roads, which requires seeking the attention of SLRA through this Act.

2.2.4 Public Lands Ordinance 1898

Part 1 of CAP 116 of the public lands' ordinance deals with the acquisition of land and the provision of the Ordinance may not apply to the Provinces.

Under the Public Lands Ordinance Law, the GoSL can acquire any land in the public interest as stated in Section 4. Therefore, in an event this project needs a land, with no alternative or the alternatives are remote, this part of the Act can be used for land acquisition. The declarations for the warrant of acquisition for such land are then Gazetted. Section 5 of the public land ordinance carves out the processes in informing the owner or owners of the land accordingly.

Parts 1 of this ordinance also outline the following:

- ✓ power to enter into a survey;
- ✓ power to enter and take a land by the Director of Surveys and Land with all necessary workmen and other servants;
- ✓ how to mark out land acquired for the service or use of Government;
- ✓ plan and certificate to be registered;
- ✓ registration to be conclusive;
- ✓ the power of the minister to sell lease when public work is abandoned or land is superfluous to requirement;
- ✓ Cases in which the owner refuses to give up possession and so on.

Part 2 of the ordinance provides for payment of compensation to the affected persons. Section 15 of the ordinance states that the affected persons of any land appropriated by the government for public benefited shall be entitled to compensation as per the value of the land. Compensation cannot be determined in isolation; as per Section.16 of the ordinance, compensation should be determined together with the owner, the occupier, or any other person having interest in a land that has been appropriated by Government.

The following are also highlighted in part 2 of this ordinance

- ✓ cases of disputed compensation;
- ✓ matters to consider in determining compensation;
- ✓ matter to be neglected by the court in determining compensation when application is been made to the court with twenty-one days (21) before the Director of Surveys gazette the land acquired on behalf of government.

The following are the matters the court normally do not consider when dealing with compensation cases from an aggrieved against the state:

- the degree of urgency which have led to the acquisition
- any disinclination of the person interested to part with the land acquired, etc.

2.2.5 Factories Act, 1974

The Factories Act of 1974 is administered by the Ministry of Labour and was set up to regulate occupational health and safety issues, which might arise at factories. During the construction of new medium voltage lines and the rehabilitation of the remaining 11kV and LV lines, occupational health and safety issues might arise which falls under this Act.

This Act talks about workplace health and safety thus:

- ✓ that sufficient and suitable sanitary facilities to be provided for employees;
- ✓ that printed copies of any regulations made under any part of the act which is to be enforced within the workplace should be posted in the factory;
- ✓ owners of factories shall make sure necessary precautions are taken to ensure the safety of employees;
- ✓ competent persons should be in charge of machinery and that two or more engineers should not be in charge of one machinery;
- ✓ that any factory machinery developing more than 250 horsepower or where any amount develops more than 75 horse-power, all such machinery should be under the general supervision of an engineer;
- ✓ every factory having machinery developing more than 250 horsepower all such machinery shall be inspected regularly by an engineer;
- ✓ accidents should be reported to the respective authorities as prescribed in the act;

2.2.6 Local Government Act, 2004

This Act focuses on having a meaningful decentralization and devolution of Government functions through the establishment and operation of local councils around the country. It recognizes local councils as the highest political authority in the locality and shall have legislative and executive powers to be exercised in accordance with this Act or any other enactment. Local councils shall be responsible, generally for promoting the development of the locality and the people's welfare in the locality with the resources at its disposal and with such resources and capacity as it can mobilize from the central government and its agencies, national and international organizations, and the private sector. Local councils have the responsibility to prepare a development plan, which shall guide the development of the locality.

This project will be implemented within areas under the jurisdiction of the Freetown City Council and Western Rural District Council which are all part of the local council. The project may involve possible involuntary resettlement issues which requires the valuation of property that is covered under Part VIII, Section 72 of this Act.

2.3 Institutional Framework

2.3.1 Environment Protection Agency, Sierra Leone

The Environment Protection Agency was set up to replace the National Commission for Environment and Forestry (NaCEF), which was mandated to oversee issues pertaining to the environment and forestry. The EPA was established with a Board of Directors set up as its governing body. This Board consists of a Chairman and representatives from the various line Ministries and a Unit as stated in section 3 of Part II of the EPA Act Subject to this Act, the Board shall have the control and supervision of the Agency. The Agency shall act in liaison and cooperation with government agencies to control pollution and the general protection of the environment. The Agency, subject to this Act, shall promote effective planning in the management of the environment, coordinate and monitor the implementation of the Act.

The EPA generally oversees the EIA process which this ESHIA process is not an exception to. Summary of the main functions of the EPA in the ESHIA process are as follows:

- ✓ registers and categories the project;
- ✓ conducts ground truthing of the project site;
- ✓ reviews and make recommendations with respect to agreed ToR of the project
- ✓ monitors public disclosure;
- ✓ give approval of license through the EPA board;
- ✓ audits and monitors ESHIA project implementation.

2.3.2 The Ministry of Energy

The Ministry of Energy (MoE) is the energy sector ministry tasked with the responsibility to formulate and implement policies, projects and programmes on energy and provide oversight functions across the entire energy supply chain for all sub-sector agencies (which include electricity production, electricity transmission, electricity distribution and supply) and other forms of energy supply and utilization, coordinating and managing all aspects of energy in its various forms in the country. The MoE is one of the implementing agencies of ESURP.

2.3.3 The Electricity Generation and Transmission Company

The Electricity Generation and Transmission Company (EGTC) is responsible for the generation, transmission of electricity and sale of electricity to EDSA. EGTC also manages the national transmission grid, which connects electricity generation sources to bulk electricity consumers.

2.3.4 The Electricity Distribution and Supply Authority

EDSA is responsible for the supply distribution of electricity to customers. Key functions of EDSA include:

- ✓ responsible for the supply, distribution and retail sale of electricity for the entire country except in areas which the Commission has issued a distribution license to another appropriately qualified entity;
- ✓ be responsible for dispatch and system control of electricity within its territory;
- ✓ establish as far as is practicable uniform standard voltages throughout its area of supply;
- ✓ secure the supply of electricity at reasonable prices;
- ✓ carry on any business usually associated with electricity distribution and supply;
- ✓ promote and encourage the economic and efficient use of electricity, especially for domestic, commercial, agricultural, industrial and manufacturing purposes;
- ✓ perform any other functions incidental or consequential to its functions under the 2011 Act.

2.3.5 The Sierra Leone Roads Authority

The SLRA is the institution responsible for managing roads in the country. Their mandate is to develop and maintain the national roads network, advise Government on general road policies and contribute to addressing transport concerns, among others. The SLRA manages Right-of-Way (RoW) issues in Sierra Leone. EDSA has to make all application with respect to the RoW to SLRA for this project.

2.4 World Bank's Safeguard Policies

This relates to the current environmental and social policies of the WB. These policies are mechanisms for addressing environmental and social issues in WB's financed projects' project design, implementation, and operation, and they provide a framework for consultation with communities, public disclosure, restoring livelihoods of displaced persons etc.

This project triggered three (3) safeguards policies including OP/BP 4.01, OP/BP 4.11, and OP/BP 4.12.

OP/BP 4.01- Environmental Assessment (EA) helps to ensure the environmental and social soundness and sustainability of investment projects. It further supports the integration of environmental and social aspects of projects in the decision-making process.

BP/OP 4.11- Physical Cultural Resources (PCR) - assists in preserving PCR and in avoiding their destruction or damage. PCR encompasses resources of archeological, paleontological, historical, architectural, and religious (including graveyards and burial sites). There is a cemetery along the Congo town Kingtom route in the west and another along Cline Town, Granville Brook (dumpsite) and Blackhall road in the East were the line passes.

BP/OP 4.12 Involuntary Resettlement seeks to avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

This policy covers direct economic and social impacts that both results from Bank-assisted investment projects and are caused by:

The involuntary taking of land resulting in:

- ✓ relocation or loss of shelter;
- ✓ loss of assets or access to assets; or
- ✓ loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or
- ✓ the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons

Hence a Resettlement Framework (RF) has been develop for possible development and implementation of RAP.

3.0 PROJECT DESCRIPTION

This chapter details the project components, site locations, the main activities to be performed under the project and presents the potential environmental issues that could arise from the different activities.

3.1 Project Components

The project components comprise: (a) the construction four 33/11kV substations and upgrade of one 11kV switching station to a 33/11kV substation; (b) construction of about 46km of 33kV subtransmission lines to link the five substations; and (c) the rehabilitation and construction of 11kV and low voltage distribution network in the communities around the substations. All the substations, the subtransmission and the distribution lines are located in the Western Urban and Rural Areas. The tentative 33kV line routes and proposed sites for the 33/11kV substations are shown on Figure 1-1

3.1.1 Substation

All the five substations would be indoor type comprising a main control building that would house all the electromechanical equipment, Outdoor power transformers mounted on plinths, substation gate house and customer service centers all fenced within a piece of land about 35m x 25m. A typical substation layout showing the various components of the substation is provided in Figure 3-1

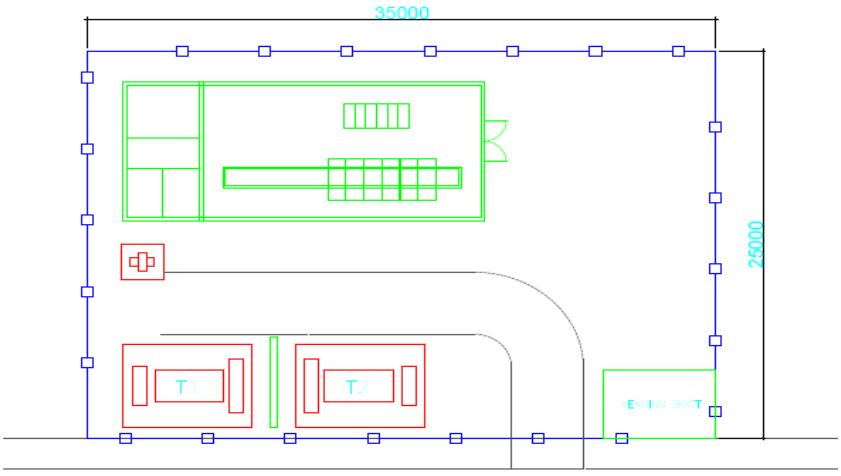

Figure 3-1: Typical Substation Layout

3.1.1.1 Power Transformer

The power transformer would be delivered empty of the transformer oil filled. The oil which has no PCB agents would be delivered separately and filled at site after installation before testing and commissioning. The risk of oil spill arises during the filtration and filling the transformer with the oil. Oil leakages during operation also poses environmental risks. The large volume of oil poses fire hazard to the surrounding communities in case of explosion.

3.1.1.2 substation Equipment

All the substation equipment (33 and 11kV switchgears, metering panels, battery and battery chargers, etc.) would be supplied fully assembled and their delivery, installation and operation does not pose any significant environmental problem. The batteries would be Lead Cadmium type that does not require refilling during its life of operation

3.1.1.3 Control Building

The control building would be of sancrete construction. The cement for the construction would be sourced from the local market.

3.1.2 33kV Subtransmission Lines

The 33kV subtransmission network will connect the all the five substations together. The total length of the proposed lines is about 46km. There would be two types of construction, Steel tubular poles and lattice tower lines.

3.1.2.1 Line Structures

Steel tubular pole line (Figure 3-2) had been proposed for construction of subtransmission lines in the densely built up Western Urban Areas, whilst double circuit lattice towers are proposed for the subtransmission lines to the substations in Western Rural Areas. The poles would be directly buried in excavated holes of about 600mm in diameter, whilst the towers that would have a maximum base diameter of 3.5m and would be erected on concrete foundations.

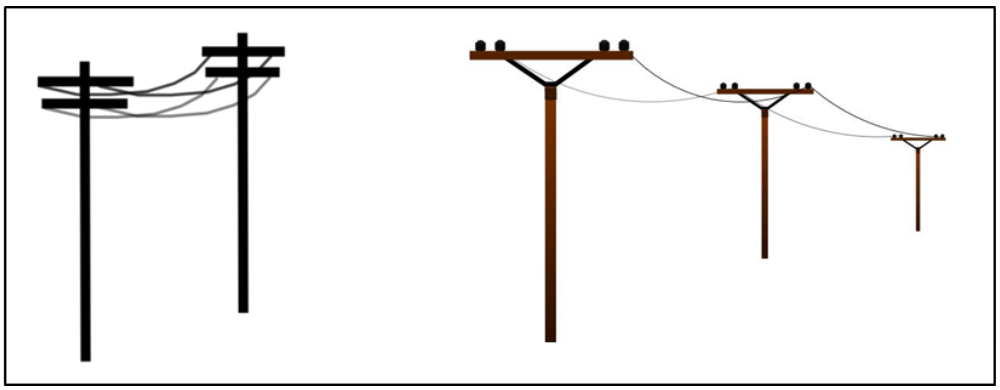

Figure 3-2 : 33kV line on Steel Poles (Flat Construction)

3.1.2.2 Foundations

Foundations will be designed for all the specified structure types for a variety of soil conditions, both in dry and fully submerged conditions and for rock. Foundations for tower lines will be of concrete, with a depth of about 2m and an area of about 3.5m x 3.5m. In flooded areas the height of concrete foundations for lattice structures will be at least 1,200mm aboveground level to ensure protection of the steel against corrosive water. Using tower measurements of 3.5 m X 3.5 m at the base and footings of 3 meters x 3 meters x 2 meters deep under each corner, the diagonal corner distance from the center point of the

tower is calculated at 4.3 meters plus 2.7 meters clearance for construction, a total of 7 meters is used as the estimated footprint for construction purposes.

3.1.2.3 Right of Way (ROW)

Generally, the ROW of transmission line includes land set aside for the transmission line and associated facilities, land needed to facilitate maintenance, and to avoid risks of fires and other accidents. It provides a safety clearance between the high-voltage lines and surrounding structures. However, for MV subtransmission and distribution lines in urban areas (as is the case for this project), it is more economical to restrict the lines to the ROW of the roads so as to limit the social impact on the community.

3.2 Project Activities

The project activities will consist of a range of operations that are aimed at ensuring that the transmission and distribution network construction is completed in time and will be operational as required. The implementation of the main activities will occur in three different phases: Preconstruction Phase, Construction Phase and Operation Phase.

3.2.1 Preconstruction (Mobilization) Phase

Mobilization of equipment, materials, and construction personnel, together with final design will commence when all necessary permits and approvals have been obtained. The Mobilization Phase will include establishing offices and material storage areas in the project area, assembling equipment; and procuring construction workforce and materials. The Mobilization Phase is anticipated to last approximately three months after contract signature. The delivery of material could overlap with the construction phase activities

It is anticipated that materials and equipment will be imported for the construction phase, through the Port of Freetown and delivered to the storage areas by container trucks.

3.2.2 Construction Phase

The major activities that would be involved in the construction phase includes:

- ✓ Tower Spotting;
- ✓ Clearing of Right-of-Way;
- ✓ Clearing and Excavation of Tower Foundation and substation earthworks;
- ✓ Clearing of Tower Track;
- ✓ Storage and Transportation of Equipment and Material;
- ✓ Erection of Towers and Stringing of Transmission Lines;
- ✓ Erection of substation equipment and transformers

Construction of the proposed transmission line and substation will utilize skilled, semi-skilled, and unskilled labor. A temporary workforce of approximately 80 workers is anticipated. Most of the labor force will be recruited from within Freetown and will include the maximum use of qualified personnel from the local communities. It is anticipated that the construction phase will last approximately 12 months.

3.2.2.1 Tower spotting

Tower Spotting is the determination of the individual location for the installation of the towers. Activities that will be undertaken along with tower spotting include final survey and soil investigation. These activities necessitate intrusive access and some clearing of vegetation, and or temporal displacement of property in the road ROW. Geotechnical survey and tower spotting are therefore activities that shall be carried out after the issuance of an environmental permit and disbursement of funds from the lending agencies to identify the optimum foundation design for each tower. The selection of the foundation design type will follow the collection and analysis of the data of each tower location after soil investigations. At this stage minor adjustments may be made to the final tower location, due to the vertical profile of the transmission line corridor, and to avoid buildings that may have been constructed after the collection of baseline data on structures in the proposed ROW. Such adjustments will be limited to a few meters in either direction.

3.2.2.2 Clearing of Right-of-Way

All the subtransmission line routes are within the ROW of the main roads within Freetown so there would not be much vegetation to be cleared. However, there may be temporal activities commercial (table top trading, carpentry and machine shops, etc.) along the ROW.

3.2.2.3 Clearing and Excavation of Tower Base and Foundation

The proposed tower base areas will be cleared. These will be selected spots within the ROW for mounting the towers. The area to be cleared for a single tower will be made up of the dimensions of the tower base (5 m x 5 m). So, the total tower base area will be approximately 25 m^2 per tower.

Tower foundations will vary according to the prevailing geology. The towers will have concrete footings with foundation depths of 2–3 m or more depending on the nature of soils at the selected tower spots. Most of them will have footings of the pad and chimney type, which will be excavated mechanically. This method involves constructing a concrete pad at the base of the excavation area, after which each foot of the tower is erected within its own 'chimney' of steel reinforced concrete. After about two days, the formwork will be removed, and the excavation will then be backfilled to original ground level and consolidated.

The ground surfaces of the tower sites will be graded to provide gentle drainage away from the tower legs to avoid the collection of water at the tower bases which may lead to the development of stagnant water pools. Where necessary, particularly on hillsides, terracing, cribbing or riprap may be used to provide protection for tower foundations. In areas prone to flooding (swampy areas) a raft foundation

for transmission line towers may be used. The raft foundation is similar in concept to the pad and chimney foundation except that all four feet of each tower would be set on a single raft of concrete.

3.2.2.4 Transportation of Equipment and Material

During construction, the materials will be transported to the site via public roads and access tracks. Vehicle movements will be minimal since the work camps will be sited close to the proposed sites.

3.2.2.5 Erection of Towers and Stringing of Transmission Lines

After transporting the steelwork and its components from storage facilities to the site, erection of the transmission towers will proceed. Once the towers are erected, the conductors and shield wires will be strung and appropriately 'tensioned' to provide the minimum clearance between ground level and the wires. The proposed line is expected to cross over other power and transmission lines, highways, roads, and rivers and streams. Guard structures will be used when installing the conductor to ensure that the line does not cause hazards and nuisance to the public and construction staff alike. Due notification will be communicated to the appropriate authorities in cases where these lines will have to cross roads and utility lines.

Once the towers have been erected and the lines strung, tests and measurements shall be carried out to ensure that the line performs as expected. Minimum distances such as clearances between the lines and the ground level shall be checked and the lines shall be 'tensioned' as per specification. After the construction of the line, the soil conditions along the right-of-way will be assessed for such problems as compaction and erosion and mitigation action will be taken as appropriate. Areas of bare soil are expected to be re-planted with native cover flora to stabilize the soil, reduce erosion and prevent invasion by undesirable plant species. The line will be fitted with an optic fiber cable (OPGW), which will be used for system protection, control and communication.

3.2.3 Operations Phase

The operational phase of the project will involve the commissioning of the line and substation and maintenance of the RoW, the power lines, the towers and substation equipment.

The operation and maintenance of the transmission line will be based on internationally accepted standards, such as those of the International Electro-technical Commission (IEC). The EDSA has its own specific procedures for the operation and maintenance of its lines and substations. The main activities to be carried out during the operating life of the transmission line include surveillance of the condition of the transmission line, towers and RoW; routine and emergency maintenance and repairs; and vegetation control. Vegetation control measures will be done manually.

3.2.3.1 Routine Running Maintenance

This consists of routine maintenance carried out by the maintenance department to ensure the integrity and safety of the lines. The maintenance activities carried out here include:

- ✓ Foot patrol: The Line Maintenance team carries out routine physical examination of the transmission line and its component parts to ensure the safety, security and integrity of the line. Such activities are carried out at least twice a year.
- ✓ Security patrol: This is done to check on segments of the line close to populated areas for signs of vandalism, tampering, and general security of the lines. It is to ensure an early detection of and rapid response to acts of vandalism and to rectify such situations as promptly as possible.
- ✓ Tower auditing and repairs: This provides a means of assessing the ageing process of towers. It starts one year after the commissioning of a line section and follows a one-year cycle. In a cycle of tower auditing, 10% of all suspension towers and all dead-end towers are thoroughly examined. As the line ages, it is subjected to wear and tear resulting in fatigue which may not be noticeable by a distant visual inspection. Detection and tightening of loose bolts on support and hardware can reduce premature wear and indicate for replacement of worn components before failure.

During operation, defects that are identified are repaired. Such defects may include the replacement of defective conductors, flashed over insulators, defective dampers, vandalized components, and maintenance of access tracks and ROW.

3.2.3.2 Major Maintenance

These are scheduled maintenance programs that are carried out on the transmission line to counteract the effects of the ageing of towers, lines and other accessories. The repairs may also arise out of the running maintenance activities. These maintenance programs usually become necessary as a result of the lines running through harsh environments. Some of the activities carried out under the major maintenance program include:

- ✓ Replacement of insulation of sections of the transmission line.
- ✓ Treatment of rust and re-painting of tower components.
- ✓ Replacement of corroded towers and transmission line components.
- ✓ Replacement of conventional bolts and nuts with anti-theft fasteners on older line sections.
- ✓ Rehabilitation of access roads and tracks.

3.2.3.3 Emergency Maintenance

These are activities relating to correction of sustained line faults. These could span a whole spectrum of minor faults (e.g. insulator failure) to such major defects as tower failures. Some of the activities carried out under this program include the construction of temporary by-pass line to replace collapsed sections of lines, reconstruction of the collapsed section, and aerial and ground patrols to locate sustained line faults.

4.0 PROJECT ALTERNATIVES

This Chapter describes the various alternatives which were available and considered as part of the development proposals. Generally, a comparison of alternatives can help to determine the best method of achieving project objectives while minimizing environmental and social impacts

4.1 No Project Alternative

The main objective of the project has been categorised into the following components; improving the Distribution utility capacity enhancement and performance, enhancing primary medium voltage distribution network reinforcement and extension, secondary and low voltage distribution network reinforcement and extension. The Environmental and social impacts of the project are assessed and no significant impacts are anticipated.

The sites for all the Substations are either on land owned by EDSA (Falcon Bridge) or on Government lands. The rehabilitation of the 11 kV and Low Voltage distribution lines would address the increased demand for electricity in the different capital city and its surroundings.

It is believed that there will be many benefits from the project that could over-weigh its limited environmental impacts such as providing fluent power supply to the consumers, in addition to the developmental and socio-economic benefits. Therefore, the no-project alternative is not an environmental/social requirement.

If the 11kV and Low Voltage distribution lines were not rehabilitated, the consequences would be as follows:

- ✓ energy capacity will not increase in the city-thus scaling up the electrification component of USURP by connecting new users (including commercial and industrial consumers) in the Freetown urban areas will be aborted;
- ✓ secure the demand of the new establishment as well as to cope with the demand increased from the residential/housings will not be achieved;
- ✓ the power supply to the consumers will not be improved;
- ✓ the consumers' financial losses from low-quality power supply will decline;
- ✓ as a result, an increase in the economic activities in the western region in not expected.

The Sierra Leone ESURP project has identified the needs for refurbishment, rehabilitation, expansion, and upgrading of the electricity distribution network and proposed different medium voltage network (33/11 kV and 33 kV) transmission and distribution options based on the length of the lines and the maximum required power transfer. The 33/11 kV and 11 kV voltage levels were considered based on the recommendation of the (ESURP) Study and because of technical-economic analysis studies done as part of the preparation of the (ESURP) study for an increase in electricity accessibility and supply.

4.2 Alternative Technology

Steel Tubular Poles (with a footprint of about 800mm) would be used for the 33kv sub-transmission lines within urban areas with narrow road RoW where it is difficult to erect steel lattice towers. Insulated

conductors would be used in crowded areas where it is difficult to meet line safety clearances. Alternatively, underground cables would be used in such areas. However, periodic checks will be carried out during operations to ensure immediate remedial measures are undertaken when and where necessary to avoid any spillover effects on the neighbouring communities and workers.

4.3 Location/Route Alternatives

The selections of the Substation, transmission and distribution lines location have been undertaken accord to criteria that fulfill technical, environment as well as socioeconomic objectives in order to achieve the most feasible application. Advantageously, a site for all the Substations is on land either owned by EDSA (Falcon Bridge) or on Government lands to serve the increase of the electricity demand from the surrounding area and demand on new connections to rural, and industrial areas around the Substation. Construction of a new 33/11kV Substation at Waterloo and Lumley Junction on land to be acquired by EGTC/EDSA under the India Exim Bank Facility project, all prescribed procedures for the acquisition of the landed properties will be followed to grievance and dissatisfaction in the course of executing the different project components.

Generally, there are few environmental constraints for construction and operation of the substation, transmission and distribution lines that are described in the ESMP report. If these constraints were followed during the implementation of the project, there will be no environmental/social objection with regards to site selection of the substation, transmission and distribution lines.

5.0 DESCRIPTION OF THE PROJECT ENVIRONMENT

Environmental baseline data is important to understand the physical, biological and socio-economic characteristics of the project's environment. Such information sets the ground for analysis of the potential impacts of the project's activities on the existing environment. Therefore, the collection of baseline data focuses on the information required to conduct an environmental and social impact assessment of a transmission and distribution network project.

5.1 Project Location

Sierra Leone is bounded on the North and East by Guinea, on the southeast by Liberia, and on the southwest and west by the Atlantic Ocean. The total area of the country is 71.740 km². The country is divided into five (5) administrative regions: the Northern, Eastern, Southern North-Western Provinces, and the Western Area. The project sites are located in the Western Urban and Rural Areas (Figure 5-1).

Generally, the coastal area of Freetown is a low-lying plain extended inland from the Atlantic Ocean. The area closest to the ocean is a largely swampy region; however, the Sierra Leone Peninsula, where Freetown is situated, is dominated by hills. To the East, the land rises from the coastal plain to a plateau in the North and to hilly terrain in the South. Sierra Leone is a constitutional republic with a directly elected president by its people. It consists of four provinces split into sixteen (16) districts (previously 14 districts). The Western Area province or Freetown Peninsula is comprised of the Rural Western Area and Urban Western Area Districts.

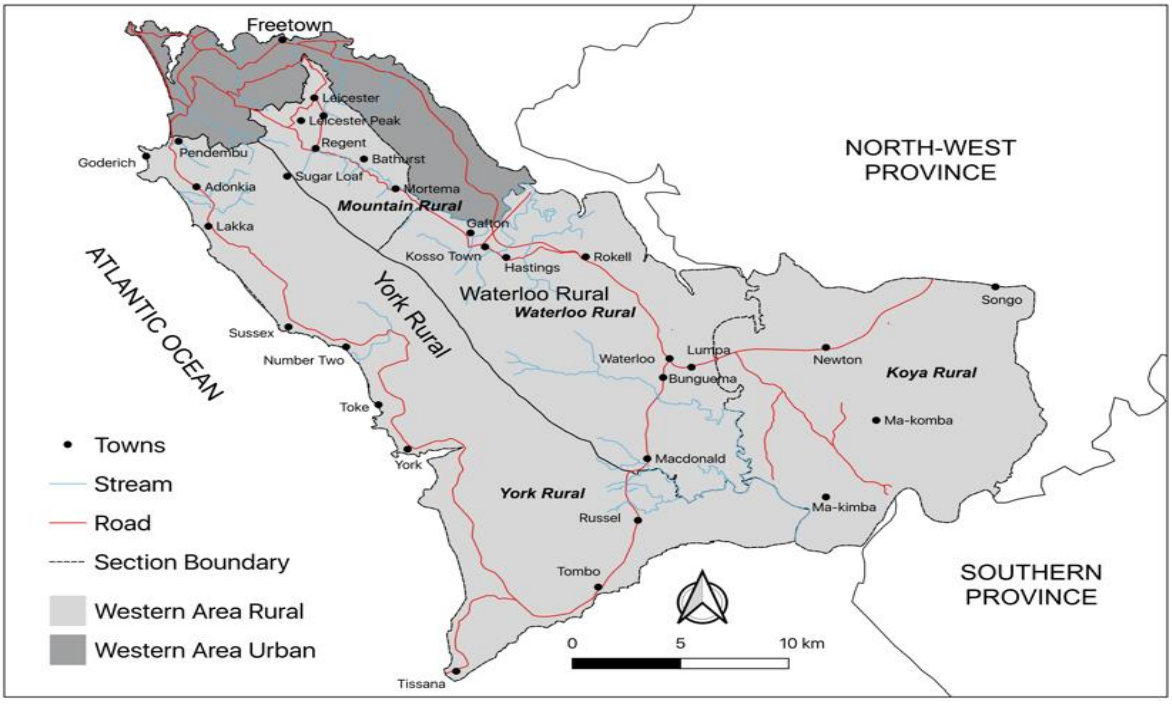

Figure 5-1: Project Area Map

The Western Area Rural District (WARD C), one of the sixteen Districts of Sierra Leone is located around the Peninsula in the Western Area. It borders the capital city Freetown to the East and West; Port Loko to

the North; and the Atlantic Ocean to the South and East. The Rural District capital was officially moved from Freetown to Waterloo in October 2009, by the GoSL. Waterloo is the largest town and capital of the district. Other major towns include Regent, Newton, Benguema, Tombo, and Leicester. The 2015 Population and Housing census registered WARD C's population as 444,270. Table 5-1provides the population distribution in Ward C.

The district is run by a district council headed by an elected District Council Chairman.

Table 5-1: Population Distribution in WARD C

Name	Status	Population Census 2004-12-04	Population Census 2015-12-04	Name
Western Area Rural	District	174,249	444,270	Western Area Rural
Koya Rural	Ward	22,996	70,423	Koya Rural
Mountain Rural	Ward	9,925	30,488	Mountain Rural
Waterloo Rural	Ward	77,791	213,778	Waterloo Rural
York Rural	Ward	63,537	129,581	York Rural
Sierra Leone	**Republic**	**4,976,871**	**7,092,113**	**Sierra Leone**

Source: Statistics Sierra Leone Demographic and Housing Survey, 2015

The Western Area Urban District is the most populous district in Sierra Leone. Western Area Urban hosts the country's capital and it is divided into Central, East, and West, which are further divided into wards and constituencies.

The district is the seat of the country's central government hence the wealthiest district in Sierra Leone with the largest economy, financial and cultural center. It is locally governed by an elected city council mayor elected every 4 years. The Freetown City Council is one of six municipal governments in Sierra Leone. The population distribution in the Western Area is provided in Table 5-2.

Table 5-2: Population Distribution in Western Area Urban District

Name	Status	Population Census 2004-12-04	Population Census 2015-12-04	Name
Western Area Urban (Freetown)	District	772,873	1,055,964	Western Area Urban (Freetown)
Central I	Ward	50,271	62,499	Central I
Central II	Ward	20,135	21,413	Central II
East I	Ward	55,166	61,244	East I
East II	Ward	79,934	89,530	East II
East III	Ward	316,409	448,572	East III
West I	Ward	46,319	53,981	West I

West II	Ward	91,345	130,149	West II
West III	Ward	113,294	188,576	West III
Sierra Leone	**Republic**	**4,976,871**	**7,092,113**	**Sierra Leone**

Source: Statistics Sierra Leone Demographic and Housing Survey, 2015

5.2 Physical Environment

An assessment of the project area based on a review of aerial photography, topographic maps, public databases, published literature as well as site visits was conducted

5.2.1 Topography and Geology

All the proposed substations and subtransmission line routes in the project area are situated on relatively lowland.

The Geological study was done mostly through desk studies on information gathered applicable to the various site and their general surroundings. Site visits were also made in order to identify some of the geological features of the site.

The Freetown Complex is a major intrusion characterized by a prominent layering of repeated sequences of troctolitic, gabbroic and anorthositic rocks. Differential resistance of these rocks to weathering and erosion has given rise to the parallel range of mountains from which Sierra Leone derived its name "Sierra Leona", - the Lion Mountain.

The Freetown Complex forms a crescent-shaped Peninsula intruding into the Atlantic Ocean from the West Coast of Sierra Leone. The Complex is approximately 60 km from the most northerly exposure to the southern tip of Banana Islands with a maximum width of 12 km. The Complex is essentially a Lopolith based on inwardly dipping layering that steepens towards the ocean.

Intensive mapping, geophysical prospecting, and drilling by the Department of Geological Survey revealed that the intrusion is part a funnel-shaped body with the centre of the "funnel" situated in the Atlantic, west of the Peninsula. The layered structures are concordant with the floor of the intrusion.

The funnel-shaped intrusive sequence consists of Olivine gabbro, layered troctolite, gabbronorite and anorthosite with a composite thickness of approximately 7000 metres.

The layered series of the complex have been divided into four major zones, in each of which is a generalised upward sequence from olivine-rich to plagioclase-rich rocks and within which prominent rhythmic layering occurs with strong differentiation in terms of mineral proportions. In addition, these four zones are delineated by two characteristics; topographically expressed, whereby the base of each zone forms a scarp and the top of each slope and strike valleys and by the repetition of rock types. A fifth zone, described as a marginal Facies, is unexposed and was revealed by the limited drilling on the eastern side of the complex.

Some of the project areas (Waterloo) are found within the Bullom sediments occupying the low-lying coastal plain of Sierra Leone. These sediments extend up to 50 km inland. Outcrops are rare and generally poor. The area consists of a laterally variable sequence of poorly consolidated, near horizontal,

often iron-stained gravels, sands and clays with occasional intra formational laterites and lenticular seams of lignite. The adjoining territories to the north and south are generally low-lying and flat. The general flatness is broken abruptly by a spectacular range of thickly forested mountains rising to nearly 1000 metres and dominating the peninsula at the northern end where Freetown is situated.

5.2.2 Land Use

Land use pattern in the Greater Freetown area was projected to continue to grow in terms of the built-up environment. The line route around the Western Urban District is proposed along the RoW but these routes have a high density of occupancy with residential houses, kiosks, and makeshift structures. Some line routes around Murray Town to Congo Town, somewhere between Kingtom and Connaught hospital passes through the coastal low land.

The lack of adequate planning and development control over the years, as well as constraints to development posed by the conflict (1991-2002), has led to rather an inefficient land use. The residential settlements are expanding on the coastal lowlands with increasing encroachment on the hill slopes. Generally, conditions of housing in the central parts of the city have deteriorated due to overcrowding in the low-income areas. Commercial activities are concentrated in the central business district and development of shops. Offices and workshops are expanding along the roads leading to the city centre. Industrial activities, on the other hand, are concentrated in the eastern part of the city. Aberdeen, one of the beneficiary communities, is a fast-growing community with commercial shops, hotels and high rise office buildings sprouting up along the RoW of the substation. All these developments place excessive demands on utility services and have a direct bearing on the expectations on the project. project.

In the Western Rural district, it is anticipated that very little compensation will take place since most of the transmission line routes especially the Regent - Jui, Jui - Wellington and Jui -Waterloo is proposed along the RoW of the highway, which has recently been cleared for the road construction works. A large part of the Cline Town – Blackhall road route passes through the Granville Brook dumpsite.

The proposed site of the substation is located in a fenced premise belonging to the ministry of transport part of which has been rented to a manufacturing firm. Proposed site is adjacent to sausage factory. The proposed Jui substation would be located in a training college's fenced premise adjacent to a mobile bank for the Sierra Leone Commercial Bank (SLCB). A photograph of the bare land proposed for the Cline Town substation is provided in Figure 5-2

Figure 5-2 The proposed Cline Town Substation site (the bare land)

5.2.3 Climate

The climate of Sierra Leone is a monsoon type humid tropical climate with two distinct seasons. The dry season is from November to April and the rainy season is from May to October. The annual rainfall averages about 3,000 mm, ranging from a low reading of 2,000 mm in the North to a high reading of 4,000 mm in the South. Average monthly temperature ranges from 23°C to 29°C, but it can rise to an average maximum of 36°C in the lowlands towards the end of the dry season while in the highlands the average monthly temperature could be as low as 15°C at the beginning of the dry season.

Climate data for Freetown was obtained from the Meteorology Department in Freetown. The department collates monthly rainfall and temperature data for all districts in the country. The available monthly rainfall data for Freetown covering 2013 – 2018 is tabulated in Table 5-3 and the average monthly rainfall for the period 2000–2016 in Figure 5-3. The monthly rainfall data for Freetown for the year 2018 (January - October) is shown in Figure 5-4. Monthly temperature data was available from January 2003 to December 2012. The rainfall and temperature data for Freetown was used to describe the climate of the project environment in Freetown.

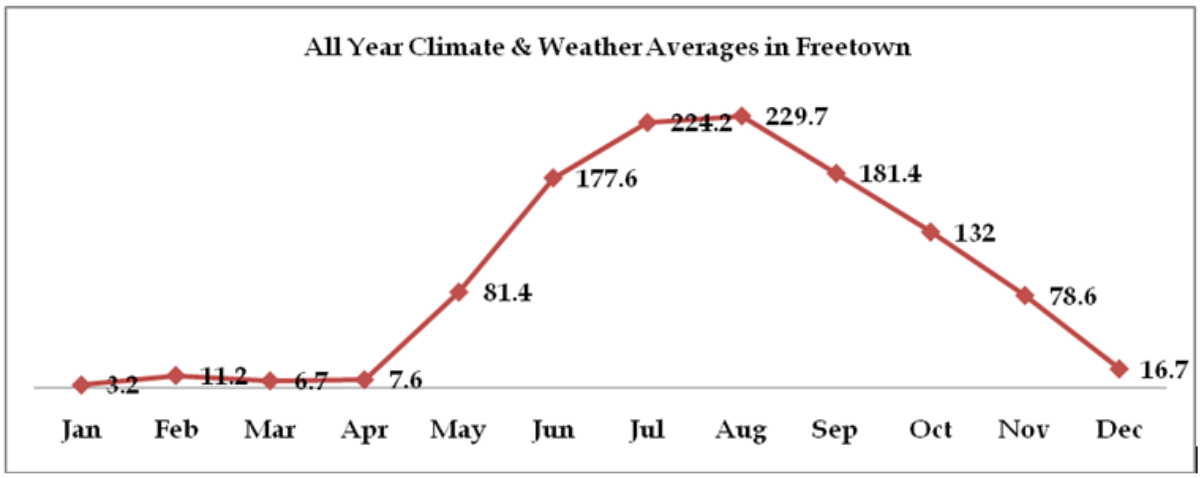

Figure 5-3: Line graph of Average monthly rainfall of Freetown 2000 – 2016

Table 5-3: Monthly Rainfall Data for Freetown (2013 - 2018)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
2013	8.2	2.4	7.2	16.8	196.6	487.2	404.7	540.4	536.4	283.1	87.9	53.7
2014	5.8	6.8	5.3	35.3	116.7	289.9	574.5	533.9	487.2	317.8	190.5	10
2015	1.3	12.3	0	19.7	173.9	263.5	831.1	489.2	556.1	251.9	56.7	0
2016	0	0	0	0.2	79	146.5	106.5	350.9	374.2	386.5	7.3	21.4
2017	2	1.7	17.3	35	176	352	940.3	1219.3	754.3	258.7	104.3	8
2018	3.3	3	13	20.7	34.3	290.3	691	548.3	588.3			

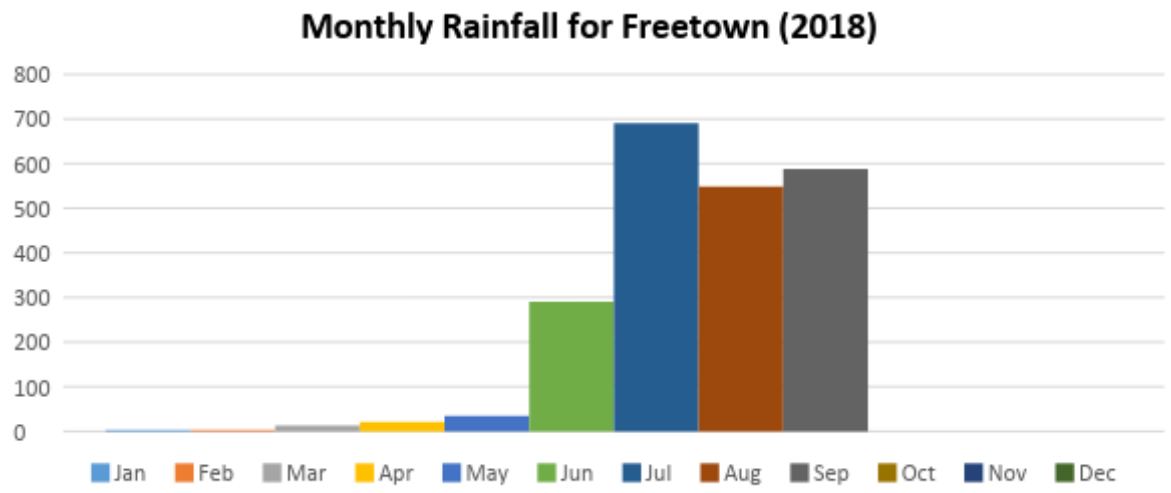

Figure 5-4: Monthly Rainfall Data for Freetown (January - October 2018)

5.3 Air Quality and Noise

This includes the establishment of both the present and future state of the environment with a focus on air quality and noise, taking into account changes resulting from natural events and from other human activities. The period of prediction of the future state of the environment should be comparable with the life of the ESURP project and this may mean predicting the air quality and noise aspects for decades to come. The main aim of the study was to assess the quality and determine the ambient air quality conditions and noise at the new substation locations, which will be the basis for future monitoring of air conditions during the project life cycle.

Specifically, the assessment set to:

a. establish baseline data for Total Suspended Particulate Matter (TSP), particulate matter (PM_{10} and $PM_{2.5}$); determine levels of carbon monoxide (CO); nitrogen dioxide (NO_2) and Sulphur dioxide (SO_2) ;
b. develop a technical report on air quality and noise monitoring exercises, and
c. establish monitoring and action plans following IFC guidelines.

5.3.1 Methodology

i. Air Quality

The air quality assessment was conducted at five (5) locations in the project area. The study employed real-time approach in the study of particulates. The HoldPeak 5800F $PM_{2.5}$/PM_{10} formaldehyde monitor was used during the assessment. The monitor has a resolution of 1µg/m^3 with a recording range of 1µg/m^3 to 999 µg/m3 with a minute by minute reading potential. This process was done each time a set of measurement was made each day. The Drager X- am 5000 (*www.drager.com*) was used for monitoring NO_2, SO_2 and CO. It is a small, light and easy to use which makes it ideal for field monitoring in areas

where conventional monitoring requirements are somehow restricted (electricity run monitors). It is very robust, water-tight and is designed for single-handed operation in tough industrial environments. Water- and dustproof according to IP 67 and with an integrated rubber boot, the device provides optimal functionality even under harsh conditions.

a. Quality Assurance (QA) Procedure

IFC guidelines on air quality were considered by observing various quality assurance procedures for different indicators. Prior to the commencement of monitoring each time, the HoldPeak 5800F was calibrated with TES 5322 Air Quality Monitor for $PM_{2.5}$ by observing parallel readings which did not drift. The zero point accuracy of the gaseous sensors was reached by carrying out the fresh air calibration each time measurement was made in order to correct instrument drift. Significant drift may interfere with data quality and this was achieved by the one-button calibration procedure of Drager XAM 5000 in an area away from the monitoring zone or area where trace levels of the measured gases or interfering gases are found. The display containing the current gas concentration changes with the display showing "OK" when calibration was done indicating a successful calibration process.

ii. Noise Monitoring

A Multifunctional Sound Level Meter (SLM)- SL-5868P was used to measure noise levels. This device conforms to the International Electro-technical Commission (IEC) 651 type 2 and American National Standards Institute (ANSI) 1.4 type 2. It measures a range of 30-130dB has a built-in calibration signal of 94dB, resolution of 0.1 dB, accuracy of ±1 dB. It can weight frequencies to either A, C and F and time weightings of Fast: 125 m/s, Slow: 1 sec.

QA Procedures

✓ The sound level meter was mounted on a camera tripod at a height of 1.3 meters.

✓ In all situations, the microphone was placed at least 3.5 meters away from nearby acoustical reflective surfaces (such as any hard surface).

✓ Measurements were performed with the following parameters:

- frequency weighting: A;
- time weighting: Slow;
- Measurement time: 20mins/5mins;
- Max hold.

✓ Prior to and after each noise reading, the SLM was calibrated using ND9 sound level calibrator with sound pressure level set at 94dB at an accuracy of ± 0.3dB. At every calibration, the difference in calibration was not greater than 1dB.

✓ Measurements were taken on days with no rain or high winds because these elements can both damage equipment and decrease the accuracy of the measurements.

Measurement Procedure

Measurements were made at ideal locations where there is less interference from other noise sources; (noise sources from vehicular horns, motor bikes, and nuisance from megaphones. Observations were made for a total of 20 minutes per location with readings taken from four directions for 5 minutes. Noise readings shown above are therefore averaged values of readings from four directions.

GPS coordinates were simultaneously taken at each location.

5.3.2 Results and Discussions

The following paragraphs presents the dusts and noise levels at the existing substations sites and how they compare with the WHO standards. The WHO Air Quality standards and IFC Noise standards with average concentrations of respective environmental performance indicators is provided in Table 5-4

Table 5-4: WHO Air Quality standards and IFC Noise standards with average concentrations of respective environmental performance indicators

Air Quality parameter	Units	Averaging Period	IFC Standards	Lumley SS	Aberdeen SS	Cline Town SS	Jui SS	Waterloo SS
Particulate Matter (PM_{10})	**µg/m³**	**1 year 24 hours**	**50 100**	**60.41**	**83.76**	**42.41**	**46.9**	**123.99**
Particulate Matter ($PM_{2.5}$)	**µg/m³**	**1 year 24 hours**	**25 50**	**17.63**	**22.49**	**13.28**	**12.63**	**45.67**
Nitrogen dioxide NO_2	**ppm**	**1 year 1 hour**	**40 200**	**BDL**	**0.028**	**0.018**	**0.035**	**BDL**
Sulphur dioxide SO_2	**ppm**	**24 hours 10 mins**	**125 500**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
Carbon monoxide CO	**ppm**	**1 hour 8 hours**	**35 9**	**BDL**	**-4.615**	**-1.38**	**-0.92**	**BDL**
Noise	**dB(A)**	**16 hours Day time**	**70**	**60.45**	**53.71**	**48.72**	**61.44**	**63**

BDL – Below Detection Limit, which is the concentration or quantity, derived from the smallest measure that can be detected with reasonable certainty for the monitor.

i. Particulate Matter

Figure 5-5 shows the spread of values of particulates with aerodynamic of less than 2.5 and 10 micrometres in diameter at all substation. There is no meaningful difference between the average levels of PM_{10} and $PM_{2.5}$ between sites but the spread of data is strongly apparent in the Waterloo substation. Such an observation was made because it is located close to the main highway linking Freetown and the Provinces. Hence, there were frequent vehicular activities around the site. It should be noted that the release of the Particulate matter is mainly due to mechanical abrasion or resuspension of dust particles or emissions from car exhausts which is uncharacteristic of the results observed in this baseline study. Nevertheless, the ten (10) hours average level of both PM_{10} and $PM_{2.5}$ at all five sites was considered good especially at the Lumley, Aberdeen, Cline Town, and Jui which showed good agreement with WHO ambient air quality standards. Emission profile of these indicators at these sites showed a good pattern of release indicating that the source(s) of emission appears to be uniform. However, the outlier values observed at the Aberdeen substation was noted to be coming from combustion engines and a waste-burning activity. The ten (10) hours daytime monitoring results showed good agreement with ambient standards set by WHO for all five sites.

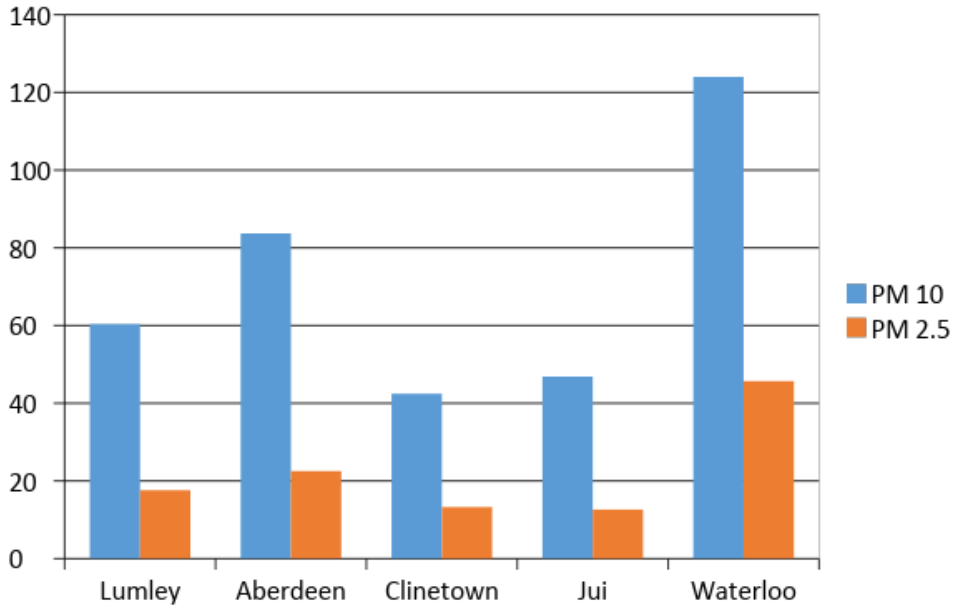

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Figure 5-5:Bar chart showing the spread of PM 2.5 and PM 10 across all five stations monitored

ii. Gaseous Indicators (NO_2, SO_2, and CO)

The gaseous sensors fitted in the Drager X am 5000 devices for NO_2, SO_2 and CO gases did **NOT** read the concentrations of the three main combustible gases in most cases but spontaneous releases from combustible engines in the Jui area was observed. However, the results recorded for these gases were below the detection limit (**BDL**) which is expressed as the concentration or the quantity derived from the smallest measure that can be detected with reasonable certainty for this real-time monitor. All five stations revealed no trace of the gases as evident in the time-weighted average values. It should be

emphasized that the device has a resolution of 0.01 ppm and 0.1 ppm for both NO_2 and SO_2, respectively and 2 ppm for CO with very short response times of 15 seconds for NO_2, SO_2 and 25 seconds for CO. Probable reasons why concentrations of these gases were not detected at these locations could be ascribed to; absence of sustained combustion activities because these gases are the basic indicators of fossil combustion. Even though evidence of releases of these gases was observed in few stations, our observations could be attributed to vehicular and waste-burning activity.

Judging from the current state of results, it is reasonable to note that the local airshed at all five areas is pristine as at the time of the study. However, this unperturbed state of the local airshed could be impacted when communities engage in burning activities around the sites as evident in few values. Nonetheless, the baseline air quality for these indicators in all these sites is good given the extremely low levels that might be present.

iii. Noise Levels

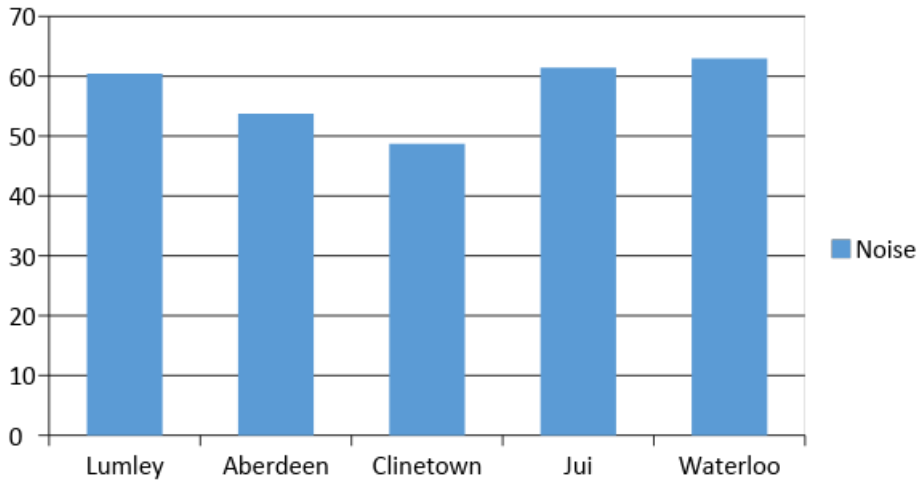

Figure 5-6: Noise levels at the five stations monitored

According to the IFC regulation for noise at the workplace, noise levels should not exceed 70 dB (A) during the day for the potential industrial or commercial site. It is noted in Figure 5-6 that there was not much variation in noise in all five areas. Noise nuisance at the Jui, Waterloo and Lumley sites sometimes are within the minimum allowable limits, thus values are permissible, and the major source of daytime noise was from vehicle engines and horns as the locations are close to motor runways. The WHO has indicated that between 60-90 dB (A) would result in severe loss of hearing, damage to health and disturbance to sleep. It would mean that pedestrians and street sellers at these sites are exposed to periodic noise levels that are considered harmful.

The following findings were observed:

i. Particulate matter for PM10 and PM2.5 showed good conformity with respect to international standards although periodic emissions that are transient at the Jui and Waterloo Substations were deemed unacceptable;
ii. Combustible gases were noted to be below the detection limit at all sites although a few unsustainable emissions were observed at the Aberdeen, Jui and Cline Town Sun-stations;
iii. The impact from noise does not appear to be of serious concern with respect to residents' health in all the locations.

An environmental baseline monitoring for particulate matter, combustible gases, and noise assessment were conducted at the Power Sub-stations of EDSA in the Western Area. The overall local airshed in the areas was good although few activities in few areas showed levels that are challenging to residents. The non-detection of sustained emission of combustible gases at these sites was mainly due to free-flowing motor traffic and less burning activity, which are indices of combustion. The noise levels at these sites were of little concern considering that only few values levels exceeded permissible guidelines.

5.4 Water Quality

The assessment of water supply sources across the communities in the project area is to ensure that the current water quality status of those community water sources is determined and that there is no risk of contamination in the future.

5.4.1 Methodology

The general objective for the water quality assessment of community water supply sources is to determine their current water quality status and to ensure that any development in the community will not affect their water quality.

Specific objectives of the assessment are:

- ✓ analyse water samples from community water sources for key drinking water quality parameters to determine whether the water is safe for drinking;
- ✓ assessment of the water sources to determine whether standards in construction and siting are met;
- ✓ contamination prevention and recommendation for improved water supply.

i. Water quality monitoring procedure

The Figure 5-7 below summarizes the monitoring procedure.

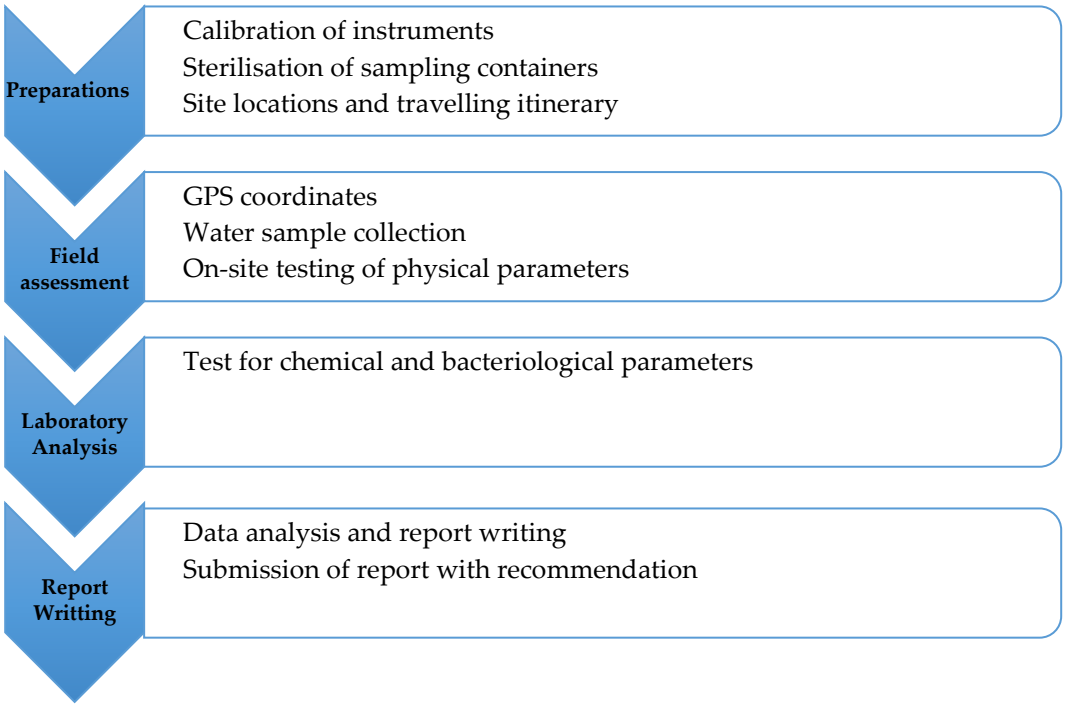

Figure 5-7: Water Quality Certification Procedure

ii. Water quality monitoring parameters

To determine whether the water from the water sources is safe for drinking, they were tested for physical, chemical and bacteriological parameters. Although, Sierra Leone is yet to develop its drinking water quality standards, the permissible limits set in the WHO Guideline for Drinking Water Quality was used to determine its safeness. The most important of these parameters are faecal contaminants, as they tend to have an immediate adverse effect on humans. A comparison of the water quality with WHO guidelines is provided in Table 5-5

Table 5-5: Drinking water quality parameters and there WHO guideline values

Physical	WHO Guideline	Chemical	WHO Guideline	Bacteriological	Who Guideline
Temperature	No value	Residual Chlorine (mg/l)	0.3-0.5 after 30min. disinfection	E.Coli	Zero
Conductivity	<450 µS	Aluminum (mg/l)	<0.2	Faecal Coliforms	Zero
TDS	<248	Ammonia (mg/l)	No. Value	Non-Faecal	10
pH	6.5 – 8.5	Bromine (mg/l)	No. value		

Turbidity	<5.0	Calcium Hardness (mg/l)	1	<250
		Copper (mg/l)		<1.0
		Fluoride (mg/l)		<1.5
		Iron (mg/l)		<0.3
		Magnesium (mg/l)		<200
		Manganese (mg/l)		<0.4
		Molybdenum (mg/l)		0.25
		Nitrite (mg/l)		3.0
		Nitrate- (mg/l)		<10
		Potassium (mg/l)		<6.0
		Phosphate (mg/l)		<20
		Silica (mg/l)		<15
		Sulphate (mg/l)		<400
		Sulphide (mg/l)		<0.5
		Sulphite (mg/l)		No. Value
		Chloride (mg/l)		<250
		Arsenic		0.01
		Chromium		<0.05
		Bicarbonate (mg/l)		No. Value
		Zinc (mg/l)		<5.0

iii. Instrumentation

Equipment and Instruments Used for the Water Quality Assessment

The following instruments and reagents were used to carry out the water quality analysis monitoring and analysis.

a. HydroKit HK3000 and Aquasafe WSL50 Pro

These instruments were used to analyse for physical, chemical and bacteriological parameters. The HydroKit is equipped with a handheld meter that allows for on-site testing of physical parameters and a Hydrotest photometer HT1000 for chemical analysis.

The Aquasafe WSL50 Pro is equipped with a dual chamber digital incubator that allows for field microbiological parameters. The instruments are fully stocked with buffer solutions which were regularly used for calibration.

Figure 5-8: HydroKit Hk3000 and Aquasafe WSL50 Pro

b. Deep Meter

This is instrument was used to check the depth to water level and the depth to base of the well or borehole. The deep meter has a tape with a length of 50 m.

Figure 5-9: Deep meter

iv. Overview of some of the water quality parameters tested for

This shows an overview of the water quality parameters analysed for in the assessment. The following parameters are in line with both national and international physical and chemical water quality analysis. These parameters are selected to acquire baseline data to compare the project's construction and operational impacts on water resources within selected project areas. Thus, it will give an informed decision on whether or not the different stages of the project components have influenced these resources positively, negatively or non-effects during auditing and monitoring of the project.

a. pH

This parameter is used as a measure of a water's acidity and alkalinity and has values that range from 1 - 14. A pH value of 7 means the water is neutral (that is neither acidic nor basic) and values below and above 7 are acidic and basic respectively.

b. Temperature

Temperature affects almost all parameters by affecting their concentrations in different sources of water. Increase in temperature can lead to an increase in the rate of chemical reactions. In waters that have a warmer temperature, the respiratory rate of microorganisms is increased which can also lead to high use of oxygen and can consequently lead to an increase in the population of the organisms like bacteria and phytoplankton.

c. Conductivity

This is a water's ability to conduct electric current. Conductivity is particularly sensitive to changes in the concentrations of Dissolved solids particularly minerals salts. The normal unit of conductivity is microSiemens (μS). The TDS in ($Mg^{-}1$) can be determined by multiplying the conductance by a factor, which is normally between 0.55 and 0.76 (*Water Quality Assessment- A guide to Use of Biota, Sediments and Water in Environment Monitoring – Second Edition*).

d. Iron (Fe)

Iron as an element that could be found abundantly in the earth crust although its concentrations can be less in natural waters. Iron exists in two states which are the +2 and +3 oxidation states and these states can highly be determined by pH and oxidation-reduction potential. Surface water usually has low concentrations of iron, which could hardly be more than 1mg/L of water; but ground waters that are in contact with iron-bearing minerals, local geology and mining may have high Iron content.

e. Manganese (Mn)

Manganese in ground waters normally exists in the soluble divalent state, which is largely due to the absence of oxygen. Although it is difficult for the element to exist in concentrations greater than 1 mg l-1, it can cause stains to laundry and plumbing. The element can be removed by methods of aeration, pH corrections and the use of Iron exchange chemicals. Manganese occurs in the effluent from industries, domestic wastewater and receiving water bodies.

f. Nitrate, Nitrogen

This element, in its highly oxidized form, is always present in both surface and ground waters; this is since it is the end stage after decomposition has taken place in the organic nitrogenous matter. Another main source of this element is from fertilizers, drainages from animal farms as well as from some industrial waters.

g. Sulphate (SO_4)

Sulphate is again another abundant compound in the earth. It has concentrations ranging from a few milligrams to thousands per litre of water. A major source of Sulphate is from the breakdown of organic compounds containing sulphur. It is one of the least toxic compounds and higher concentrations can lead to dehydration and intestinal irritation.

h. Calcium Hardness

Because Calcium can dissolve almost from all types of rocks, it is always detected in many glasses of water. The concentration of calcium that is found depends on the geology or the type of rocks in that region. It contributes to the total hardness that can be found in water. When water containing calcium is heated it forms boiler scale which is normally seen in kettles. Calcium hardness can be determined by a titrimetric method using EDTA.

i. Fluoride

Occasionally, groundwater could reach a concentration greater than 10 mg/ l, and this commonly happens in arid areas. However, the concentration of 1.3 mg/l is normally the concentrations of natural ground waters. WHO has proposed a guideline value of 1.5 mg/l. Higher concentrations can result in mottling of the teeth. In addition, excess fluoride intake can result in a condition called skeletal fluorosis (which is a crippling condition). Major industrial sources of Fluoride are pesticides and fertilizers, coke production, glass etc.

j. Chloride

Normally, anions of chlorides are found in natural waters. A key influence for an increase in chloride concentrations in ground waters is the geological formations of that region. In addition, a high concentration of chloride can also indicate intrusion by sea water into freshwater, sewage or industrial. The salty taste that might be tasted in fresh water may depend on the ions that chloride is associated with. For example, with Magnesium or Calcium, it can reach a concentration of up to 1,000 mg/l-1 and it is undetectable.

k. Bicarbonate

Bicarbonate which is an anion is alkaline. In natural waters, when photosynthesis takes place if there are plants, oxygen is being released together with bicarbonate. These actions can lead to an increase in the pH level which makes it more alkaline

l. Ammonia

Ammonia which is a nutrient contains both Nitrogen as well as Hydrogen. Its chemical formula in its two states is: NH_3 in the un-ionised state and NH_{4+} in the ionised state; these two forms of ammonia give total ammonia. Water bodies can be polluted by some industrial processes, fertilizer run-off and paper production that is ammonia based. At some pH levels, high concentrations of ammonia can be poisonous to aquatic plants and animals. Water that is unpolluted can normally have ammonia or ammonia compounds <0.1 mg/l as nitrogen.

m. Biological contaminants

Biological contaminants have been proven as one of the most harmful. They have been categorised into viruses, protozoa, and bacteria. Contaminants from faeces have serious health risks. These include *E.coli* and other faecal coliforms. Common transmission is through the faecal-oral route. Contamination of groundwater sources from fecal coliform is usually by aquifer and local pathways. Major causes are the construction design, sitting of the well, sanitation and hygiene practices in the community. Faecal contamination of drinking water sources can lead to water-borne diseases like diarrhoea and cholera. WHO recommends a zero value for faecal contaminants in drinking water sources.

Iv. Sampling Locations

The ESHIA team visited communities around the proposed substation sites where all water sources identified within close proximity to the site were sampled. Community water sources like hand-dug wells, gravity system and surface water were assessed for water quality.

Table 5-6: Community water sources assessed for water quality in Western Area Urban and Rural Districts

No	Community	Description	Easting	Northing
1	Waterloo	Well	712546	921158
2	Jui	Well	704188	928159
3	Cline Town	Well	697176	938729
4	Aberdeen 1	Tap	688679	939464
5	Aberdeen 2	Tap	688693	939485
6	Lumley	Well	690126	934995

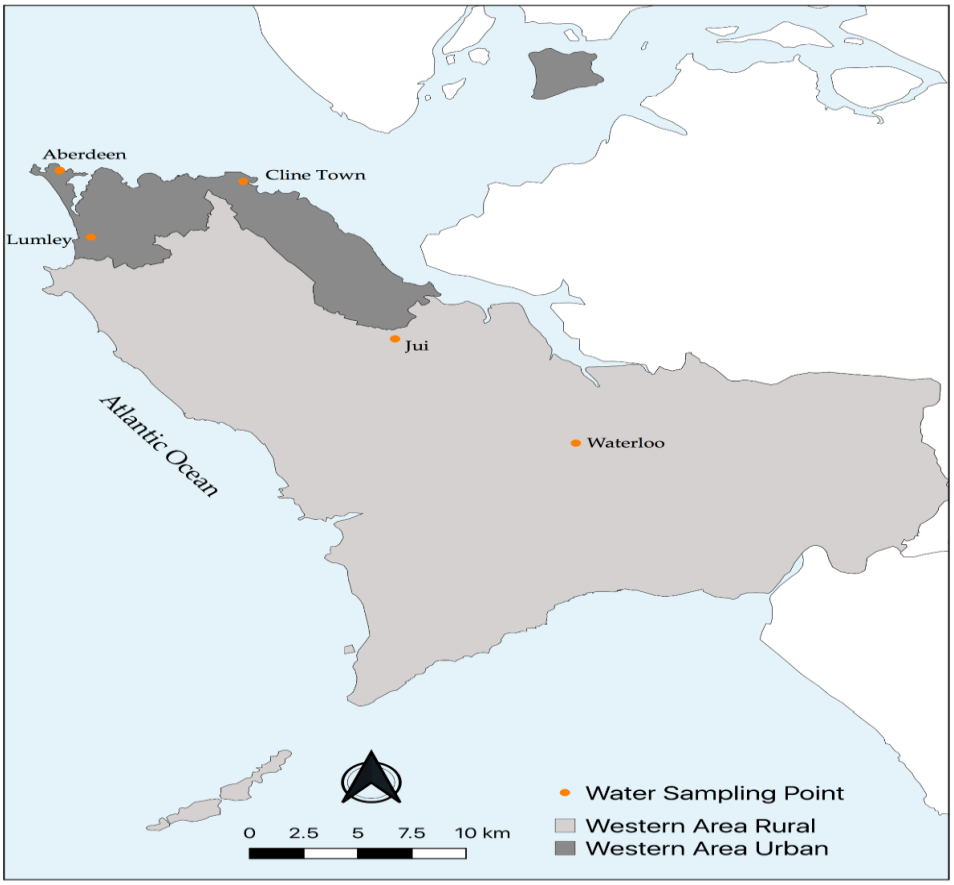

Figure 5-10: Water Sampling Points

5.4.2 Results and Discussions

Table 5-7: Water Quality Result

Town							W H O
Location	Aberdeen 1	Jui	Waterloo	Cline Town	Lumley	Aberdeen 2	
Water Source	Tap	Well	Well	Well	Well	Tap	
Date							
Time							
Water Temperature (^oC)	24.1	23.4	24.2	24.4	24.3	24.3	No. Value
pH	7.3	6.3	6.4	6.6	5.6	6.7	6.5-8.5
Turbidity	2.2	2.1	1.1	0.9	1.0	1.3	<5.0
Electrical Conductivity	66.0	247	110.4	249	197.3	169.3	<450μS
Total Dissolved Solids	33.0	123.5	55.2	125.3	98.9	84.3	<280
Residual Chlorine (mg/l)	0.01	0.01	0.01	0.01	0.01	0.01	0.3-0.5
Aluminium (mg/l)	0.23	0.24	0.22	0.24	0.25	0.24	0.20
Ammonia (mg/l)	0.10	0.08	0.1	0.10	0.14	0.09	No. Value
Calcium hardness $CaCo_3$	6.5	36	9.8	8.9	12.3	31	<250mg/l
Copper (mg/l)	0.00	0.26	0.00	0.00	0.00	0.44	<1.0mg/l
Fluoride (mg/l)	0.01	0.1	0.01	0.01	0.05	0.01	<1.5mg/l
Iron (mg/l) Fe	0.04	0.15	0.03	0.03	0.05	0.04	<0.3mg/l
Magnesium (mg/l)	1.2	2.6	0.5	2.2	3.8	1.1	<200mg/l
Manganese (mg/l)	0.0	0.01	0.02	0.00	0.01	0.01	<0.4mg/l
Molybdenum (mg/l)	0.01	0.02	0.1	0.01	5.8	0.01	<0.25mg/l
Nitrate (mg/l)	1.0	12.0	15.0	15.0	15.0	1.0	<10mg/l

Potassium (mg/l)	7.0	1.8	2.5	3.3	4.7	0.8	<6.0mg/l
Phosphate (mg/l)	0.2	0.1	0.2	0.1	0.1	0.1	<20mg/l
Silica (mg/l)	0.1	0.13	0.01	0.02	0.01	0.0	<15mg/l
Zinc (mg/l)	0.00	0.1	0.00	0.21	0.00	0.00	<5.0mg/l
Chromium (mg/l)	0.00	0.08	0.02	0.03	0.01	0.01	<0.05mg/l
Sulphate (mg/l)	5.3	30	5.6	6.6	17.7	0.00	<400mg/l
Sulphide (mg/l)	0.0	0.01	0.1	0.02	0.0	0.01	0.5mg/l
Sulphite (mg/l)	0.01	0.02	0.01	0.0	0.02	0.01	No. value
Chloride (mgl)	6.4	25.0	8.6	8.2	11.9	25	<250mg.l
Bi-Carbonate (mg/l)	0	0	0	0	0	0	No. value
Faecal Coliforms	Nil	Nil	Nil	Nil	Nil	Nil	Zero
None- Faecal	Nil	Nil	Nil	101	45	101	10

The water samples collected and analysed proved to be contaminated with non-faecal coliforms. In the Western Area, Cline Town and Lumley have a higher number of non-faecal coliforms that are above the 10 counts per 100ml permissible limit stated by WHO.

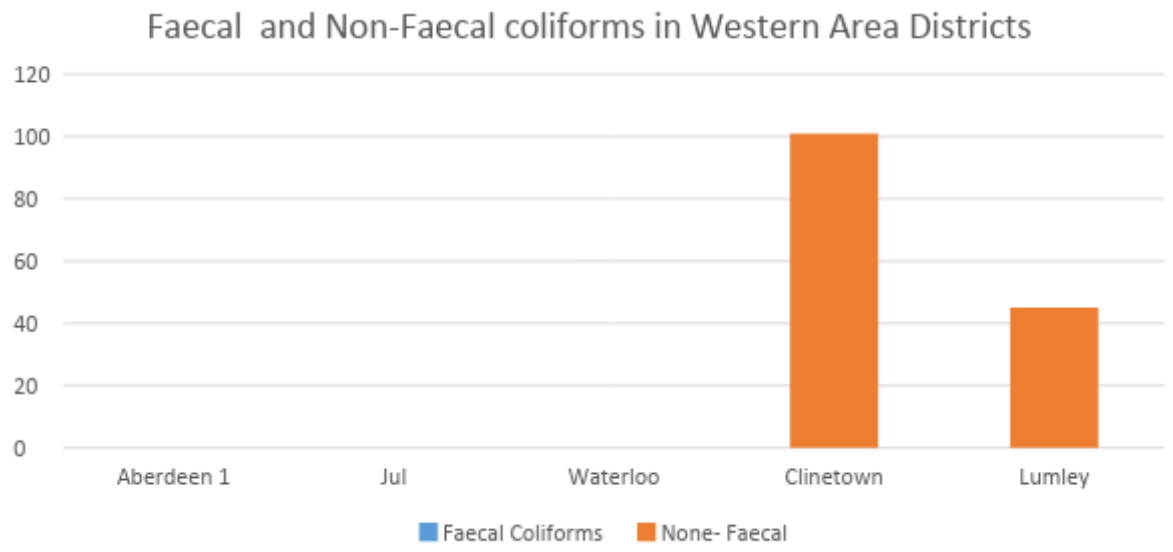

Figure 5-11: Results for faecal and non-faecal coliform test

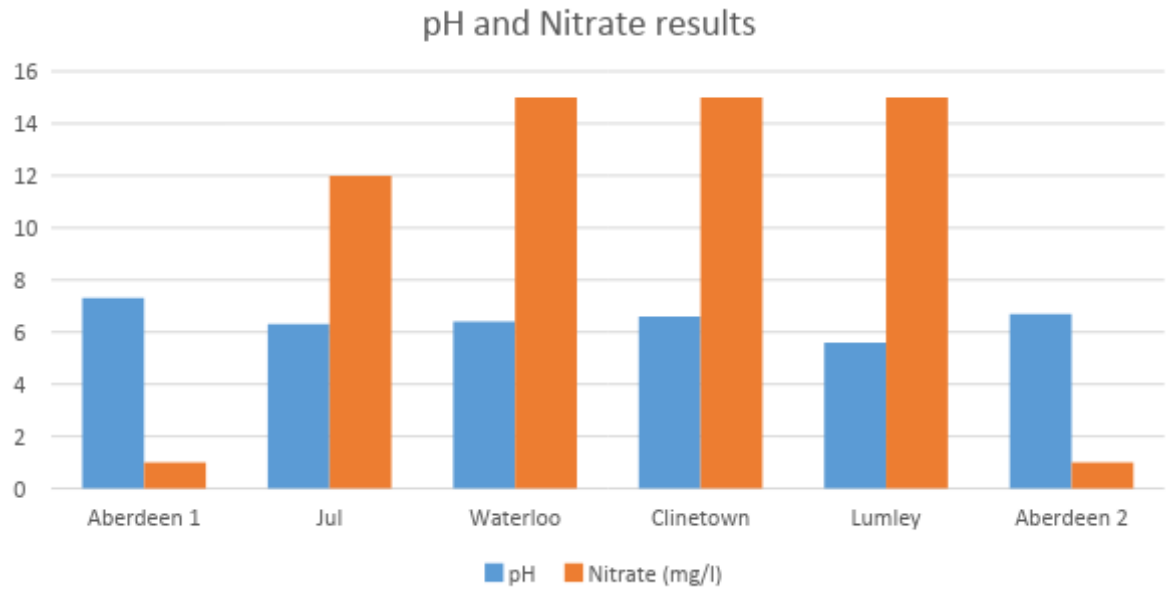

Figure 5-12: Results of pH and Nitrate test

5.4.3 Conclusion

Two water sources in Cline Town and Lumley are contaminated with non-faecal coliforms that are above the WHO 10 count per 100 ml of the water sample. The presence of non-faecal coliforms poses a risk of water-borne diseases. However, the chemical composition of the water source is good with the exception of some recorded nitrate results that above the permissible limits.

5.5 Socio-economic Baseline Data

5.5.1 Socio-Economic Status and Living Conditions

National Socio-Economic Context

Sierra Leone covers a total area of 71,740 km^2 and has a population of 7,092,113 according to the 2015 Housing and Population Census Result. Historically, political instability and weak economic growth led to the brutal and destructive 10-years civil war, which officially ended in 2002.

According to the UNDP Report on Sierra Leone's progress in Human Development (2016), the country moved one position up the Human Development Index (HDI), placing the country in 181 out of 188 countries. According to this survey, Sierra Leone had an HDI value of 0.420 but was still below the 0.523 average for Sub Saharan Africa. The report further shows that 77.5% of the population of Sierra Leone (approximately 4,724,000 people) is multi-dimensionally poor even though income poverty (i.e. $1.2 per day) is 56.6%.
According to the 2015 census, the literacy rate for males is 59.4%, compared to 43.9% for females. 44.2% are literate in English Language only.
Sierra Leone gender inequality remains very high, out of 118 members of Parliaments in 2018, only 18 (15%) Parliamentary seats are held by women (15%). Sierra Leone Gender Inequality Index (GII) value in 2015 is 0.650 (ranked 151 out of 188 countries).

Table 5-8: Information on National Social Indicators

Key Social Indicators	Rate	Source
National Population	7,092,113	Statistic Sierra Leone, Population and Housing Census, 2015
GDP Per Capita (+)	$499 (2017)	https://countryeconomy.com/countries/sierra-leone
Open Defecation	17%	Sierra Leone Multiple Indicator Cluster Survey, 2017
Literacy rate (10 yrs and above)	51.4%	Statistic Sierra Leone, Population and Housing Census, 2015
Economic growth rate	21.5% in 2015	African Development Bank Group (2017). Sierra Leone Economic Outlook. [online] Available at

		https://www.afdb.org/en/countries/west-africa/sierraleone/sierra-leone-economic-outlook/
Human Development Index	0.42 in 2015	https://countryeconomy.com/countries/sierra-leone
Poverty rate	77.5 (estimated)	UNDP (2016). About Sierra Leone. [online] Available at https://www.afdb.org/en/countries/west-africa/sierraleone/sierra-leone-economic-outlook/
Total Fertility Rate	5.2 (Children/women)	Statistic Sierra Leone, Population and Housing Census, 2015
Infant mortality rate (IMR)	56/1000	Sierra Leone Multiple Indicator Cluster Survey, 2017
Contraceptive prevalence rate	22.5%	Sierra Leone Multiple Indicator Cluster Survey, 2017
Life expectancy at birth	48 years	UNDP (2016) About Sierra Leone. [online] Available at http://www.sl.undp.org/content/sierraleone/en/home/countryinfo.html
Maternal Mortality ratio	1,100/100,000 in 2013	WHO (2014). *Sierra Leone*. [online] Available at http://www.who.int/maternal_child_adolescent/epidemiology/profiles/maternal/sle.pdf
literacy race	51.4 %	Statistic Sierra Leone, Population and Housing Census, 2015
Primary school gross enrolment	105	Statistic Sierra Leone, Population and Housing Census, 2015
Secondary School gross enrolment rate	48	Statistic Sierra Leone, Population and Housing Census, 2015

Essential water and sanitation facilities for the majority of Sierra Leoneans are extremely limited due to the limited functional infrastructures for water supply as only 36.3% of households use pipe-borne water as the primary source of drinking (Census 2015). The PRSP II document prepared by the GoSL, also states that approximately 70% of the population live in absolute poverty, with expenditure below 1 US$/day. The average person's total consumption falls short of the minimum acceptable level, by 27.5% of the poverty line (PRSP II, 2008).

Agriculture is the largest economic sector in the country. Nearly two-thirds of the population depends on it for their livelihood and it is responsible for almost half of the country's GDP. There has been a steady increase in domestic food production in the last number of years. For instance, rice which is the staple food and the most common crop cultivated by the majority of Sierra Leoneans, production increased at an annual rate of 17.8% between 2000 and 2010 compared to -7.1% between 1990 – 1999 (FAO, 2013). Nonetheless, the living conditions continue to be difficult especially for persons living in rural communities who struggle to remain at subsistence levels. Poor health indicators reflect the lack of access among the population to basic service notably – health services. Endemic diseases, especially malaria and HIV/AIDS loom as a threat; in 1997, UNAIDS estimated the HIV prevalence among adults to be 3.2%. In 2002, a national prevalence survey estimated the rate at 5%, while a study in 2010 revealed an increase of 1.5% (UNDP, 2013).

Sanitary conditions are deplorable as sewage and refuse disposal systems do not function effectively in most places or are non-existent. Rural living conditions are challenging (PRSP II, 2008).

According to the 2015 census, about 17.8% of Sierra Leone's total population has access to electricity, compared to 49% in Ghana, 46% in Nigeria, 96% in North Africa, 73% in Asia, 99% in China and 76% global average. Only around 1% of the rural population in Sierra Leone has access to electricity.

Generally, the road network system in the study area is relatively good as most of the roads are tarmacked. There are plans by the central government to improve the situation in other areas. As part of the effort, the Government has signed a contract for the rehabilitation of many roads, which is now in implementation.

Overall illiteracy level in the project area is low. The Ministry of Education Science and Technology under the flagship of HE Retired Brigadier Julius Maada Bio has introduced the free and quality education programme for government and government assisted schools to help improve the literacy rate in the country. NGOs and other development partners are providing opportunities in helping develop the educational standard and enrollment.

Many households can afford a square meal per day. Many children, primarily girls are found on the streets selling all types of items to support their family on a daily basis. The councils and the central government are working toward improving the situation of children living on the street so that most or all of those children will go to school or other skills providing institutions. The Ministry of Social Welfare Gender and Children's Affairs with the support from UNICEF has passed the Child Rights Act 2007, which has already commenced implementation specifically to assist Orphans, and Vulnerable Children (OVC).

Politically, the Western area is divided into constituencies and wards, which are headed by Members of parliament and councilors, supported by ward committees. The Western Area Rural district is further divided into zones, which are headed, by "headmen" or village chiefs. The western area is a heterogeneous community with diverse local and foreign cultures that are practiced by various cultural groups without disturbance to other groups. Krio is the most commonly spoken language in the western area. Western Area also enjoys religious plurality and tolerance with Muslims and Christians living together.

Salary/wage employment and business enterprises/trading are the most prominent economic activities in the study areas. Transport systems including taxi, Okada, tipper, delivery, etc. are also everyday economic activities undertaken by residents in the study areas.

Barbing shops and lady's hairdressing, telecommunication services, guesthouses and "chop bars", etc. form major economic activities in the service sector.

Western area has land degradation problems caused by rampant and uncontrolled land clearing for infrastructural development, which has changed the geographical landscape.

According to the 2015 Housing and Population Census, Western Area Urban has an estimated population of 1055, 964 comprising 528, 207 males and 527, 757 females while Western Rural district has an estimated population of 444, 270 consisting of 221, 351 men and 222, 919 women.

Quality Control and Reliability

Three senior consultants developed the tools used, reviewed and later piloted within the project area for final confirmation. Our data collection team comprises of trained and qualified data collectors with not less than two years of experience in data (qualitative and quantitative) collection environment. During data collection (household survey – questionnaire), two (2) supervisors supervised the entire data collection process with eight smart and seasoned enumerators in the field while one senior consultant was engaged in a Real-Time Data (RTD) monitoring remotely from a dashboard. All households surveyed were geo-referenced to ensure uncompromising data quality and to confirm enumerator's household visit.

A day and a half training session on the tools were also conducted for all enumerator to clearly understand the tool as this immensely improved data validity and reliability. The training package includes understanding tools and ethical considerations associated with data collection.

5.4.1 Socio-Economic Baseline

Methodology

The social baseline study involving a review of available data and appropriate literature materials on the Project area of influence was conducted, followed by a reconnaissance visit to the project site.

Field investigations by various social experts were carried out during the period during November 2018, in order to ground-truth facts contained in the literature, and to obtain primary data for this report. This was followed by administering of questionnaires to selected households within selected communities in the project areas of influence.

The social study was carried out using participatory techniques and aimed at facilitating and enhancing awareness, mutual understanding, trust, and capacity building. Information was collected on the following issues:

- ✓ demographic conditions of residents;
- ✓ socio-economic conditions and land use patterns of affected communities;
- ✓ education and Labour Profile;
- ✓ formal and informal governing structures;
- ✓ local infrastructure (transport, housing, health);

- ✓ livelihood;
- ✓ income and expenditure trends;
- ✓ water, energy, and sanitation.

Data analysis was carried out for both primary data collected at the focus group meetings and household surveys, as well as the secondary data collected by means of a desktop review of existing data sources to gather relevant socio-economic baseline information at a national and districts levels.

I. Study Design

- ✓ A total of 10 communities were covered in the study, which includes all the communities located within the Project area.
- ✓ The study employed a mixed approach that combined quantitative and qualitative data collection methods to attain the studies objectives. The study also employed the use of desk review, covering secondary data collection and analysis, qualitative and quantitative (primary) data gathering, and triangulation of data from the different data sources.

II. Data Collection and Sources

The study utilised several key data sources and indicators to present the socio-economic status of communities visited including the 2015 Population and Housing Census Report, UN Office for the Coordination of Human Affairs, 2015 District Profiles Report and various reports from the World Bank and the WHO. These have been duly cited within the report.

Data collection has been facilitated through the use of checklists for use in Focus Group Discussions and Household Questionnaires used to collect first-hand information on socio-economic conditions and livelihood activities of Project area population and communities. Data were collected electronically using the Kobo Collect mobile data collection application. 292 household questionnaires were administered randomly to sampled household heads by trained enumerators in Krio Language. The minimum sample size was calculated by dividing the population of each target community by the national average for the number of residents per house (8.8) (Statistics Sierra Leone, 2015) and multiplying by 0.05 (5%). Qualitative data and information were collected on relevant parameters such as the communities' livelihood activities, main sources of income, occupations, availability, and access to social facilities, infrastructure and public services. Socio-economic data from the household surveys were analysed using the SPSS application and Microsoft (Ms) Excel. Charts and tables were generated most of which are presented and discussed in the baseline study findings of this report. ESRI's Arcmap version 10.4, background Image, Google Earth Professional and Sierra Leone's 50K map were utilized spatially to represents features of interest.

III. Results

A. Household Surveys

Household Characteristics

As indicated in Table 5-9, 70% of households are males headed with a significant proportion (29.2%) of households being headed by females. The 29% of female-headed households could have a zero-vulnerability index on the project even when the proposed intervention is activated.

Table 5-9: Gender/Sex of Household Head

Variable (Gender)	Frequency	%
Male	207	70.8
Female	85	29.2
Total	**292**	**100.0**

Source: Socio-Economic Household Survey, November 2018

Age of Household Head

The result below shows that quite a significant proportion (67%) of household heads interviewed fall within the active working age cohort (19yrs - 59yrs). This may imply that the project area has potentially available labour. However, the larger proportion of household heads within active working age bracket does not represent required available skills or technical inclination of the proportion surveyed with regards the proposed project.

Table 5-10: Age of Household Head

Age of Household head	Frequency	%
19 to 29 years	32	10.8
30 to 39 years	98	33.5
40 to 49 years	66	22.7
50 to 59 years	51	17.3
60 to 69 years	36	12.4
70 Plus	9	3.2
Total	292	**100**

Source: Socio-Economic Household November, November 2018

Marital Status of Household head

The greater representation of households above age 19 years indicates some degree of increase in the quality of responses from respondents (Table 5-10).

84.3% of household heads are married to at least one spouse. (See Table 5-11).

Table 5-11: Household Head Marital Status

Variables (Marital Status)	Frequency	%

Married	246	84.3
Single	14	4.9
Divorced/Separated	3	1.1
Widowed	28	9.7
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

Education and Labour Profile

Reardon et al., (2000) have presented in their research that higher education attainment could enhance possible better livelihood and higher income level. Table 5-12 shows that 59.4% of households surveyed have no formal English education and only 8.1% have at least attained tertiary education or have been admitted to the tertiary educational system.

Table 5-12: Educational Status of Household Head

Variables (Education)	Frequency	%
Primary school level	20	7
Junior Secondary School (JSS) level	35	11.9
Senior Secondary School (SSS) level	39	13.5
Tertiary level	24	8.1
Arabic education	32	10.8
Never been to school	142	48.6

Source: Socio-Economic Household Survey, November 2018

The low proportion of higher educational attainment within communities surveyed may indicate a scarce technical skilled labour and high possibility of numerous active informal income and livelihood activities within the surveyed communities. This will mean that only unskilled labor will be easily sourced from the communities.

Further investigation into proportion of household members that have at least attained tertiary education or technical vocational training revealed that 71.9% of household members have attained neither a tertiary education nor a technical vocational training. Only 27.5% of households reported they have at least one member of their households that have attained either a tertiary education or technical and vocational (Tech-voc) training in a formal environment.

Of those household heads that have never been to school, 46.7% of them are females whilst 53.3% are males.

Data show that a significant proportion (30.8%) of households has at least one child who has dropped out of school for various reasons most notably the cost of schooling and teenage pregnancy/early pregnancy.

Table 5-13: School Drop Out

School Drop Out	Frequency	%
Yes	90	30.8
No	202	69.2
Total	292	100

Source: Socio-Economic Household Survey, November 2018

The religion of Household Head

The Muslim religion predominates the study area as they account for 88.1% of households surveyed; with Christianity accounting for 11.9% of households surveyed. Each religion has its unique cultural practices.

Table 5-14: Household Head Religion

Religion	Frequency	%
Christian	292	11.9
Muslim	292	88.1
Total	**185**	**100**

Source: Socio-Economic Household Survey, November 2018

Culture, Ethnicity, and Language

The common language spoken within the project areas is Krio. The communities are heterogeneous in nature with various diverse local and foreign cultures.

An international institution such as IFC (PS8) recognizes the value of preserving community cultural heritage, which can include tangible resources of cultural value such as sacred graves, sacred bodies of water or other natural resources and intangible forms of culture such as cultural knowledge, innovations and traditional lifestyles that could be impacted by a project though the line route across Kingtom and Race cross cemetery.

Vulnerable Groups

Children, women, elderly people, those who are sick, disabled and those who are part of any ostracized or disempowered minority (for example homosexuals) are considered most vulnerable among other vulnerable groups. The operationalisation of the proposed intervention of the project could affect vulnerable people differently. Road crossing and access to other services/facilities for children and disables could be affected by the project. In particular, few potentially vulnerable groups were identified in the project vicinity.

Household's Assets Base

Household Assets base has been used as one of the key parameters by many Authors in determining household poverty level and as a measure of household's resilience in cases of livelihood and economic shocks and seasonality. For instance, in rural communities, where one of the major assets of residents is mostly land, their livelihood portfolio almost totally hinges on the land for survival. As indicated in Table 5-15, about 95.7% of households reported they have at least one of the basic household furniture, which includes, bed; tables; cooking utensils; chairs. 87.6% of households reported they have at least one radio tape, which they can listen to news from. 65.9% of have got land in their community of residence and only 58.9% reported they have households and owned the houses they dwell in. The project should ensure that the Resettlement Action Plan to be undertaken maps assets properly and ensure adequate compensation.

Table 5-15: Household Assets Base

Multiple Response		
Asset	**Frequency**	**%**
Radio Tape	256	87.6
Basic Household Furniture	279	95.7
Car	3	1.1
Motorcycle/Bicycle	71	24.3
Musical Stereo	126	43.2
Generator	13	4.3
Wonder/Improved Stove	0	0
Television	13	4.3
House	172	58.9
Land	192	65.9
Others	9	3.2

Source: Socio-Economic Household Survey, November 2018

Housing/Dwelling Type

All transmission and distribution lines in the Western Urban District are located in a very heavily built-up area in the capital city, with relatively narrow and congested roadway RoW. This would make it very difficult to plan for the construction lines.

In the Western Rural, the Regent to Jui segment which runs through mountainous terrain offers ready opportunity along a newly constructed road to easily accommodate the poles. The Wellington –Jui to Waterloo also provides good opportunity for installation of the poles as the construction of the Freetown –Masiaka Highway is underway.

As indicated in Figure 5-13 below, a larger proportion (85%) of the households surveyed live in houses built of concrete cement, plastered with concrete cement and roofed with zinc; and only 12% are built of

corrugated metal sheets and roofed with zinc. 3% of the structures are built of mud blocks, plastered with cement and roofed with zinc.

Figure 5-13: Household Dwelling Type

Livelihood and Economic Profile

The dominant primary income-generating activities within the Project Area is petty trading and casual works such as tailoring, carpentry and mechanic/fitter. Figure 5-13 shows that 61.6% of the households surveyed are dependent on petty trading (such as assorted fruit selling, cooked foods/cookery, provision shops, recharge card sales, hawking with cosmetics, cigarettes, sachet water etc.) as their primary sources of income for their households.

A respondent rate of 28.1% accounts for the self-employed during the socio-economic survey in the selected project locations. Commercial vehicle driving (taxi, mini-buses), motorbike and tricycle riding are the various livelihood activities undertaken by household heads that are self-employed.

The high proportion of households' dependency on petty trading as a primary source of income could mean that business is the key livelihood activity in the surveyed area.

A respondent rate of the 4.3% are teachers, which form the third highest category of household income sources. Other household heads income sources are health workers, civil servant, bank workers, administrators, and Police. Only 2.7% are unemployed.

The low level of households' participation in low profitable and informal employment sector could possibly be attributed to the low proportion of households that have attained a tertiary or post-secondary education (see **Educational Status of Household Head**) Thus, project is likely to impact (medium to high) the lives of the petty traders, bike riders and other commercial income sources earners positively. During construction, contractor workers would patronize those businesses especially those dealing in food stuff, sachet water, transport operators etc.

Table 5-16: Occupation of Household Head

Household Head Occupation	Frequency	%
Administrator	6	2.2
Civil Servant	1	0.5
Health worker	1	0.5
Self-employed	77	28.1
Teaching	13	4.3
Trading	180	61.6
Unemployed	8	2.7
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

Diversification has been viewed by many researchers to be positively correlated to better household livelihood, increase in household income and better well-being of households, as could serve as resilience factor when uncertainties in one set of livelihood activities occur. According to the survey, a greater proportion (51.9%) of the households do not diversify their income sources.

Table 5-17: Income Source Diversification

Diversification	Frequency	%
Yes	139	47.6
No	152	51.9
No Response	1	0.5
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

Most of those households who diversify do so into petty trading and other casual or self-employments are considered their secondary income sources.

A greater proportion (30.8%) of the household heads surveyed earn on average between Le151, 000 – Le200, 000 and 23% of households reported they earn less than or up to Le100, 000 on monthly basis. Only 3.8% of the households surveyed earn up to Le 1 million or more on a monthly basis. This low-income level of the household could be likely associated with type income activities undertaken by households.

Table 5-18: Average Income Distribution among Household Heads

Average Monthly from Main Occupation	Frequency	%
Up to Le100,000	68	23.2
Le101,000 - Le150,000	39	13.5
Le151,000 - Le200,000	90	30.8
Le201,000 - Le400,000	41	14.1
Le401,000 - Le600,000	17	5.9
Le601,000 - Le1m	11	3.8
Le1.1m - Le2m	6	2.2
Le2.1m_Le4m	5	1.6
No Response	14	4.9
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

The overall low-income level of households indicates that most of the households live in poverty and therefore highly vulnerable to economic shocks.

Access to credit facility is seen as lubricant and multiplier factor to trading and possible income and livelihood diversification for rural households. According to data presented in Table 5-19, about 52% of households interviewed are not aware of credit facility within their communities.

Table 5-19: Access to Credit Facility

Availability of Credit Facility	Frequency	%
Yes	17	9.2
No	71	38.4
Not Aware	**97**	**52.4**
Total	**185**	**100**

Source: Socio-Economic Household Survey, November 2018

Health and Safety

Researchers have provided evidence of a positive correlation between environmental conditions and health of persons living in the same community. This explains that poor health conditions of persons or community are highly linked to poor environmental management. Typical examples include trapped or stagnated water serve as breeding ground for mosquitoes.

As indicated in Figure 5-14 below, malaria is reported as the most prevalence (about 70%) disease in the surveyed area, followed by typhoid (slightly above 60%), flu (about 50%) and tuberculosis been the least (less than 10%) reported disease in the study communities.

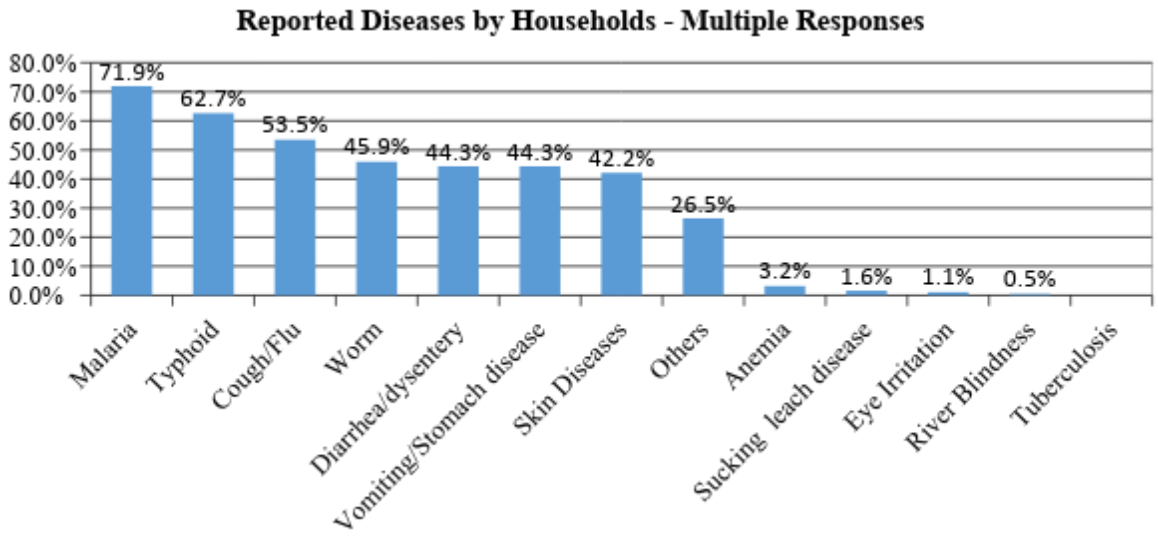

Figure 5-14: Community/Household Disease Prevalence

The proposed intervention is likely to have zero impact on the current health status of the communities.

As indicated in Figure 5-15, more than half (51%) of the households interviewed reported they seek medication from hospitals whenever they fall sick. Second to the hospital is Community Health Center (CHC), which accounts for 45% of households. Project construction activities will directly impact the surrounding communities because of congestion or overcrowding during construction activities due to the migration of people to the selected locations either in search of job or business activities. This would put pressure on the existing social amenities such as toilet, housing, and water resources and increase the prevalence of waterborne, STIs etc. Thus, impacts would likely be medium to high in the selected project locations

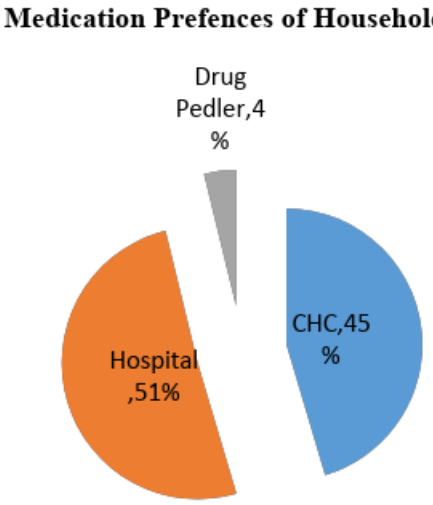

Figure 5-15: Medical Preferences of Households

Knowledge of HIV/Aids

All households' heads interviewed reported they have heard and are aware of the HIV/Aids from health workers (75.7%), media (22.7%), family member/friend (1.1%) and school (0.5%) as indicated in Table 5-20.

Table 5-20: Source of Information on HIV/Aids

Source of HIV/Aids Information	Frequency	%
Family member or friend	3	1.1
Health worker	221	75.7
Media	66	22.7
School	1	0.5
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

The practice towards HIV/Aids by households interviewed is awful and stigmatizing as 83.2% of households interviewed reported they will not buy food from somebody infected with HIV/Aids because there is a tendency for the virus to transfer from the infected person to them. This implies that even though almost all of them have heard about the disease, they have little knowledge about the disease. This is supported by the quite significant proportion (40%) of household who are not willing to do a test or not sure of the disease. The little knowledge of HIV/Aids by such large population means that significant effort is needed to engage and sensitize the population on such life-threatening global disease.

Water, Sanitation and Waste Management

Potable Water

The quality of underground and surface waters could be influence by both sanitary facilities and wastes management practices, such that poor waste management can lead to the effect of leachates leaching into underground water or wash away of dirt into surface water, making it impure for drinking and other purposes.

As indicated in Figure 5-16, over 70% of the households in the study area rely primarily on underground water for both domestic and drinking purposes and less than 20% primarily reply on surface water.

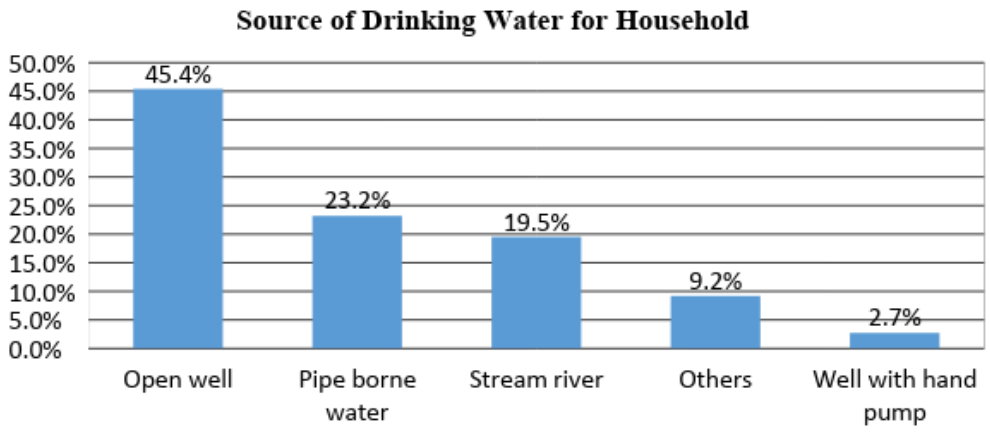

Figure 5-16: Source of Water

Socio-Economic Household Survey, July 2018

The proposed intervention is likely to have zero impacts on community water sources and underground waters.

Quite a significant proportion of households' heads reported that there are problems with the quality of water they collect from within the community sources currently, as indicated in Table 5-21.Table 5-12

Table 5-21: Perceived Quality of Water

Water Quality Good or Bad	Frequency	%
Yes	147	50.3
No	145	49.7
Total	**292**	**100**

Source: Socio-Economic Household Survey, November 2018

Results from the analysis, as indicated in

Table 5-22, shows that majority (61.1%) of the households have got at least one source of potable water located within their premises.

Table 5-22: Proximity to Potable Water Source

Water Source Located within Compound	Frequency	%
Yes	113	61.1
No	72	38.9
Total	**185**	**100.0**

Source: Socio-Economic Household Survey, November 2018

The survey data indicates that the average distance to a potable water source to households in the surveyed area is 22.4m, and it implies that most households within the surveyed area have better access to a potable water source irrespective of its quality.

Wastes Management and Sanitation

On a broader basis, waste is generally categorized into two: solid and liquid wastes. The first could either be, domestic, industrial, office or agriculture; and the latter could either waste waters or sewage (e.g. faeces).

Well over 90% of solid wastes found in the study area were of domestic and agriculture in nature, sewage waste was the most eminent liquid wastes identified during the study. As indicated in Table 5-23, about 38.0% of households interviewed reported they use ventilated improved pit latrine available within their premises whilst 37% of them use flush toilet in-house. The proposed intervention would have insignificant/zero impacts on these facilities.

Table 5-23: Household Sanitary Facility

Sanitary Facility Use by Household	Frequency	%
Flush toilet in-house	109	37.3
Traditional pit latrine - Open space	72	24.7
Ventilated improved pit latrine	111	38.0
Total	**292**	**100.0**

Source: Socio-Economic Household Survey, November 2018

The proposed intervention is likely zero to impact on the waste generation and management.

Household Energy Use for Cooking and Lighting

The type of energy source used by a household/person could affect the health and wellbeing of the person/households. For instance, using electric base cooker is healthier than using gas base cooker and gas base cooker is healthier than using coal and wood. Data captured from field surveyed shows that 85.9% of households in the study area do not use improved energy source for cooking food and warming homes.

The proposed intervention is likely to impacts positively these energy sources as sufficient flow in electricity could alter the energy usage to a more improved system.

Table 5-24: Household Source of Energy for Cooking

Energy for Cooking and Warming Home	Frequency	%
Gas	41	14.1
Charcoal	251	85.9
Total	**292**	**100**

Source: Socio Economic Household Survey, November 2018

Table 5-25 below indicates that about 94% of households' surveyed use electricity from national grid and 3.2% use generator to light homes during night hours.

The Proposed Project is most likely to impact positively these energy sources to a better energy source from the national grid.

Table 5-25: Household Source of Energy for Lighting Homes

Energy Source for Lighting Home	Frequency	%
Electricity from generator	9	3.2
Electricity from National grid	276	94.6
Flash or Chinese light	7	2.2
Total	292	100

Source: Socio Economic Household Survey, November 2018

5.5.2 Conclusion

- ✓ Acceptance of project: Analysis of all data shows a total acceptance of the project by local residents;
- ✓ Livelihood disturbances could be the one of the most important issues likely to be affected during implementation of proposed intervention;
- ✓ There is a youthful population and a bulk of labor availability. However, over 70% of the readily available youthful population is unskilled;
- ✓ Malaria is the most prevailing disease that could undermine the health of the survey population.

6.0 PROJECT IMPACTS AND MITIGATION MEASURES

To ensure the accurate determination of project impacts; both environmentally and socially, the ESHIA study was carried out at different levels. The most appropriate technology with the most environmental and socioeconomic advantages and suitable mitigation measures are presented to minimize the negative impacts and optimize the positive impacts.

6.1 Pre-Construction Phase

Impact on noise:
Poles, equipment, materials and connection gadgets shall have to be mobilized before the start of construction works. The movement of these items by vehicles have the tendency to impact on noise in the surrounding communities. The impact of noise from truck movements is of negligible as the activity is expected to be temporary and very low density.

Impact on air quality:
Air emissions from vehicles carrying items as mentioned inter alia shall arise from exhaust from trucks containing SO, NOx, CO, particulars etc. Dust shall arise from truck movements on unpaved road. The impact of emissions and dusts on air quality from truck movements is of negligible as the activity is expected to be temporary and very low density.

Impact on environment and public safety:
The contractors have to settle for a storage site of these materials. The safety of the storage site may pose some risk to the environment and residents around the site where the storage facility will be located. The impact on environment and public safety from material storage is negligible as the quantity of materials is not huge and most materials are not of hazardous nature. Materials would be stored in locations, which are isolated from public access and noted by placement of signage and demarcation billboards around the storage sites. Hazardous materials would be stored in specialized containers according to required procedures. Impact from solid waste and hazardous materials. Securing access to transmission line routes and substations require clean up the sites and routes and remove persons, unused clothing, empty charcoal bags, solid waste and unauthorized structures in and around them. The impact from solid waste and hazardous materials expected is negligible as the waste materials are expected not of huge quantity and could be collected, transported and processed with no difficulty.

Applying the EDSA safety rules, working in substations and switching stations with live conductors, the minimum clearance from such live electrical installations should be 2.6m. It is recommended that such a minimum buffer should be established around all outdoor installations. This should be followed for substations to be rehabilitated.

The Western Urban District of Freetown has grown in population over the years as is reflected in the population census figures of 2015. Overcrowded settlements and congestion of the streets (especially in the city centre) because of expansion of settlements, residential houses, and business enterprises may pose risks to safety during assembly of works in the pre-construction phase of the project. Thus, mobilization of poles, equipment and materials to work sites and securing access to these sites, especially in these congested and overcrowded streets and settlements may have serious challenges to the contractors given the fact that development (residential, commercial) has overtaken planning in these areas. The substations would generate considerable amounts of waste (some of it hazardous) which would need to be properly handled. In some cases, cleaning may temporarily impact adversely on ambient air quality but would be beneficial in the long term.

Another cause of concern has to do with the collaboration between the Housing Department, FCC and the utility companies in managing the RoW. The Housing Department is now under the Ministry of Lands, Housing and Environment under the current administration. It was under the Ministry of Works, Infrastructure and National Assets in the previous administration. The Council issues permits and business licenses to a number of business entities in the municipality of Freetown (construction companies, cookery shops, tailoring shops, garages, pharmacies, kiosks, 'omolankays', restaurants, factories cinema halls) as per the Local Government Act, 2004. The RoW is managed by SLRA.

The absence of collaboration and coordination in development control of the RoW in the municipality of Freetown, the project environment, makes the possibility of environmental impact during pre-construction stage of this project apparent.

Employment opportunities:

The positive impact of the project is that it will create jobs for locals for the duration of the project. Unskilled labour, which is readily available in the localities shall be hired within the operating communities.

6.2. Construction Phase

As with most projects of this nature, construction phase impacts are generally of a transient nature and will be felt mainly during the actual period of rehabilitation and construction where some minor construction work may take place. Both rehabilitation and construction will be temporary in nature. Therefore, all impacts during the construction phase are temporary and will not last longer than the expended construction period of two years.

Impact on noise:
During construction, there would not be much increase in the numbers and frequencies of truck movements. The erection of poles, stringing of conducts and installation of transformers are not expected to create huge noises. However, the excavation for tower foundations and cable ditches could generate very high level of noises. As some of the areas are adjacent to residential dwellings, they could have significant impacts. Therefore, the impact from noise is expected of be medium severity.

Impact on air quality:
There is likelihood of impact from emissions from vehicle exhaust and dust from transportation and construction leading to poor air quality.
During construction, there would not be much increase in the numbers and frequencies of truck movements. As discussed above, the impact on missions and dusts from truck movement will be of no significance. The erection of poles, stringing of conducts and installation of transformers are not expected to create much dusts. However, the excavation for tower foundations and cable ditches could generate localized high level of dusts. As some of the areas are adjacent to residential dwellings, they could have significant impacts. Therefore, the impact on air quality from emissions and dusts is expected of be medium severity.

Impact on public health and safety:
The construction activities would involve movement of trucks, which move sporadically. This have the potential to cause road accidents if precautions are not taken. The construction and rehabilitation of substations are in enclosed areas. The erection of towers and poles could involve falling objects, but not common and public are kept away from the sites. However, impact on public safety from road accidents, falling objects from construction sites and traffic congestion is of low severity. Noise pollution and poor air quality can also affect residents' wellbeing.

Impact from improper storage of solid waste and hazardous materials (oil leakage, used batteries, etc):
The construction activities could generate both industrial and living solid wastes. There could also hazardous materials like oil leakage from machines and equipment and used batteries which could harm the environment. The amount of solid wastes are quite moderate and there exist procedures to handle possible oil leakage and used batteries. The impact from solid wastes and hazardous materials is expected to be low severity.

There is no need to store large quantities of fuel on site, material drop off can be limited. Thus, there are no risks of improper storage of fuel and spillage resulting in contamination of groundwater and surface water. Construction activities are concentrated within the city where fuel stations are in close proximity to the project area. Vehicles and machinery can be re-fueled from nearest fuel stations.

Potential damage to the highway due to heavy equipment and truck traffic:

The damage to road surface could arise from oversized truck movement if not regulated. Soil erosion and land degradation from runoff could arise from long exposure of excavated tower foundations and cable ditches, particularly during the raining season. The construction activities only involve small and shallow foundations and ditches which are usually filled quickly once the concreting is placed and the cables are laid. Impact from damage to road surface and exposure of soils to erosion and degradation from runoff is expected to be negligible.

Impact on occupational health and safety.

Potential safety and health impact to workers during construction/upgrading of the substations, power lines and cables are the same as those associated with any construction activities involving the use of equipment and tools, transportation of materials, construction and installation of facilities. In addition, health and safety issues include working on towers and poles. General risks associated with construction sites include slips and falls, moving trucks and machinery, exposure to electric shock and high noise levels. If the workers are reluctant to use Personal Protective Equipment, risks can be higher. However, the construction activities do not involve exposure to chemicals and other hazardous materials. The working environment and conditions are not hostile and risky. The impact on occupational health and safety is assessed as low.

Impact from damage to private structures and properties, disruption of livelihoods and economic activities:

The construction and upgrading of the substations will not require the demolishing of any private structures and acquisition of private land. The design of the MV and LV network will minimize the impacts on private properties and people's livelihood. However, the power lines will past through very crowded business and residential areas, the construction activities will require the demolishing of some private structure, damage some private properties and disrupt the businesses and livelihoods of some communities, although no resettlement and reallocation is expected. Therefore, the damage to private structures and properties, disruption of livelihoods and economic activities is expected to be of medium severity.

Impact on archeological and cultural sites:

The construction sites are from any cultural and archeologic sites. Nevertheless, there could also be a slight chance to encounter something during excavation to tower foundations and cable ditches. The impact on archeologic and cultural sites are considered of no significance.

Impact from labor influx:

There is a probability to face labor influx impact that might originate from the migration of labors to the work site. Additionally, some people may follow workers to provide service. Generally speaking, such impact is viable in remote areas where thousands of workers invade rural and small community areas causing disturbance to the surrounding community and absorb resources. The project is located in crowded urban/peri-urban areas. The small number of outside workers can not cause any labor influx impacts. The Impact of labor influx is of no significance.

Impact on creation of job opportunities and increased economic activities:
During construction phase, direct job opportunities will be created for semi-skilled and unskilled laborers for local communities. A lot of indirect benefits are expected to be sensed in the project areas due to the need for more supporting services to the workers and contractors. These could include accommodation, food supply, transport, security etc. The impact on creation of job opportunities and increased economic activities is expected to be of medium.

The contractor should have a time management plan to manage and schedule the traffic movement for the construction materials, equipment in addition to transporting the debris to the landfill. In addition, the notification to the Sierra Leone Road Safety Authority SLRSA) should be obtained and the time management plan should be approved prior to the construction/rehabilitation activities.

6.3 Operational phase

Impact from leakage of transformer oil-:
The presence of transformers on the premises of substations introduces the potential environmental impacts inherent in transformer oils. Polychlorobiphenyls (PCBs) are harmful substances to the environment. They are not produced during electricity generation or distribution, but are contained in certain equipment, mainly in transformers and condensers. There could be oil leakage during operation and decommissioning of transformers. The project does not involve the decommissioning of existing transformers. The new transformers to be purchased should meet all applicable safety standards and must be enclosed in separate secondary containment structures that will prevent any accidental spills or routine leakages that may occur from being released to the environment. The transformers will be serviced outside the country. The impact from transformer oil leakage is considered negligible.

The impact from fire hazards:
The presence, storage and use of oils, fuels and other flammable products on the premises of substations and work sites may give rise to the very likely hazards of fire outbreaks. In addition, there always is a likelihood of fire outbreaks in substations and work sites that are sited in areas where flammable materials are stored. There are already well-established procedures for the substations to operate and carry out maintenance. The impact from fire hazards is negligible.

Impact from noise:
Typical noise from substations are heard from transformers and equipment in the substations. The design and locations of the substations will ensure that noise level shall be maintained well within the guideline value for residential areas of between 35 ~ 40dB. The impact from noise of substation operations is low.

Impact form Electric and Magnetic Field (EMF).

There operations of power lines and substations create EMF in the surrounding areas. Internationally, there are no clear conclusions on the potential impacts of EMF on human's health. In particular, the project involves only medium and low voltage power lines, which have low EMF. Therefore, the impact from EMF on public health is negligible.

Impact on public safety from substations and power lines:

The substations are mostly located in relatively built-up area. They could be impact on public safety if public are permitted easy access to the public. But substations are required to secured and well maintained. The power lines could create electric shock to human and fire to property. Power lines are designed to prevent access and shielded from properties. The impact on public safety from substations and power lines is of low severity.

Table 6-1 presents a summary of proposed project impacts.

Table 6-1: Summary of proposed project impacts

Activities	**Bio-Physical Environment**						**Socio-Cultural Environment**				
	Road damage and Soil Degradation	Air Quality	Noise	Traffic congestion and road accidents		Waste Generation	Damage to private properties and disruption of livelihoods	Damage to archeological and culture sites	EMF	Occupational /Public Health Safety	Job opportunities and economic activities
Pre-Construction Phase											
Transportation and storage	0	0	0	0		1	0	0	0	0	0
Secure Access to RoW. Routes	0	0	0	0			1	0			
Secure Access to Contractors Sites	0	0	0	0		0	0	0	0	0	0
Clean up Substations	0	0	0	0		1	0	0	0	0	0

Key: 0 No potential impact or of no significance
1 Potential minor negative impact
2 Potential low to medium negative impact
1+ potential minor positive impact
2+ Potential low to medium positive impact

Activities	Bio-Physical Environment						Socio-Cultural Environment				
	Road damage /Soil Degradation	Air Quality	Noise	Road accidents and traffic congestion		Waste Generation	Damage to private properties and disruption of livelihood	Public safety	Labor influx	Occupational Health and Safety	Job opportunities and economic activities
Construction Phase											
Transport equipment to site	0	0	0	1		0	0	0	0	1	0
Clearing RoW/Tower Route	0	0	0	0		1	2	0	0	0	0
Excavating Foundations	1	2	2	0	0	1	2	1	0	1	2+
Erecting Towers/Poles	0	0	1	0	0	1	1	1		1	2+
Stringing Lines	0	0	1	0	0	0	1	1		1	1+
Substation construction	0	1	1	0	0	1	0	0		1	1+
Replace Cables/Conductors	1	1	2	0	0	1	1	1		2	1+
Install new Transformers and Equipment	0		1	1	0	1	0	0		1	0

Activities	Bio-Physical Environment						Socio-Cultural Environment				
	Transformer oil leakage	Fire hazards	Noise				EMF	Occupation health and safety	Electric shock and public safety		Job opportunities
Operation and Maintenance Phase											
Testing and Commissioning	0	0	2				0	1	1		0
Control of Trees and Vegetation								1			1
Line Maintenance							0	1	1		0
Tower Maintenance	0	0	0	0			0	1	1		0
Substation Equipment operation and Maintenance	1	1	1					1	0		0

6.4 Impact Mitigation

This section presents the environmental mitigation and management measures considered for the project. As described in Section **Error! Reference source not found.**, EDSA used a methodology for impact evaluation that assessed the consequence and likelihood of each event to determine an overall significance rating of high, medium, low or negligible. These impact categories (Table 6-1) are used to determine the required level of mitigation. A "low" or negligible category indicates a potential impact that is at an acceptable level assuming that standard operating procedures and best practices will be applied. A "medium" category is a potential impact that requires further mitigation to bring the potential impact down to an acceptable level. Finally, a "high" category represents a major or moderate consequence or probable likelihood and requires either an alternative approach or design, or a mitigation measure that will minimize the potential impact if negative. Mitigation measures are proposed below for each of the medium or high-level impacts identified. The proposed mitigation measures will also be included in the Environmental and Social Management Plan (ESMP) described in Chapter 7. An exception to this approach is the positive impacts (or benefits) identified in Section **Error! Reference source not found.** that do not require mitigation and thus are not included in the discussion of mitigation measures or the ESMP. However, in order to realize, or maximize the potential positive impacts of the project, it is important to consider enhancement measures for these positive impacts and therefore Section 6.4.4 presents enhancement measures that would be implemented by EDSA.

6.4.1 Mitigation during Pre-Construction Phase

The mitigation measures that would ameliorate impacts during the pre-construction stage would include sensitizing populations on the hazards posed by exposure to live power systems, such as electrocution, fires, EMG effects etc. On the environment side, prior to the erection of new poles, replacement of existing ones, repairs of distribution lines and substations, adequate provisions shall be made for handling (segregating and classification) of wastes and their proper disposal or reuse where possible.

Noise from truck movements is transient and will not require special mitigation except to educate drivers to avoid unnecessary blaring of horns and revving of engines especially in the vicinity of residences.

Emissions from vehicles may contain pollutants such as CO, CO2 and smoke, soot and other products of combustion. The quality of exhaust depends among other things on the state of maintenance of the engine. The contractor shall ensure that all vehicles used are properly maintained to avoid excessive air pollution. Dust emission from haulage of sand shall be mitigated by ensuring that trucks carrying sand have suitable covering material such as tarpaulin in place. Damage to road surfaces and dust generation where roads are not paved is an unavoidable impact especially in the wet season.

Road accidents shall be minimized by ensuring that trucks are in good state of maintenance and that drivers are properly qualified and obey appropriate traffic signals. All materials being transported shall be suitably secured and trucks shall carry suitable warning signal such as "flashing amber light" and "red flags" on long items such as wood poles.

The clearing of the RoW, including the tower routes/spots involves mainly removal of unauthorized structures that are within the vertical clearance distance of 5m from the highest point on the ground to the conductor. Aside from housing and business structures, these cover all trees and crops directly in the way of the lines. Spots for erecting towers shall be suitably cleared and graded during the rehabilitation of the existing lines.

6.4.2 Mitigation during Construction Phase

Exposure of soils to erosion and degradation from runoff shall be controlled by concreting the disturbed sites. As much as possible, the native ground cover beneath the lines shall be maintained. During the field surveys, it was noted that there were not many trees directly affected by the transmission lines. Some fruit and palm trees in way of towers will be affected. Poles that will be replaced on hill slopes will be highly prone to erosion and these shall be adequately protected by terracing or using stone cladding.

Noise from grading machinery is unavoidable, however the nuisance effect in residential areas shall be abated by ensuring that work is not carried out beyond the daytime working hours. Wherever possible, manual methods shall be employed in place of machinery.

The impact of loss of use of land and structures in the RoW by existing users has been addressed in the RAP. This should provide the total number of persons and households that will be affected by the rehabilitation and repairs of the existing lines and who shall receive compensation and disturbance allowances. The avoidance of high-density slum settlements will be considered by diverting the lines RoW into less populated areas. Similarly, the consultant suggests that the Lumley substation which is located in a heavily populated area to be relocated to areas close to the Babadorie river.

Excavating foundations and erecting towers and poles involves works at selected spots where towers and poles are to be located. In the case of rehabilitation works, existing poles will be replaced with new ones at the same spots. The distance between poles will be 70m apart for the 11kV Line and for the LV Line, the distance will be 40 m apart. The height of the poles for the 11kV Line will be 12 m and for the LV Line it will be 9 m. For 33kV lines, the distance shall be 60m – 80m for the steel tubular poles and about 150m for the tower lines

In the case of poles that will have to be replaced, this will involve some excavation. Typical excavation for erecting the poles will be up to 1,500 mm deep and the trenches will excavate up to 600mm deep for underground cables. The soils dug out will be reused for backfilling.

Poles for the replacement works and new transmission lines will have to be imported. EDSA shall have to approve the manufacturer from which these poles will have to be imported. With this approval the contractor will place the order and before the poles arrive in Freetown, EDSA will either go and do an inspection of the poles and conduct some testing or the manufacturer can send test reports. However, EDSA has the option to employ both methods to ascertain that the poles are of good standards and the chemicals used for preservation of the poles are within the Stockholm Convention list of chemicals that are not banned since Sierra Leone is a signatory to the Stockholm Convention on chemicals management.

In the case of the trenches that will be dug for the underground works, the contractor shall disconnect cables that are obsolete and no longer to be used. In cases where the trench to be dug are of concrete nature, concrete will be used to resurface the areas dug. If it is asphalt surface that is dug, asphalt resurfacing will be done and if it was a surface that was of laterite, laterite shall be used to resurface the trench that will be dug. All old discarded poles, unused overhead materials and discarded underground cables will be handed over to EDSA for disposal or otherwise.

The erection of towers and new wooden poles will enhance the status of the electrical infrastructure in the transmission and distribution network, which is a beneficial impact. A further benefit is that of towers serving as perches for birds.

6.4.3 Mitigation during Operation

Storm Drains

Storm drain and flooding issues have become a serious problem in Freetown as a result of household and municipal waste (solid and liquid) been deposited into drainage channels in most parts of the Freetown Municipality. This practice often blocks the main drains in the city. Storm drain and flooding issues were evident during the ground truthing exercise of the consultant on the network of channels leading to the substations Lumley Substation and the Brookfields Substation around the junction of Kingharman road and Main motor road.

Drainage network around the substations should be isolated from the oil and fuel storage to ensure that the storm water is not contaminated with oil products prior to discharge.

Fire hazards

The best defense against fire outbreaks is to ensure they are not caused at all. From the field surveys conducted, fire outbreaks was reported at Lumley substation and along the line routes from Lumley to Wilberforce particularly during heavy rains and wind.

From the reports gathered in the field, fire outbreaks have often led to disastrous consequences. Measures therefore have to be put in place to ensure that fires do not break out in the substations. Prior to the operation of the substations, and as part of project implementation, the in-house EDSA Safety and Fire Service must carry out a fire survey on the premises of each

substation to identify specific firefighting equipment for the substations. These pieces of equipment must be installed at vantage positions within the substations in addition to the standard water hydrants and fire extinguishers provided for all the substations. This will ensure that substations remain in a high state of preparedness against potential fire outbreaks. In addition, pruning of tall trees and clearance of vegetation inside and outside substation must be done quarterly. Also, fire buffers must be created and maintained around the fencing to ensure that potential fires from non insulated overhead cables and poles are not able to affect the substations and the poles.

Avifauna

EDSA must ensure that good housekeeping is done at all times in the substations. Bird nests in areas likely to cause electrical faults shall be promptly removed and transferred to nearby trees, if practicable.

Earthing of equipment

EDSA must ensure that there is adequate earthing of equipment to prevent shocks and malfunctioning of protection equipment.

6.4.4 Enhancement of Positive Impacts

Below are measures that EDSA would employ to help improve the positive impacts of the project. The enhancement of the positive impacts can help foster community support for the project and for future EDSA projects.

Increased Employment Opportunities

EDSA would encourage its primary construction contractors to hire local workers, procure goods and equipment locally, and subcontract local companies for minor civil works. EDSA may also hire temporal local skilled engineers to assist in the supervision of construction works whilst providing hands on training for them.

Impact: Secondary Economic Effects

Local businesses and vendors will likely experience some economic effects from the presence of the workforce during construction and operations. Once the project is completed, the increase in power supply will offer improvement in standard of living and employment opportunities in surrounding communities.

EDSA would further enhance these effects through participation in additional capacity building efforts for activities that are made possible by the provision of electricity from the project. EDSA may work with organizations that provide education to women and children, that help people set up and manage new businesses, or that help strengthen the capacity of local government services that will support the growing economic activity.

Table 6-2: Environmental impact, significance, duration and their mitigation

(S: Significant Impact, M: Medium Impact, NS: Impact not Significant, P: Permanent and T: Temporary)

No.	Activity	Potential impacts	Significance	Duration	Mitigation Activities and Method	Responsibilities
Pre-Construction /construction phase						
1.	Recruitment of local workers by contractors	Positive increase income and livelihood	S	T	Project must employ as many locals as possible	Contractor
2	Influx of construction workers	Risk of communicable diseases	M	T	Contractors should be encouraged to recruit locals; Initial screening of workers for HIV/STD/STI; Supply condoms;	Contractor
		Health and safety issues workers at risk from accidents on site			Appoint health and safety focal person; Follow occupational health and safety plan for contractor; Provide PPEs to all workers; Workers must be informed of the risk at work place;	Contractor/EDSA

					Use signage and barricades at risky sites; Ensure proper transportation, storage of hazardous materials; Provision of vehicle on standby, communication and emergency procedures; Maintain record of accidents; Provide compensation for injuries and accidents.	
3	Mobilization of construction Equipment and materials	Congestion and risk of accidents due to increase in vehicle and machines and traffic	M	T	Stage delivery of required materials and equipment; Store all construction equipment and materials at 'off road' sites; Post signs along the highway and use flag persons; Move heavy machines only early mornings and late evenings	Contractor
		Workers exposed to air	M	T	Provide PPE for workers	Contractor

		and noise pollution				
4	Construction of transmission lines	Reduction in visual aesthetics	NS	P	No mitigation required	-
5	Excavation of tower foundations and cable ditches	Archaeological and cultural sites	NS	T	Follow the Archaeological chance find procedure	Contractor, EDSA, Monument and Relics Commission
6	Vehicular movement and machinery operation	Noise and poor air quality	M	T	Install silencers on machinery, regular maintenance of vehicles. Regular sprinkling of water, Trucks carrying construction materials shall be covered while transporting	Contactor
Operation Phase						
	Removal of workers	Reduction in employment opportunities	S	P	Make locals aware from outset about temporary nature of employment	Contractor
	Regular clearing of RoW	Risk of electrocution of maintenance workers	M	T	Provide PPE to workers; Follow OHS and emergency procedure in case of emergencies	Contractor

	Operation and maintenance of transmission line	Risk of electrocution of maintenance workers and locals	M	T	Follow OHS and emergency procedure in case of emergencies; Secure the workplace and shut down power; Use PPE; Inform locals in advance of maintenance work being carried out; Educate public and locals on risk transmission line	EDSA
	Incomplete removal of project materials	Risk of soil water impact from residuals left after project completion	M	P	Clean up all worksites after project completion	Contractor
	Electrocution of birds	Birds accidently hitting the transmission line leading to injuries and death			Construction of cage box on conductors; Placing colorful/ fluorescent tape on the tower; Sufficient phase –to-phase and phase –to-ground wire spacing	EDSA Contractor

7 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

This section provides plans to minimize impacts arising from project activities and contains a list of proactive measures that will address the potential impacts prior to their occurrence. It is a document that has to be used and consulted by all concerned parties and stakeholders during construction and operation phases. The success of any project lies in the hands of management as it is the focal point for decision taking and releasing the required financial resources. Management should therefore be convinced on the sensitivity of this undertaking and be fully committed to provide its support towards environmental stewardship.

EDSA management shall ensure that there is a technically and legally binding contract document between the contractor, all his subcontractors, and the project management team of EDSA so that the mitigating measures, listed in this Plan, are mentioned into the contract document and it will ensure that the contractors strictly adhere to these conditions. Moreover, EDSA and the contractors appointed for these works must have a competent environmental team that would conduct the day to day environmental monitoring of project activities and report to management on a regular basis.

7.4 Objectives of the Environmental Management Plan

Specifically, the plans are to:

- ✓ Define the environmental management responsibilities of EDSA within the project phases of pre-construction, construction, operation and maintenance, and commissioning;
- ✓ Outline a monitoring mechanism and identify monitoring parameters to ensure that proposed mitigation measures are fully implemented and managed, and;
- ✓ Identify the resources required to implement the ESMP.

7.5 Environmental Management Plan

The matrix in the Table 7-1 below gives a summary of the environmental management plan and estimated costs. The overall implementation of this plan lies with EDSA. Various institutions will remain responsible for certain activities. EDSA shall remain accountable for ensuring that the monitoring and corrective actions are implemented. The tables below do not include a column indicating who is accountable but rather who is responsible for a particular aspect.

Table 7-1: Environmental and Social Management Plan

Project Activity/Issue	Nature of Impact	Proposed Management Measures (Including Legislation and Regulation)	Institutional Responsibility	Cost Estimates	Monitoring Procedure
○ **Pre-Construction Phase**					
● Secure access to Distribution Line Routes, rehabilitation and construction sites;	● Loss of use of land along the Resistance from affected persons	- Control of encroachments into RoW; - Public education and awareness campaign	● EDSA ● EDSA	● To be determined by EDSA ● USD 3,500	● Quarterly checks ● Print and electronic media, workshops, FGDs
● Cleanup Substations	Waste generation	Provide waste disposal site	Contractor	USD 6,500	Regular Inspections
○ **Construction Phase**					
● Transport Equipment to Site	Noise, Dust, Air pollutants, Road Accidents	- Adopt best practices as necessary	EDSA/ Contractor	Contractor's costs	Periodic monitoring
● Clearing RoW/line route	Loss of use of land Soil erosion, sedimentation and runoff	- Proper leveling and return land to its original form	EDSA/ Contractor	Contractor's costs	Periodic monitoring
● Excavating	- Waste generation	- Maintain native vegetation	EDSA/	Contractor's	Regular

Foundations and Erecting Poles on existing sites	- Health and Safety risks of workers assembling towers/poles	cover - replant disturbed sites - Personnel Safety equipment	Contractor	costs	Inspection
● Stringing Lines and Replacing existing cables/ conductors	- Visual intrusion - Waste generation – mostly metals, insulators, etc	- Segregate and dispose of wastes as appropriate - Improve alignment and tensioning	EDSA/ Contractor	Contractor's costs	Regular Inspection
● Rehabilitation of Substation houses and Install new Transformers and Equipment.	- Construction impacts (Storm Water, debris waste etc.) - Disposal of transformers and other items, oil leaks	- Personnel Safety equipment - Segregate and reuse, recycle or dispose debris as appropriate - Adopt safety procedures - Adopt best practice	EDSA /Contractor	Contractor's costs	Periodic inspection
○ **Operation phase**					
Maintenance of Vegetation Control	Loss of vegetation cover Loss of income from fruit trees	- Implementation of an integrated vegetation management approach (IVM) - The selective removal of tall-growing tree species and the encouragement of low-growing grasses and shrubs along RoW	EDSA	To be determined at the time of operation and maintenance by EDSA	EDSA Prevention and Maintenance Department to regularly take action.

Line Maintenance	Waste generation Health and Safety of workers	- Segregate and dispose waste as necessary - EDSA Safety rules and personnel protection	EDSA	As and when appropriate USD 3,000 for PPE	EDSA Prevention and Maintenance Department to regularly take action.
○ **Special Issues**					
EMF	Unknown health hazards	Protect public/staff from equipment Public education Training	EDSA	USD $ 8,000	- EDSA Prevention and Maintenance Department to collaborate with the Radiation Protection Agency, MoE to monitor for health effects and hazards
PCBs	Health hazard	Safe handling Procedures Personnel Protection Training	EDSA	US$ 7,500	- Regular monitoring of disposable oils containing PCBs. - Regular monitoring of staff performance.

Use of SF6 equipment	Health hazards	- Safety disposal of transformers containing SF6. - Training in handling transformers containing SF6. - Use of appropriate PPE	EDSA	US$ 3,500	Regular checks and monitoring
Hazards Management	Health and Safety Hazards (fire, injuries, electrocution etc)	- Training in Health and safety; - Proper storage and handling of flammable materials - Appropriate PPE - Tool box sessions to discuss safety and worker interaction with local community, sexual harassment, local girls and prevention of gender based violence and sexual exploitation	EDSA/ Contractors	USD 4,000	Regular monitoring in the effectiveness of staff performance
Waste Management	Health, Safety and Pollution hazards related to used oils, worn out	Training in waste management; Appropriate PPE	EDSA/ Contractors	USD 3,500	Regular monitoring in the effectiveness of

	parts from equipment, worn out poles and cables etc.				staff performance
Transformer Oil Leaks	Pollution hazards Health and safety hazards	Construct bonds around transformers	EDSA/ Contractors	USD 3,500	Regular monitoring in the effectiveness of staff performance

7.5.1 Occupational Safety and Health issues

The contractor shall ensure that the guidelines proposed in their operational manual as well as this ESMP for the health and safety of workers together with the communities where they are operating are adhered to. EDSA management shall ensure that the availability and use of Personal Protective Equipment (PPEs) be periodically monitored during the construction, operational and maintenance phases. All employees who refuse to use the protective equipment provided shall be properly sanctioned. To ensure that personal protective equipment is always readily available, all defective equipment shall be promptly replaced. Regular safety tests as recommended by manufacturers shall be conducted on equipment such as cranes and winches.

7.5.2 Fire hazards

In order to prevent any outbreak of fire, construction work shall be monitored regularly to ensure that the execution of works is done strictly adhering to technical specifications relevant to electrical safety. The use of low quality components, inadequate sizing of cables and negligent execution of works and general non-observance of safety rules shall be monitored regularly.

7.5.3 Waste management

The management of wastes generated from insulating oils from transformers, worn out transformers, worn poles and cables etc. shall be monitored periodically to ensure that the wastes are collected promptly and disposed of at appropriate public waste dumping sites. The cleanup of accidental spills of oil, fuel and paints whenever they occur shall be monitored to ensure that the cleanup is promptly and properly done.

7.5.4 Public/Worker safety

Occurrences of accidents involving distribution lines and structures that may affect public safety or worker safety shall be recorded whenever they happen, with specific notes on frequency and severity. This will eventually indicate whether additional mitigation measures are required to make the system safer.

7.5.5 Identification of project-affected persons and compensation payment

The RAP consultant shall Identify PAPs and communities during his/her assignment. EDSA shall ensure adequate compensation packages to the PAPs as per the Resettlement Framework of 2018.

7.5.6 Substations

During the operational phase of the project, the substations shall be managed regularly by EDSA to ensure that they comply with all regulatory requirements. Parameters to be monitored shall include the following:

i. Fire safety

The substations shall be managed regularly to ensure that all installed fire extinguishers and water hydrants are in good working conditions and that all extinguishers have been recharged as required by the Factories Act, 1974. The perimeter of the substations shall also be inspected to ensure that the vegetation barrier (fire buffer) created against fire is well maintained.

ii. Storm drain around substations

Storm water being discharged from the network of drains at the substations shall be regularly inspected to ensure that storm water does not affect substations operation.

iii. Noise

Operating noise levels of the substations shall be managed to ensure the levels do not go beyond the guideline limit values.

iv. Occupational safety, health and welfare

The safety, health and welfare of the workers are of paramount importance to EDSA.

Monitoring shall be carried out on occupational safety and health within the substations during their operational phase.

v. Personal Protective Equipment

The provision and use of personal protective gears shall be purchased and management shall monitor to ensure workers are well protected against the hazards of the workplace. The purchase of PPE is costed in the plan.

vi. Good housekeeping

Management shall ensure that good housekeeping is maintained at all times on the premises. All weeds springing up through the stone carpet of the substations shall be monitored on a daily basis to ensure that there is always a firebreak at the perimeter.

The premises shall be monitored to ensure that potential nesting places of birds are kept free, as these are likely to cause electrical faults.

7.5.7 HIV/AIDS

There exists the likelihood of contracting and or transmitting HIV/AIDS by immigrant/workers in the various work localities. Education on the HIV/AIDS and the use of condoms shall be provided by EDSA and the contractors.

Even though this monitoring program could be useful, Contractors and EDSA shall ensure, through its educational program, that safe sex is practiced by the construction teams so that incidences of the diseases due to activities of the construction crew are prevented or minimized. EDSA should ensure that workers demonstrate responsible behavior in their interaction with local young girls, and avoid gender-based violence and sexual exploitation of local girls in all circumstances

7.5.8 Possibility of Chance Finds

The possibility of discovering historic, cultural/archaeological finds during construction is limited under this project. This project involves the rehabilitation of existing structures (poles and substations) hence the consultant finds the possibility of chance find very limited. However, should they be found, a chance find procedure as described in Performance Standard 8 of IFC should be followed. Chance find procedure has also been developed for this report (see Appendix 8).

7.5.9 Contractor's obligation and legal requirements

The contractors shall employ Environmental Health and Safety (EHS) officers who shall prepare their own safety plan prior to the commencement of construction works. The Contractor's safety plan shall include, to the extent practicable, all steps to be taken by the Contractor to protect the environment in accordance with the current provisions of national environmental regulations, the World Bank Groups Environmental Health and Safety General Guidelines and the Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution, 2007 as well as the ESMP for this project.

7.5.10 Monitoring and Training Costs

In order to be effective, environmental monitoring must be fully integrated with the overall project management effort at all levels of the project activities. The project itself is aimed at providing a high level of environmental protection by developing a properly designed and constructed plan of activities that will function effectively throughout its life span.

The monitoring plans with their associated costs provides a framework for implementing the mitigation measures recommended and proffer cost estimates for plan implementation.

Table 7-2 Shows the monitoring plan for all three phases of the project.

Table 7-2: Monitoring Plan for the Pre-construction, Construction, Operation and Maintenance Phases

Issue	Objective	Monitoring and Training	Performance Target	Indicator	Responsible Party/Parties	Cost
Pre-Construction						
Foundation is laid for institutional strengthening and capacity building for ESMP implementation with regards to: ● Securing access to Transmission Line Routes, rehabilitation and construction sites; ● Clearing of Substations.	To ensure that staff are trained to understand and to appreciate the ESMP	Training session and programs organized for contractor's staff and supervised to the satisfaction of EDSA Relevant Health, Safety and Environmental Policies as mentioned in chapter 2 of this document implemented.	Minimal breaches in this ESMP procedures	15 staff in the preventive maintenance Dept. trained in ESMP implementation.	ESMS/EDSA/ Contractor	In house training at the EDSA training School, Kingtom contractor's cost.
Contractual obligations and environmental compliance	To ensure contractor complies with provisions of the ESMP	Suspension of project activities to ensure environmental mitigation measures are satisfactorily Implemented	Contractor's EHS plan comprehensively covers all aspects	Contractor's EHS plan submitted before mobilization of works.	EDSA	contractor's cost.
Construction Phase						
Air Quality	To reduce the	Introduce spraying	Reduced	The particulate	EDSA/	Part of contractor's

	negative impacts of the dust emitted from material transport and construction works To reduce the negative impacts of vehicle and machinery (cranes, drilling machines, etc) exhaust fumes	programs during digging of trenches for underground cable works and substation construction to reduce dust being emitted from these activities. Initiate dust fallout monitoring program to monitor efficiency of dust management measures Regular maintenance of vehicles and machines	emissions from digging trenches and substation construction works Good vehicle and machine maintenance records	matter (PM) should be less than or equal to 1. $PM_{2.5}$ 50 $\mu g/m^3$ 2. PM_{10} 100 $\mu g/m^3$ (IFC Standard 24hrs)	Contractor	cost
Noise and Vibration	Minimize noise impact	Vehicles to be switched off when not in use; Regular maintenance of vehicles and machines to ensure	Machines and vehicles to be serviced according to vehicle, machinery	Residential, institutional and educational (dBA 55day time and dBA 45 night time).	EDSA/ Contractor	Part of Contractor's Cost

		silencing equipment are still effective i.e. exhaust mufflers Fixed noise producing sources such as generators, cranes to be either fixed with silencers, housed in enclosures or barriers put up around the noise source	and equipment handbook	Industrial and commercial areas (dBA 70 day time and night time) {IFC standards}		
Storm Drains	To reduce impact on storm drains due to digging and rehabilitation/construction of substations	Diversion of water from storm drains should be done following best engineering practices	Successful diversion of storm drains	No flooding feedback	EDSA/ Contractor	Part of contractor's cost
Clearing RoW/Line route	To reduce loss of use of land, soil erosion, sedimentation and runoff	EDSA to clear RoW from encumbrances.	Successful clearing of RoW	RoW cleared	EDSA	Cost to be determined by EDSA.
Excavating Foundations and Replacing Poles	To reduce on waste generation, health and safety risks of workers	Replant disturbed vegetation cover/disturbed sites and workers to have	Successful excavation of foundations and	Approximately 5000 poles successfully replaced	Contractor	Contractor's cost

	replacing poles	Personnel Safety equipment during work hours	replacement of poles			
Stringing Lines and Replacing existing cables/conductors	To ensure an effective segregation and disposal of wastes, alignment and tensioning of cables.	Segregate and dispose of wastes as appropriate. Improve alignment and tensioning. Contractors to take adequate steps to ensure stringing does not impact the roofs by climbing on them	Achieving good waste management practices/waste disposal. Successful alignment and tensioning of cables.	Approximately 322km of conductors successfully disposed off.	Contractor	Contractor's cost
Rehabilitation of Substation houses and Installing new Transformers and Equipment.	To reduce construction impacts, ensure safe disposal of transformers and other items, and eliminate oil leaks.	- Personnel Safety equipment; - Segregate and reuse, recycle or dispose as appropriate; - Adopt safety procedures; - Adopt best practice.	Satisfactory implementation of construction works and installing of transformers and equipment.	Approximately 131 Transformers Replaced.	Contractor	Contractor's cost
OPERATION AND MAINTENANCE						
Vegetation Control	To reduce the loss	Monitor RoW for	Successful	Quarterly	EDSA	To be determined

	of vegetation cover	encroachments and ensure appropriate land uses under overhead cables	implementation of the programme of work of the Prevention and Maintenance Dept. of EDSA.	pruning of trees and clearing of trees around substation.	Prevention and Maintenance Department	
Line Maintenance	To reduce waste generated, health and safety issues	Training of staff in the Prevention and Maintenance Department of EDSA	Successful maintenance of Line Route.	Quarterly pruning of trees and selective removal of vegetation along the underground route.	EDSA	To be determined
SPECIAL ISSUES						
EMF	To reduce if not eliminate health hazards	Routine inspection to identify hazards and potential hazards by Health and Safety Dept of EDSA Training to protect staff and public from equipment with	Adequacy of training and public education Health and safety record of workers	EMF frequency of 50Hz (Electric field: 5000V/m; Magnetic field: μ/T 100) EMF frequency of 50HZ (Electric field: 6150V/m;	EDSA	USD5,000

		potential to generate EMF effects Public education		Magnetic field: μ/T 83) {ICNIRP standards}		
PCBs	To reduce if not eliminate health hazards	Routine inspection to identify hazards and potential hazards by Health and Safety Dept of EDSA Training of staff on Safe handling Procedures; Ensure that Personnel Protection Equipment are worn by workers when appropriate	Successful handling of equipment with PCBs Health and safety record of workers	Appropriate storage, decontamination and disposal of PCBs.	EDSA	USD 5,000
Use of SF6 equipment	To reduce if not eliminate health hazards	Routine inspection to identify hazards and potential hazards by Health and Safety Dept of EDSA Training of Staff on safety procedures in handling equipment	Successful handling of equipment with SF6 Health and safety record of workers	Appropriate storage, decontamination and disposal of transformers with SF6s.	EDSA	USD 2,500

		with SF6 Training in environmental issues				
Hazards Management	To reduce if not eliminate health and safety Hazards	Routine inspection to identify hazards and potential hazards by Health and Safety Dept of EDSA Training in environmental issues; Apply rules on hazards management	Successful implementation of hazards management Health and safety record of workers	Appropriate storage, decontamination and disposal of equipment containing hazardous materials.	EDSA/Contractors	USD 2,500
Waste Management	To reduce the generation of waste, health, Safety and pollution hazards	Routine management of waste generated Training in waste management practices for the electricity sector; Ensure that the waste management programs are adopted	Successful implementation of waste management programs	Quarterly submission of waste management report.	EDSA/ Contractors	USD 1,500

Transformer Oil Leaks	To reduce pollution hazards, health and safety hazards from potential transformer oil leaks	Routine inspection to monitor leaks from transformers Training in handling of transformer oils EDSA Environment Officer to monitor transformer oil leaks	Successful implementation of monitoring plan for controlling transformer oil leaks	Submission of quarterly reports of transformer oil leaks.	EDSA	USD 1,500

7.6 Monitoring Plans

7.6.1 Noise Monitoring Plan

Noise monitoring should be undertaken by EDSA throughout the life cycle of the project and EDSA has to have a competent Environmental Officer who possesses both the qualifications and experience appropriate to perform the required measurements and reporting.

A report must be compiled weekly or depending on the intervals of the monitoring programme then submitted to management to ascertain compliance with the required standards. Management should be advised of any significant increase of the ambient sound levels as operations continue. The ambient noise levels will be sampled in terms of the following parameters:

- ✓ the A-weighted equivalent sound pressure level (LAeq) for duration not less than 30 minutes per monitoring point; and
- ✓ measurements to be taken during both daytime (06:00 to 22:00) or as appropriate.

7.6.2 Quality Monitoring Plan

Based on the predicted impacts on the surrounding environment, it is recommended that a dust fallout monitoring network be established on a continuous basis. Spraying of dust point sources be done and records kept to inform EDSA Management on fallout measures to reduce impact of dust on the surrounding environment. The dust fallout monitoring can serve to meet various objectives, such as:

- ✓ compliance monitoring;
- ✓ use as input for health risk assessment;
- ✓ assist in source apportionment;
- ✓ source quantification;
- ✓ tracking progress made by control measures.

7.6.3 Waste Management Monitoring Plan

A waste management monitoring plan is proposed throughout the operation and closure of the project. The objectives of the monitoring programme include:

- ✓ to identify areas and sources of waste generation;
- ✓ to submit samples of waste generated for contractor and management decisions;
- ✓ to report on the compliance of the methods of waste disposal;
- ✓ to determine the dynamics of waste containment and disposal movement.

The aims of the monitoring is to assess whether any impacts are occurring to the public and the environment, either as a result of pre-construction, operation and maintenance and closure or as result of any contamination by the activities of the project's operations, and then make recommendations for mitigation or remediation of any sources of contamination, if identified.

7.6.4 RoW Monitoring Plan

Based on the activities of the project along the RoW, it is recommended that monitoring be done to ensure effective implementation of project activities along the RoW. The objectives of the monitoring programme include:

- ✓ to report on the compliance of EDSA with World Bank, EPA Regulations and IFC on resettlement and compensation;
- ✓ to implement decisions of the Grievance Redress Committee.

High levels of encroachment where noticed during field survey on the RoW and the substations. A monitoring network should therefore be created to prevent further encroachment as this will aid smooth implementation of project works along the RoW and the substations.

7.6.5 Health and Safety Monitoring Plan

Based on the potential impact of the project on health and safety of workers and the public, a Health and Safety Monitoring Plan is recommended. The objectives of a monitoring plan include:

- ✓ to identify health and safety issues as they emerge during the project life
- ✓ to identify areas and sources of health and safety issues
- ✓ to recommend training packages for the handling of equipment with containing SF6, PCBs
- ✓ to determine source points for EMF effects

7.6.6 Monitoring Budget

Table 8-3 provides details of the monitoring budget. This is based on the assessment of the manpower required, patrols by EDSA Environmental and Social management unit (ESMU) and the frequency of monitoring.

Table 7-3: ESMP Monitoring Cost

Monitoring Activity	Objectives	Tasks	Indicator	Responsible Entity	Monthly Cost (USD)	Estimated Cost for Year	Comments	Schedule
Noise Monitoring Plan			Monthly reports	EDSA/Contractors	200	2,400	EDSA	Continuous monitoring throughout Construction phase
Air Quality Monitoring Plan			Quarterly reports	EDSA/Contractors	200	2,400	EDSA	Continuous monitoring throughout Construction Phase
Waste Management Monitoring Plan			Quarterly reports	EDSA Preventive and Maintenance Department/Contractor	1,000	12,000	Costs include data collection and logistical cost.	Continuous monitoring throughout Construction and operation phase
RoW Monitoring Plan			Quarterly reports	EDSA Preventive and Maintenance Department/Contractor	350	4,200	Costs include data collection and logistical cost.	Construction and operation phase

Health and Safety Monitoring Plan			Quarterly reports	EDSA/Contractor	1,000	12,000	Costs include data collection and logistical cost.	Continuous monitoring throughout Construction and operation stage
						$33,000		

7.7 ESMP and Monitoring Plan during Decommissioning Phase

Complete decommissioning or closure of project of such nature is not feasible. Most importantly, rehabilitation, upgrade or construction of new facilities are applicable when the need arises. For the proposed project, the Project Manager and the Environmental Health and Safety Manager will be responsible for the implementation, monitoring and the continuous improvement of closure and abatement plan. The rehabilitated substations and distribution lines are expected to have an operational lifespan of at least 25 years. However, it is anticipated that transformers, switchgears, cables, poles, and ancillary facilities will be replaced with new ones as and when required. After 25 years, the option will exist to continue to apply for clearance to continue to operate, to replace the transformers and ancillary facilities with more up to date technology or to decommission the entire infrastructure. Therefore, the lifespan of the proposed development is potentially indefinite.

No detailed decommissioning plan is therefore proposed for this project. The following management control measures are required as and when the infrastructure ceases operation:

- ✓ All components (including transformers, switch gears, poles, cables etc.) shall be dismantled and removed from site preferably for reuse elsewhere or alternatively, for recycling of materials; and
- ✓ Infrastructure associated with the development (e.g. buildings, land) which has no immediate use or value to EDSA, must be decommissioned and the property rehabilitated to EDSA's satisfaction.

Monitoring Activities and Reporting

Closure and post-closure monitoring will document the progress of the closure efforts. The elements of closure and post-closure monitoring programs will include the following:

- ✓ confirm the stability of power availability;
- ✓ evaluate the success of underground cables, overhead cables, switch gears, transformers, poles as measurement tools;
- ✓ access the adequacy and performance of substations and distribution networks;
- ✓ demonstrate that the quality of storm drainages are met;
- ✓ evaluate the success of previous training programs as measurement tools.

Closure and post-closure monitoring and control programs will be conducted twice per year (dry and wet seasons) for a period of two years after the closure has been completed. In the event that deficiencies in the system are identified, appropriate mitigation measures will be taken to correct these deficiencies.

Monitoring will include visits to substations reconnaissance along the distribution network. Monitoring will also be used to identify areas that may require further improvement.

Closure and reclamation Schedule

In general, site reclamation will begin immediately following decommissioning of the project infrastructure. Upon completion of final closure and reclamation, sites will also be monitored for a two-year period to evaluate success.

The table below is a summation of both Monitoring Plan for the Pre-construction, Construction, Operation and Maintenance Phases cost (Table 7-2) and the ESMP monitoring cost (

)

Table 7-4: ESMP Budget

No.	ACTIVITY	INTERVENTION PLAN	Cost TOTAL (USD)	Responsible ACTION
1	Mitigation during the preconstruction, construction and operation phase	• Site preparation • Construction • Operations	3,200 - 28,800	EDSA Contractor EDSA
2	Environmental and Social Monitoring	• Noise • Air quality • Waste • RoW • Health and safety	3,840 3,840 19,200 6,720 19,200	EDSA '' '' '' ''
1	EDSA/ HSE-	<u>Capacity Building</u> • Training on the 'Handling and		EDSA

	Substations	clean ups of PCB contaminated materials ● Environmental Monitoring ● Environmental Audit ● PCB detection and Disposal Procedures ● On the Job training for each substation HSE Officer. ● Provision of protective wears (Hard hats, safety gloves, Ear Muffs, Nose muffs).	16,000	,, ,, ,,
	Grand Total USD		63,000	

8 GRIEVANCE REDRESS MECHANISM

8.4 Objective

The objective of the Grievance Redress Mechanism (GRM) is to ensure that procedures are in place to allow affected people to lodge a complaint or a claim without cost and with the assurance of a timely and satisfactory resolution of that complaint or claim.

The GRM is also to ensure that vulnerable groups including women have equal access to grievance redress procedures.

8.5 Potential sources of grievance/ disputes

The sources of grievance can range from rates of compensation and eligibility criteria to the location of possible resettlement sites and the quality of services at those sites.

8.6 The Grievance Redress Process

Grievance related to any aspect of the project will be handled through negotiations, which will be aimed at achieving consensus following the procedures outlined below:

v. grievances will be filed by the person affected by the project with the Grievance Redress Committee (GRC), which will act within 15 days on receipt thereof.
vi. if no understanding or amicable solution can be reached, or if the affected person does not receive a response from the GRC within 15 days of the registry of the complaint, he/she can appeal to the Resettlement Implementation Committee (RIC) (if set up) which should act on the complaint/grievance within 15 days of the day of its filing.
vii. another 15 days will be given for mediation between the complainant and the RIC.
viii. if the affected person is not satisfied with the decision of the RIC, he/she, as a last resort, may submit the complaint to a court of law.

8.6.1 Registration/ Receipts of complaints

All complaints received in writing (or written when received verbally) will be documented. Please refer to **Appendix 7** for sample grievance registration form, to be used by complainants.

8.6.2 Determining and Implementing the redress action

Determining and implementing redress at the GRC Level:

- ✓ within the first 4 (four) days of the 15 (fifteen) days, the GRC will look into the complaints after documentation and checks it against the system and processes for data collection and possible compensation to determine if the complainant has a case;
- ✓ if the complainant has a case, within the last 11 days of the 15 days, the GRC will determine the gaps and recommend to the RIC for approval and implementation.

Determining and implementing redress at the RIC Level:

- ✓ in the event that the complainant still feels aggrieved, he or she takes the complaint to the RIC;
- ✓ at this stage, the RIC will call for all documents relating to the complaints right from the data collection/ census stage within the first 4 (four) days;
- ✓ in the next 11 (eleven) days. The RIC will go to the field to make a determination of the complaint and eventually take action.

8.6.3 Verifying the redress action

After successful determination of the complaint by the RIC/GRC, a follow up action will be taken by one of these two committees to verify the implementation of the redress.

8.6.4 Monitoring and Evaluation

Monitoring and evaluation will provide RIC/GRC with feedback on implementation of redress actions on complaints and to identify problems and successes as early as possible to allow timely adjustment of redress actions that may have to do with physical progress of resettlement and rehabilitation activities, the disbursement of compensation and the sustainability of income restoration and development efforts among affected communities.

The monitoring and evaluation team of the GRC shall provide quarterly update on monitoring the effectiveness of the redress actions to the RIC.

8.6.5 Dissatisfaction and Additional Steps

The GRM has provided adequate procedures and mechanisms for the aggrieved person to seek redress. However, if the person is not satisfied with the decision of the RIC, he/she, as a last resort, may submit the complaint to a competent court of law.

8.7 Membership, Function and Financing of the GRC

EDSA will be the implementing entity to prepare for and implement all possible grievance redress issues.

Suggested Membership of the GRC:

- ✓ Ministry of Energy;
- ✓ EDSA;
- ✓ Ministry of Finance;
- ✓ Ministry of Justice;
- ✓ Parliamentary Oversight Committee on Energy;
- ✓ Sierra Leone Roads Authority;
- ✓ Freetown City Council/Councilors/Ward Committee Members/Tribal Heads;
- ✓ Ministry of Lands, Housing and Environment;
- ✓ Sierra Leone Police;

- ✓ Ministry of Agriculture.

General Functions:

The GRC would continue throughout project implementation as a structure to oversee grievance redress issues to:

- ✓ ensuring multi stakeholder consultation, collaboration and coordination;
- ✓ take responsibility for the groundwork required to implement possible grievance issues;
- ✓ take responsibility for grievance management and provide overall guidance to the grievance redress mechanism;
- ✓ maintain/record all data and information on grievance issues.

Specific Functions:

1. EDSA: shall chair the committee and shall be responsible to convene meetings; give responsibilities to committee members and moderate meetings.
2. ESURP: the Facilitator/ Secretariat, will be responsible for the following:

    - ✓ coordinate, organize and facilitate committee and PAP meetings, including preparation of an agreed standing agenda, presentations and sending minutes to stakeholders;
    - ✓ coordination and liaison, including tracking and reviewing project progress through regular meetings with respective committee members and committees;
    - ✓ ongoing reporting and communication to all stakeholders, through a communication strategy, on the progress of committee related matters.

3. Disputes Sub-committee
    - ✓ receive all complaints;
    - ✓ investigate all complaints and aim to resolve them internally;
    - ✓ refer grievances to the GRC.
4. Ministry of Lands, Housing and the Environment

    - ✓ facilitate preparation and signing of survey plans for EDSA in the event there is land acquisition;
    - ✓ verify survey claims;
    - ✓ participate in stakeholder consultations;
    - ✓ support in providing alternative public land for affected business that will be demolished.

5. Freetown City Council

    - ✓ verify asset valuations;

- ✓ support in providing alternative land for affected businesses that will be demolished;
- ✓ support the demolition of affected structures;
- ✓ provide guidance on livelihood restoration for urban enterprises;
- ✓ public relations support;
- ✓ manages the Councilors.

6. Sierra Leone Roads Authority

- ✓ establish the required RoW for roads;
- ✓ provide formula for compensation;
- ✓ support demolition of structures.

7. Law Officers' Department

- ✓ draft compensation agreements;
- ✓ provide guidance on grievance resolution;
- ✓ participate in compensation sign-off meetings.

8. Sierra Leone Police

- ✓ safety and security during construction and demolition of structures;
- ✓ traffic management during construction.

Financing will be obtained from project funds.

8.8 Schedule Template for Grievance Redress and Institutional Responsibilities

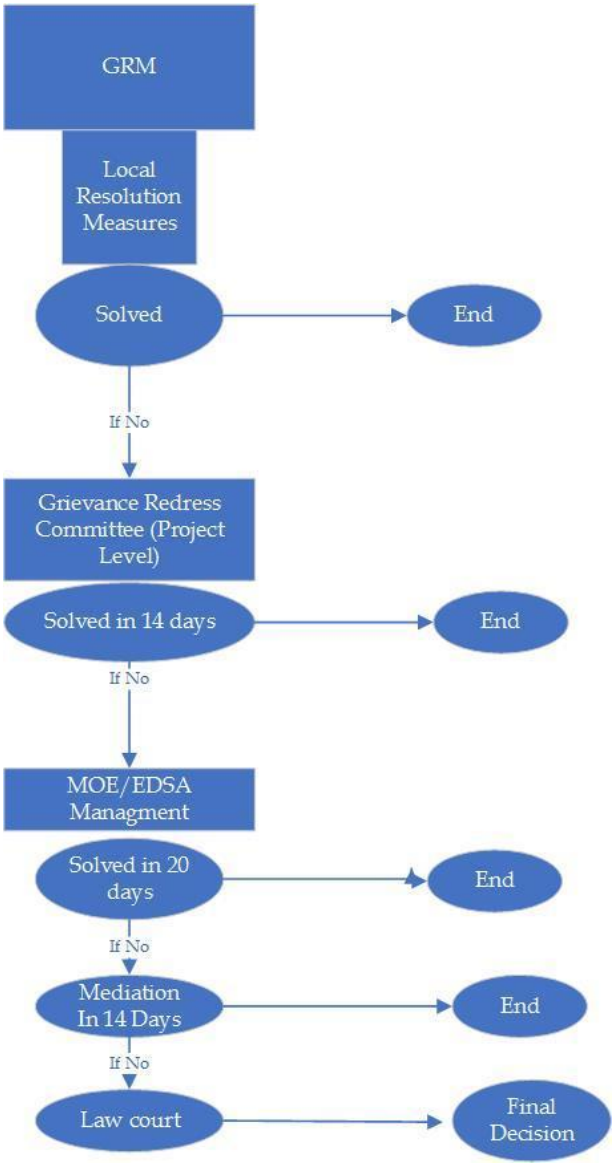

Figure 8-1: Flow Chart for Grievance Redress

9 PUBLIC CONSULTATIONS AND DISCLOSURE PLAN

9.4 Public Consultation

Public consultations were held in accordance with the World Bank safeguard policies which one of the seven (7) basic components of the Environmental Assessment (OP/BP 4.01). This provided relevant and adequate information about the project to stakeholders, proposed project-affected groups and Community Based Organizations (CBOs) to enable them to understand project risks, impacts, and opportunities. Extensive public consultations took place during the inception stage where on-site discussions were held with stakeholders such as headmen, chiefs, residents, security personnel etc. During field data collection to establish the baseline social conditions interviews and Focus Group Discussions (FGD) were conducted.

9.5 Objectives of Public Consultation Process

Consultations play a major role in identifying the potential impacts of any proposed project and can assist in the identification of socio-economic, religious and cultural impacts. The main objectives of the consultation process undertaken are as follows:

- ✓ to provide information about the project and its potential impacts to those interested in or affected by the project, and solicit their opinion to that regard;
- ✓ to understand and address stakeholder concerns and expectations of the project;
- ✓ to manage any unrealistic expectations and address misconceptions regarding the project;
- ✓ to ensure participation and acceptance of the project throughout the lifetime of the project by the key stakeholders including the community;
- ✓ to provide a mechanism to address any stakeholder grievances regarding the project;
- ✓ to verify that their issues have been considered by the technical investigations.

9.6 Stakeholder Engagement Conducted

During the ESHIA, views from stakeholders at all levels (national, local government and residents in the project area), were sought through interviews, group discussions and a number of public meetings. Feedback from these consultations is taken into account in this ESIA.

Key Stakeholders

Consultations were held with the personnel of regulatory agencies and the following Ministry Department and Agencies (MDAs):

i. EPA-SL;
ii. Ministry of Lands, Housing, and Environment (MLHE);

iii. MoE;
iv. EDSA;
v. SLRA;
vi. The Freetown City Council (FCC);
vii. Western Area Rural District Council (WARD C).

Consultation were also held with citizens in individuals of Aberdeen community, Rokel, Kissi Brook (black hall road), Cline Town, Fourah bay, Colbot, Lower Bombay, Susan's Bay, Kroo Bay, Koleh town and Crab town communities as listed in Appendix 5.

Participation and Consultation Methods

Each consultation meeting included a presentation by the ESHIA team to introduce the project and provide a brief description of the project component and location, the steps undertaken to assess and finalise the location, the communities that might benefit from the power supply and the probable environmental and social impacts arising from project activities. The presentation was followed by an open discussion to note the opinions and concerns that the communities may have regarding the project. All communication at the meetings was translated into local dialects to ensure that all the attendees were well informed. Minutes of the meetings held are attached in Appendix 4.

All the project-affected communities welcomed the project and promised giving their support to its fruition. Appendix 6 summarizes the consultations held with affected communities. Few concerns raised were:

✓ erection of electric poles along roadside for fear of vehicular hit. This they say is normally experienced in their communities and the poles that are hit are left hanging which have caused deaths in many cases. They furthered that there has always been very late response from EDSA to re-fix such poles when they are damaged;
✓ that poles have been erected firmly/properly and have overhanging of poles over roofs and road during storms, hence the Kroo Bay community suggested that the poles be passed along the coast instead of over their roofs;
✓ recruitment of unskilled labour during the project construction phase.

9.7 Disclosure Plan

Disclosure shall be done as per EPA regulations. Upon approval of this document by the EPA, public disclosure will be authorized. Hence, the document shall be made available to the public domain; printed copies of the report shall be made available at designated places around the project area for public review and comments. A date will be set and advanced notices made in the print and electronic media.

The disclosure will more specifically target PAPs, MDAs, civil society groups, councils (Urban and Rural), tribal heads, local authorities, Members of Parliament in the project area etc.

10 CONCLUSION

It is concluded that:

- ✓ The project is suitable in terms of its socio-economic viability;
- ✓ The location of Substations, transmission and distribution lines are very ideal in as much as the majority of Substation sites are government owned and the line route mostly followed RoW which is also a property of the GoSL;
- ✓ Residents of the communities warmly favor the project. However, their expectations from the proposed project require continuous engagement with local stakeholders in order not to jeopardize the project's successful implementation;
- ✓ In all, there are less anticipated adverse impacts from the proposed project on the environment than its numerous positive socio-economic impacts;
- ✓ It is anticipated that resettlement will be minimal.

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7. World Bank Group (WBG) Guidelines: Environmental, Health, and Safety Guidelines General EHS Guidelines, 2007
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9. World Bank's Operational Policies on Environmental Assessment (OP4.01)

Appendices

Appendix 1: TOR for the Preparation of Environmental Social and Health Impact Assessment

TOR FOR THE PREPARATION OF ENVIRONMENTAL, SOCIAL AND HEALTH IMPACT ASSESSMENT

1 Background

The parent ESURP project that is ongoing is meant to rehabilitate the 11kV and Low Voltage distribution lines. The preparation of ESMP and ARAP is currently ongoing and expected to be completed by September 30, 2018.

The AF has been requested by the Government of Sierra Leone (GoSL) to finance consulting services, works, goods and operating costs to: (1) scale up the electrification component of USURP by connecting new users (including commercial and industrial consumers) in the Freetown urban areas. This additional assistance will also help the Government to deal with the impacts and aftermath of the Ebola virus disease (EVD) also enhance support to strengthen sector institutional capacity under ESURP by supporting the EDSA to improve its operational and financial performance and its long- term sustainability. The ESURP AF project is meant to enhance the impact of the project development objective of component 1 and 2 of the parent projects being implemented by EDSA as follows:

a. ***Component 1: Distribution utility capacity enhancement and performance improvement***: this component supports the acquisition of modern Management Information System to assist EDSA to improve its operational performance in the key areas of commercial management and attention and resolution of incidents in electricity supply to its customers
b. ***Sub-Component 2-A: Primary medium voltage distribution network reinforcement and extension:*** This sub-component finances the upgrade of four existing 11kV secondary SSs to 33/11kV primary SS and construction of one new 33/11kV SS as well as associated 33kV overhead lines and underground cables to link the SSs.
c. ***Sub-Component 2-B: Secondary and low voltage distribution network reinforcement and extension***. This sub-component includes investments on rehabilitation and expansion of the 11kV and Low Voltage distribution network to major unserved commercial and industrial centers in Freetown.
d. ***Sub-Component 2-C: Project Implementation Support***. This sub-component will cover the cost of strengthening the capacity of the project implementing team in EDSA to manage and monitor the project implementation as well as finance the necessary safeguards studies.
e. **Sub-Component 2-D: Compensation of Project Affected Populations**. This component will cover the cost associated with compensation payments to persons that would be affected by the investment activities under sub components 2.A and 2.B of the project. This fund would be provided by the GoSL and disbursed by the MoE.

The detailed activities to be undertaken under component 2 are:

Sub Component 2A – Sub-transmission Network

a. The construction of new 33/11kV Primary SSs at Aberdeen, Cline Town and Jui to replace the existing 11/0.4kV transformer SS;
b. Upgrade the existing 11kV Switching SS at Falcon Bridge to 33/11kV Primary SS;
c. Construction of a new 33/11kV SS at Waterloo on a land to be acquired by MoE under the India Exim Bank Facility project
d. Construction of the following new 33kV lines to link the above SSs:
    - Kingtom – Aberdeen: 6.8km, Single Circuit line on Steel Tubular Poles
    - Kingtom – Falcon Bridge: 2.5km, Single Circuit line on Steel Tubular Poles
    - Falcon Bridge – Cline Town: 3.0km, Single Circuit line on Steel Tubular Poles
    - Cline Town – Blackhall Road: 1.1km, Single Circuit line on Steel Tubular Poles
    - Jui – Regent: 12.3km, Single Circuit line on Steel Tubular Poles
    - Wellington – Jui: 13.2km, Double Circuit line on Lattice Towers
    - Jui - Waterloo: 6.6km, Double Circuit line on Lattice Towers
e. Upgrade (reconducting) of the Existing Kingtom – Wilberforce & Kingtom – Blackhall Road 33kV sub transmission lines

SSs: The site for all the SSs are on land either owned by LEC (Falcon Bridge) or on Government lands.

Steel Tubular Poles: Steel Tubular Poles (with footprint of about 800mm) would be used for the 33kv sub transmission lines within urban areas with narrow road ROW where it is difficult to erect steel lattice towers. Insulated conductors would be used in crowded areas where it is difficult to meet line safety clearances. Alternatively, underground cables would be used in such areas.

Sub Component 2B – Distribution Network

f. Rehabilitation and extension of 11kV and Low Voltage distribution lines to new customers: this would be a scale up of the ongoing rehabilitation works

All the SS sites have been identified. The 33kv lines routes have been identified and Georeferenced line route drawings had been prepared. Currently, an ESMP and ARAP for the rehabilitation of distribution network in parts of Freetown is currently under preparation. The ESMF and RPF for the parent project is being updated for the AF. It is now the intention of EDSA to hire the services of an individual consultant to assist it prepare a comprehensive plan to ensure strict observance of or adherence to environmental and social safeguards in accordance with relevant Sierra Leonean laws as well as World Bank safeguard policies and applicable environmental, health and safety guidelines.

2 Scope of Work

As part of this assignment, the consultant will:

a. conduct initial assessment/screening to identify and characterize project impacts;
b. initiate consultations with PAPs and other relevant stakeholders based on results of the initial assessment/screening;
c. prepare environmental, social and health impact assessment;
d. Assist EDSA to complete the relevant forms as per the requirements of SL EPA for the purpose of registration and permitting of the project
e. propose mitigation measures for the negative impacts and
f. propose an Environmental and Social Management Plan (ESMP) which is materially consistent with the SL EPA laws and regulations and the World Bank's operational policies. The ESMP should be adaptable and would be incorporated into the bidding documents for the works contract to guide bidders to prepare the preliminary contractor's ESMP with clear responsibilities for the implementation of identified aspects.

Key Tasks

At the minimum, the ESHIA shall include detail identification and description of the following:

1. *Project Background:* An overview and general description of the project components and affected areas. The section will also explain the rationale for the ESHIA.

2. *Objectives of the ESHIA:* The main objectives of the environmental, social and health impact assessment, is to identify the nature and scale of impacts anticipated through the project.

3. *Description of project environment and Potential Impacts:* Identification of the: (i) components or activities that may extend environmental, social and Health impacts; (ii) Description of Existing Environmental and Social Conditions; The Consultant will review, evaluate and present baseline data on the relevant environmental, social, economic and physical cultural heritage characteristics within the project area taking into account the present land use and activities. Specifically, the baseline conditions should include information on:

    a. Physical environment: geology, topography, sediments/soils, surface and ground water hydrology, land pollution, water quality, air quality and sources of air emissions, noise emissions, integration of the river in an overall urban environment (e.g., the sewage network and wastewater treatment plant, climate change aspects);

    b. Meteorology: wind patterns, monthly average temperatures, rainfall and runoff characteristics; extreme storm and precipitation events;

    c. Biological environment: existing terrestrial and river flora and fauna at the site; rare and endangered species; sensitive habitats, including wetlands, parks or reserves in areas likely to be affected by works; species of commercial importance;

d. Social, economic impacts: community structure; inventory of community activities and production systems (e.g., fishing, industry, farming, small businesses); level of income, any public infrastructure and social services (goods and services); and a description of any direct, indirect and induced impacts on livelihoods;)

e. Information on disadvantaged groups or persons for whom special provisions may have to be made, if affected, and in the context of developing mitigation measures;

f. Assess whether there will be any displacements as a result of the physical works;

g. Physical cultural property: Cultural heritage assets such as cultural, religious, historical or archaeological sites, including sacred sites, graveyards and burial places, that might be affected during construction.

h. Other data as may be required by the existing environmental protection laws, regulations and standards by SL EPA

4. *Legal Framework:* Describe the policy, legal and institutional framework in Sierra Leone governing environmental and social impact issues. This section will include regulatory framework, national and international guidelines including World Bank guidelines (including the sector specific health and safety guidelines relevant to the project), international conventions and regulations relating to the assessment

5. *Description of project alternatives*: Describe possible alternative scenarios relating each to the need of the project.

6. *Potential impacts and Benefits enhancement and mitigation measures*: This should describe the beneficial/positive impacts, adverse impacts and mitigation measures, impacts on communities/PAPs and cumulative impact assessment.

7. *Environmental management and monitoring program:* The environmental and social management plan should describe the range of environmental issues associated with the project and outline corresponding management strategies to be adopted to mitigate potential adverse environmental effects. Describe environmental management, monitoring and monitoring framework.

8. *Public consultations and disclosure plan:* Consistent with the World Bank's policy on consultation and disclosure, describe a strategy for consultation with, and participation of PAPs, communities and project interests including the proposed project and its potential

impacts identification and summary of consultations. This section should also describe the methods used throughout consultations and disclosure and major findings of consultations.

9. *Environmental mitigation, management, monitoring and training costs:*
   The Consultant shall identify significant positive and negative impacts, direct, indirect and cumulative impacts, and immediate and long-term impacts related to the construction phase of the proposed works as well as once the works are finalized (operational phase). For this task, the Consultant will review the environmental and social aspects presented in the background technical documents and will generate the overall updated environmental and social impacts, specifically related to all infrastructure investments in line with the proposed detailed design.

   a. Impacts during construction phase may focus on: impacts caused by dredging; disturbance of river ecosystem; impacts of possible river banks activities; contamination of surface and groundwater by use of fuels, construction materials, and transport activity; soil contamination; waste storage; noise and air emissions; workers health and safety.

   b. Impacts during the operation phase may include analysis on: impact of discharges; impact of accidental oil and chemical spills; impact of traffic activity; impact of air emissions; impact of run-off of open storages; impact of transport of various goods and solid waste management.

   c. Impacts on public and private structures around the project area; including impacts on the running of daily business, jobs, agricultural and fishing activities; impacts on the flow and exchange of goods and services that may cause direct, indirect and induced impacts on the livelihoods of those living around the construction area).

   d. Impacts on physical cultural heritage, religious and burial sites for which mitigation measures need to be developed.

   The Consultant shall propose mitigation measures and affiliated costs for each of the above identified impacts that will represent the content/summary of an Environmental and Social Mitigation Plan for the overall project during its construction as well as the operation phases. The Mitigation Plan is part of the overall project Environmental and Social Management Plan. Costs for implementing the environmental mitigation, management and training costs should be described in detail in this section.

10. *ESHIA implementation responsibilities:* indicate the responsibilities assigned to various agencies. These responsibilities should cover (i) role of the contractor and delivery of contractors ESHIA; (ii) appropriate coordination between agencies and jurisdictions involved in ESHIA implementation; and (iii) capacity building measures that are necessary

to strengthen the capacities of project officials to manage overall safeguards issues related to the project.

11. *Implementation Schedule:* an implementation schedule covering all ESHIA activities from preparation, implementation, and monitoring and evaluation. These should indicate the target dates for delivery of activities. The schedule should indicate how the ESHIA relates to the implementation of the overall works.

12. *Costs and budget:* provide detailed (itemized) cost estimates for all ESHIA activities. The budget should include the implementation of the proposed ESMP. This section will also include sources of funds, arrangements for timely flow of funds, and fiduciary considerations that are consistent with the Sierra Leone's financial management and World Bank fiduciary requirements.

3 Reporting and Deliverable

The consultant shall report to the Project Manager for ESURP/ PIU but would on day to day, work with staff of EDSA's ESMU who are led by a ESMS as well as with an experience Supervision Engineer and a team of Planning Engineers of EDSA who would provide technical guidance on Transmission and Distribution Network.

The Consultant is expected to submit to the Project the following:

- Inception report describing the procedures and timetable for completion of the ESHIA preparation process (1 week after contract signing);
- Report summarizing the preliminary results of the screening and consultation process with PAPs and other stakeholders (3 weeks after contract signing); and
- Draft ESHIA report (2 weeks after review of screening and consultation report).

After completion of the review of the draft ESHIA, including consultations with PAPs and communities on the main finding of the ESHIA, a final ESHIA will be disclosed by the project. During the review process, the Consultant is expected to make the necessary changes to the ESHIA and organize the disclosure and consultation process.

4 Period of Assignment

It is expected that a professional time input of 6 weeks over a contract period of 10 weeks shall be required for the assignment.

5 Consultant's Qualification and Experience

- A Senior Environmental Scientist, Engineering or an equivalent qualification with at least 8 years of relevant experience, with emphasis on environmental and social impacts assessments in urban setting.

- Must have been a Team leader or played a major role in at least three assignments for the preparation of ESIA for Transmission lines, SSs and Distribution Networks.
- Must have proven experience with World Bank Safeguards Policies and requirements with demonstrated experience in preparing acceptable ESIAs in accordance with the World Bank safeguards policies.
- Demonstrable experience in preparing ESIA studies in the energy sector in the West African sub region is an added advantage.

6 Inputs to be provided by the Client

The client shall make available to the Consultant the following facilities and relevant documentation:

- SL EPA environmental laws and guidelines
- Office accommodation and local transportation when in Sierra Leone
- the RPF and ESMF for the parent ESURP project as well as the updated RPF and ESMF for the AF
- Georeferenced 33kV lines route map
- Report of survey of 33kV transmission line routes and boundary/topographic survey of six associated SS sites in the Freetown-Waterloo area
- A team of Environmental and Social safeguard specialist and Engineers
- Arrangement of Stakeholder meetings/ Consultations
- Submission of the report and relevant documents to SL EPA for approval and issuance of the necessary permit
- Any other facility needed for the timely implementation of assignment

Annex 1- Basic impact assessment Guide

- Identify potential impacts (positive/negative, direct/indirect, "cumulative" or "associated") on physical, biological, socio-economic, trans-boundary and global resources
- Distinguish impacts that can be mitigated from those that cannot ("residual impacts")
- Compare residual impacts (e.g., emissions levels) to World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) in the *Pollution Prevention and Abatement Handbook*
- Justify any deviation from EHS Guidelines
- Conduct Strategic (sectoral, regional) EA where appropriate
- Consider extent and quality of available data, key data gaps, uncertainties and issues requiring further study

Annex 2 Analysis of alternatives

- Systematically compare feasible alternatives to the project including
- "No project option" (pre-project and post-project impact assessment)
- Sites (alternatives to minimize impact?)

- Alternatives in project design
- Environmental impacts of various options
- Technology
- Relative feasibility of mitigation measures (capital and recurrent costs)
- Comparative institutional, training and monitoring requirements

Annex 3 SL EPA Screening Form

Initial Assessment / Screening Form

ENVIRONMENTAL PROTECTION AGENCY, SIERRA LEONE

(Completed in Duplicate)

Sub-Project Name: _____

Region: _____District:_____ Town_____

Address for correspondence _____

_____

Contact Person _____ Position _____

Phone No._____ Fax No. _____

E-mail Contact_____

Telephone:

Fax:

E-mail:

1.0 Description of Sub-project

1.1 Nature of Sub-project and Duration

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1.2 Scope of Sub-project [Size of labour force, area covered, type of raw materials (quantities and sources), types of equipment, implements, machinery, etc..]

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1.3 Location [attach a site plan or a map (if available)]

i. Location or Area (and nearest Town(s)): …..……..……

ii. Land take (total area for sub-project and related activities): ……

1.4 Site Description and Sensitivity [Attach photographs and sketches showing distances]

i. Distance from nearest water body or drainage channel (minimum distance measured from the edge of proposed site to the bank of the water body or drain).

More than 100 meters □ 100 meters □ Less than 100 meters □

ii. Number of water bodies and/or drainage channels/depressions close to site

……..

iii. Distance to nearest community (house) and/or other existing structures from the proposed site:

……
…

iv. Number of affected properties within the designated project area:

……..……
……

1.5 Land Cover and Topography

i. Land cover of the site consists (completely or partly or noticeably) of:

Vegetation	□	Sparse Vegetation	□	Physical Structure(s)	□
Flood Plane	□	Agriculture (Animals)	□	Cultural Resource	□
Water	□	Agriculture (Crops)	□	Other specify……	

ii. Elevation and topography of the area for the Sub-project:

Flat	□	Valley	□	Slope	□	Undulating	□
Hill	□	Mountain	□	Depression	□		

iii. Elevation and topography of the adjoining areas (within 500 meters radius of the site):

Flat	□	Valley	□	Slope	□	Undulating	□
Hill	□	Mountain	□	Depression	□		

2.0 Infrastructure

i. The Sub-project would be developed in/on:

Undeveloped site □ Partly developed site □ Well developed Other (specify) ……

ii. The Sub-project would involve excavation Yes □ No □

iii. Estimated number and depth of the excavations, etc.): ……

vi. Are any of the following located on-site or within 50 metres from the edge of the proposed site?

Water supply source	Yes □	No □
Pipeline	Yes □	No □
Power supply source (electric pylon)	Yes □	No □
Drainage	Yes □	No □

Other(s) specify: …….

3.0 Environmental and Social Impacts

3.1 Land Use

i.	Complete change of existing land use	Yes	No
ii.	High population of land owners to be resettled	Yes	No

3.2 Air Quality – Is the proposed sub-project:

i. Expected to emit any of the following during construction and operation?

Dust □ Smoke □ VOCs □

ii	Expose workers or the public to substantial emissions?	Yes □	No □
iii.	Result in cumulatively increased emissions in the area?	Yes □	No □
vi.	Create objectionable odour affecting people?	Yes □	No □

3.3 Flora and Fauna - Would the proposed Sub-project:

i.	Have adverse effect on any reserved area?	Yes □	No □
ii.	Have adverse effect on wetland areas through removal, filling, hydrological interruption or other means?	Yes □	No □
iii.	Interfere substantially with the movement of any wildlife species or organisms?	Yes □	No □
vi.	Be located within 100m from an Environmentally Sensitive Area?	Yes □	No □

3.4 Cultural Resources - Would the proposed sub-project:

i.	Disturb any burial grounds or cemeteries?	Yes □	No □
ii.	Cause substantial adverse effect on any archeological or historic site?	Yes □	No □
iii.	Alter the existing visual character of the area and surroundings, including trees and rock outcrops?	Yes □	No □

3.5 Water Quality and Hydrology - Would the proposed sub-project:

i. Generate and discharge during construction:

Liquid waste	□	Liquid with oily substance	□
Liquid with human or animal waste	□	Liquid with chemical substance	□
Liquid with pH outside 6-9 range	□	Liquid with odour/smell	□

ii. Lead to changes in the drainage pattern of the area, resulting in erosion or siltation? Yes □ No □

iii. Lead to increase in surface run-off, which could result in flooding on or off-site? Yes □ No □

iv. Increase runoff, which could exceed the capacity of existing storm water drainage? Yes □ No □

v. Lead to multiple water users, which could affect water quality and quantity? Yes No

3.6 Noise Nuisance - Would the proposed Undertaking:

i. Generate noise in excess of established permissible noise level? Yes □ No □

ii. Expose persons to excessive vibration and noise? Yes □ No □

3.7 Waste Generation

i. Types: Solid □ Liquid □ Gaseous □ Other ……..

ii. Quantity: ……..

iii. Means/Place of Disposal: …….

3.8 Occupational Health and Safety – Would the proposed sub-project:

i. Expose workers to emissions? Yes No

ii. Involve using machinery that generate excessive noise (above 70dB) and vibration? Yes No

iii.	Expose workers to working at height?	Yes	No
iv.	Expose workers to heavy lifting?	Yes	No

3.9 Socio-economic. – Would the proposed sub-project:

i.	Lead to loss of livelihoods	Yes	No
ii.	Influx of people from other communities?	Yes	No

3.10 Other Environmental and Social Impacts

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……..……
……..……
…..……

4.0 Management of (Environmental and Social) Impacts

4.1 Air Quality

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4.2 Flora and Fauna

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4.3 Cultural Resources

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4.4 Coastal and Water Resources

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4.5 Noise

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4.6 Occupational Health and Safety

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4.7 Waste Generation

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4.8 Socio-economic

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4.9 Other Measures

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DECLARATION

I, …… hereby declare that the information provided on this form is true to the best of my knowledge and shall provide any additional information that shall come to my notice in the course of processing this application.

…….. …….

Signature Date

Official use

Recommendations:

- ☐ Requires and EIA and/ or RAP
- ☐ Requires a PEA
- ☐ Does not require further environmental study

Appendix 2: Public Consultation at Kroo Bay Community Public Consultation at Kroo Bay Community

MOHAPEWA CO. Ltd

Public Consultation for Energy Sector Utility Reform Project (ESURP) Freetown Distribution System Rehabilitation for the Preparation of an Environmental, Social and Health Impact Assessment (ESHIA) and Update of Resettlement Framework

Date: 24th/Nov 2018. At: Kroo Bay Community ..... Western Urban District

No	Name	Designation	Phone Number	Signature
1	Murray A-Gorter	Consultant Safard 431	076777577	
2	Chief Mary Kamara	Community chief	078069885	
3	Chief Pa Almamy Kanbo Isabempa	Kroobay Chief	077898094	
4	Mohamed T. Kamara	CWC Chairman Kroobay	09971885-3	
5	Alice Alusine Kanbo	Kroobay youth	077307557	

MOHAPEWA CO. Ltd

6	Aminata Sallah	Kroobay	077474500	
7	Saidu J. Caren	Kroobay	030234917	
8	Fusseini Nabieu	Consultant	078072740	
9	JAMES MOMOH	✓	076 641545	
10	Ibrahim Jr Sesay	Consultant	078 715419	

Appendix 3: Public Consultation at Rokel Community

MOHAPEWA CO. Ltd

Public Consultation for Energy Sector Utility Reform Project (ESURP) Freetown Distribution System Rehabilitation for the Preparation of an Environmental, Social and Health Impact Assessment (ESHIA) and Update of Resettlement Framework

Date: 24/11/2018. At: Rokel Community Western Rural District

No	Name	Designation	Phone Number	Signature
1.	Jusfa Moiwa	Consultant	078092740	
2.	JAMES MOANAH	—	076 641545	
3	Sandy Kennah	"		
4	Juliana Williams	Village Headwoman	077 730510 078 020007	
5	John Pemagbi	Sec. to head woman	088 616946	J.P

MOHAPEWA CO. Ltd

6	Bobodeen Sesay	Advicer to Police Partnership Board	077868492	
7	Ya Marie Turay	resident	—	RTP

Appendix 4: Proceedings of few of the Consultations held

1. Meetings held on 1st November

Meeting with Superintendent Idrissa Conteh - Aberdeen Police Station.

Meeting started at 9:40 am

Present in the meeting were:

- ✓ The Superintendent;
- ✓ Mr. Ibrahim J. Samai;
- ✓ Mr. James Moanah;
- ✓ Jusufu Moiwa;
- ✓ Sandy Kanneh.

Mr. James Moanah started with a briefing on the project and purpose of the team's visit to the superintendent. Mr. Moanah intimated him that the team is undertaking an ESHIA study for ESURP at the MoE and further explained what the study entails. He also said that the project is going to upgrade the current Aberdeen SS which situates close to the Police Station.

Mr. Jusufu Moiwa the socio-economic expert boxed in after Mr. Moanah. Mr. Jusufu Moiwa banking on Mr. Moanah's presentation said that as experts they will not just go into the community to conduct this ESHIA study without first consulting with the stakeholders in that community. He asked the following questions which responses were provided by Superintendent Conteh.

Mr. Moiwa: Did you know about the project before now?

Superintendent Conteh: No

Mr. Moiwa: How long have you been working in this Police division?

Superintendent Conteh: About a year

Mr. Moiwa: How do you feel about the project

Superintendent Conteh: I think the project is a good initiative to foster development. Energy is key to development.

Mr. Moiwa: Are you okay with the project?

Superintendent Conteh: : Yes

Mr. Moiwa: Do you think there is any security challenge to the existing power station?

Superintendent Conteh: None whatsoever

Mr. Moiwa: Do you think the power station might have a negative impact on the community?

Superintendent Conteh: It has not shown any sign of negative impact since I started working here and I have not been privy to any report that it has in the past so I am really not sure it has any negative impact.

Mr. Moiwa: The project is coming to improve on the transmission line. What are some the recommendations you would like to make for improvement and for more safety of the work?

Superintendent Conteh: At the moment I can't really figure out anything because I don't know much about the project since its inception and also the meeting is impromptu. I need some time to do some research on the matter.

The meeting ended at 9:55.

2. Thereafter, the team headed to the Section Chief of the Aberdeen community Chief Fasali Marah who also doubles as the adviser of the Police Local Partnership Board in Aberdeen. He was available at his residence and discussions went on.

After the introduction of the team, Mr. Moiwa told the chief the purpose of their visit and Mr. Moanah talked on the background of the project.

Chief Fasali Marah was esteemed as he thanked the team and expressed gratitude. He said that he is happy for the project initiative adding that light has been a major problem in the Aberdeen community. He also expressed that even though electricity supply is a bit better than it was in the past, but the project is a very big ambition which aligns with their vision of development in the Aberdeen community. He also added that Aberdeen is a very responsible community with big offices, big businesses and important people who reside in the area. He assured the team that he will let other stakeholders know about the project and get them available for any consultative meeting which is to be held in the future. He assured the team of his total commitment and support towards the project.

3. **Rokel Community Consultation**

Upon observing the necessary protocols y the ESHIA team the secretary to the village head woman welcomed the team and expressed appreciation for the project. Addressing the team, the village headwoman, Madam Juliana Williams also expressed her appreciation for the project. She mentioned that she hopes the project materializes as her greatest fear with respect to electricity has been oversloads of the existing transformer which usually leads to low voltage power supply in her community. Madam Williams also expressed concern over recruiting of labour during the construction phase of the project. She beacon that labour should be sourced from the community when construction commences.

4. **Meeting at Kroo Bay, Freetown**

Meeting held on the 25th November 2018

Meeting held at the house of the section chief- PA Alimamy Kargbo Kabempa.

Four persons from the ESHIA team arrived at the residence of the Kroo Bay chief Pa Alimamy Kargbo Kabenpa. They met with seven stakeholders from the Kroo Bay community and the meeting started at 12 pm.

After opening prayers in both Muslim and Christian ways and the introduction of all stakeholders and the representatives from the ESHIA team, Mr. Ibrahim Joe Samai explained the purpose of visit and gave a background to the project. In his opening remarks, Mr. Samai told the gathering that they are working as consultants for ESURP under the MoE on a project which is aimed at improving the supply of electricity in Freetown. He further said that the project will rehabilitate and upgrade existing SSs and transmission line route within designated locations in both Western Urban and WARD C of Freetown. He mentioned some of the locations. Mr. Samai further made clear the purpose of the visit is to assess the impact of the project on the community and the livelihood of the people. He told the gathering that they are there to get feedback from the stakeholders in the community in relation to the project and also intimate them that a socio-economic team will also visit respective households and ask them a few questions regarding the project.

Pa Alimamy Kargbo Kabempa welcomed the team and thanked them a lot for coming to their community with respect to doing the needful which will ensure the smooth running and implementation of the project. He also assured of their commitment to ensuring that the project becomes successful. He, therefore, gave the team go ahead with the consultation.

Mr. Jusufu Moiwa the socio-economic expert took over from Mr. Samai and firstly asked how the people feel about the project.

In response, Mr. Michael T. Kamara the chairperson of the community welfare committee said that energy is key to development in any country. He also further said that there will be no development in any country that does not have energy. He, therefore, said that energy is very important to the Kroo Bay community because small business holders; especially people who sell cold drinks will have their businesses prosper with adequate and improved energy supply. He concluded that they as happy to get such a news on the improving of the energy in the city and to which their community will benefit from.

Madam Marian Conteh a community chief also added that they are happy for the project and branded it as a welcomed news. She also told the team that electricity has been a death factor which has caused many deaths in their community in times of disasters. She further said that they have electric poles which have been hit by vehicles and are hanging and anytime a disaster

like flooding occurs, death toll increases due to the naked and exposed wires. She says this has been the negative effect on the other previous projects. Madam Conteh, therefore, advised that this project should take into cognizance these risks.

Mr. Moiwa asked the stakeholders if they think the project will have a negative impact on their community and if yes what could that be.

Madam Marian Conteh says yes they envisage a negative impact of the project on the community. She made references to other poles in the community which has been bent over time because they were erected poorly. She says this is a major problem which they fear so much and hopes they engineers of this project take into consideration because the issues of bent poles have caused so many catastrophes in their community. She, therefore asked that high tension cables should be placed in rubbers and not just leaving the naked wires, this she said will minimize damage should there be any disaster with the project in the future.

The section chief of the Kroo Bay community also suggested that all the poles should be passed by the wharf instead of passing them above the houses in the community. He also further stated that when high tension cables are mounted over houses and when there is a disaster the damage will be so severe. He ended by saying if the cables are passed by the wharf and in times of disaster, the impact will be minimized.

Mr. Moiwa also asked about what economic impact they envisage after the installation of the project

Responding to this question, the community welfare committee chairman says they envisage lots of positive economic impact in the future after the completion of the project. He said with the increase in the power supply and steady rate of supply, businesses will thrive and economic activities will hit a boom in the community. He made special reference to cooling rooms in the community which solely depends on energy for their businesses to be successful. “This is a major business of residents in this community and it hugely depends on electricity so with the project people in the cooling businesses will realize great potentials in their business” he concluded.

The councilor also added that the installation of the project will see their community attracting investments he says. He furthered their community being located near the sea area makes them advantageous but their growth has been forestalled because of lack of energy. He, therefore, said with the project, there will see the emergence of several opportunities rushing at the community and several businesses will be established and employment opportunities will be created for residents in the community.

At the close of the meeting, Mr. Moiwa finally asked the stakeholders about other benefits they think the implementation of the project will bring to the community,

Alieu Alusine Kargbo a youth representative said they anticipant massive youth employment for youths in the community who are jobless at the moment. He also furthered that the rate of unemployment among youths in the community is high and alarming. Therefore he envisaged that the project will employ more youths, especially as unskilled laborers.

Concluding the meeting, the councilor also made a request that the community stakeholders should be allowed to monitor and supervise the project. This he says will ensure the safety and security of workers and the project in general.

The meeting ended at 12:35 pm.

Consultations continued onto the 10th of November where all communities with the project area were visited and local authorities intimated about the project. They all felt positive about the project with little/few concerns raised.

The team followed up with the individuals contacted during the ESMP preparation in September and them very positive and they affirm maintaining their earlier concerns.

Appendix 5: Summarized List of persons contacted

No	Name	Institution/ Community	Designation	Phone Number
1	Mr. Phillip Farboh	MLHE	Senior Staff at Housing Department	+23276686121
2	Larry Morgan	PAP	Member of the Morgan family at Lumley SS	+23288235399
3	Sallieu Koroma	PAP - Lumley	Trader	+23277481522
4	Osman K. Bangura	EDSA	Operations Manager Freetown 161	+23277406786
5	Monica Lamin	WARD C	Environmental Officer	+23276751181/+23230874119
6	Jesse A. Pearce	Hastings	Deputy Headman	+23230740576/+23279298136
7	Mr. Komba Biaddy	Freetown Teachers College (FTC)	Estate officer	+23276769134
8	Ing. Patrick Massuba	SLRA	Asst. Engineer Operations	+23278503040
9	Mr. Sheku Saccoh	EPA		+23277759858

Appendix 6: Summary of Consultations Held

No.	Date	Stakeholder Group	Key Stakeholders Present	Issues Discussed	Outcome
1	1/11/2018	Aberdeen Police Division	Idrissa Conteh- Police superintendent	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	The project is good and ideal; will read around the project and get prepared for subsequent meetings for vivid contributions.
2	1/11/2018	Aberdeen community	Fasali Marah – Village Chief and local police partnership adviser	Concept of construction of the 33/11kV substation and how to would improve the reliability of power supply in the community.	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; all other local stakeholders to be included in subsequent meetings; Confidence of support from community residents.
3	2/11/2018	Rokel community	Juliana Williams – Village Head John Pemagbi – Secretary to village Head Bobor Deen Sesay – Chairman Police Partnership Board and Adviser to Village Head.	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities for community youths during the rehabilitation.
4	3/11/2018	Kissi Brook (black hall road)	Pa Alimamy Batan Bangura- Section Chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity

					problems in communities; Employment opportunities for community youths during the rehabilitation.
5	3/11/2018	Cline town community	Yama Kapr Gbonkolenken – Section Chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities for community youths during the rehabilitation.
6	3/11/2018	Fourah bay community	Yah Alimamy M Kankinsah – Section Chief Chairman Mohamed Sesay – Youth Chairman	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities for community youths during the rehabilitation. Promise of community support to the project.
	3/11/2018	Colbot Community	Yah Alimamy Thoronka – Section Chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of the problem of low voltage in their communities; Employment opportunities for community youths during the rehabilitation.

7	3/11/2018	Lower Bombay and Fourah Bay wharf (Mo Wharf) Community	Kadiatu Sankoh – Section chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities for community youths during the rehabilitation. Promise of community support to the project.
8	3/11/2018	Susan's Bay Community	Pa Alhaji Alimamy Kamara - section chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Promise of community support to the project.
9		Kroo Bay community	Section Chief - Chief Pa Alimamy Kargbo	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities for community youths during the rehabilitation.
10	3/11/2018	Koleh town	Mr Abdul Koroma Community Chairman	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities; Employment opportunities

					for community youths during the rehabilitation; Promise of community support to the project.
11	3/11/2018	Crab town	Ya Alimamy Turay – Section Chief	Concept of rehabilitation of the 11kV and Low Voltage distribution lines in Selected communities in Freetown	Project is good and appreciated by authorities and residents; Anticipated the resolve of electricity problems in communities.

Appendix 7: Grievance Registration Form

Construction and Rehabilitation Project (CRP) of substations, Transmission and Lines Sample Grievance Registration Form

Grievance Number: _____ Location: District: _____ Village/Section/Area: _____ Name of Registrant: _____ Name of Complainant: _____ Address: _____Telephone #: _____ Date Complaint Received:
Classification of the grievance (Check boxes) ☐ Water Use ☐ Dispute with contractors ☐ Noise ☐ Inter-community dispute ☐ Land acquisition and Compensation ☐ Involuntary resettlement ☐ Technical/operational coordination ☐ Financial ☐ Process delays ☐ Water Quality ☐ Sanitation ☐ Water Use ☐ Other (specify)_____
Brief description of the grievance:
What is the perceived cause?
Suggested action (by complainant) to address grievance:

Appendix 8: Archaeological/Natural Heritage/ Cultural Chance Find Procedures

Chance Find Procedures: Archaeological/Natural/cultural Heritage

Cultural property include monuments, structures, works of art, or sites of significance points of view, and are defined as sites and structures having archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. This may include cemeteries, graveyards and graves. The Monuments and Relics Commission is directly responsible for any object of archaeological significance is Sierra Leone. They are supervised the Ministry of Tourism and Culture.

In the event such cultural/natural heritage are discovered during excavation, the following procedures should be followed:

i. Stop the construction activities in the area of the chance find;
ii. Delineate the discovered site or area;
iii. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible authorities take over;
iv. Notify the MOE/EDSA Project Coordinator/Manager who in turn will notify the responsible local authorities immediately (within 24 hours or less);
v. Responsible local authorities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures;
vi. Decisions on how to handle the finding shall be taken by the responsible authorities;

viii. Construction work could resume only after permission is given from the responsible local authorities and the concerning safeguard of the heritage.

Monitoring for Archaeological Materials

The field supervisor or foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the EDSA safeguard Officer. The EDSA safeguard Officer will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.